CITY OF SEBASTIAN
HOME OF PELICAN ISLAND

Airport Master Plan
Sebastian Municipal Airport

Sebastian, FL
October 2018

- FAA AIP# 3-12-0145-012-2016
- FDOT# 439715-1-94-01
- City of Sebastian Project # A1656

TKDA









EXECUTIVE SUMMARY
Airport Master Plan

At the request of the Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT), partial sponsors of this study, a new Airport Master Plan, Layout Plan and Property Map were created to document changes at the airport since the last Master Plan in 2002 and Airport Layout Plan Update in 2010. The purpose of a Master Plan is to identify 20-year demand, facility needs, alternatives, and provide a capital improvement program and financial analysis for the City of Sebastian to address anticipated demand. A graphical representation of the Master Plan process is shown as follows:



The study began in November 2016, and is anticipated to be completed following regulatory agency review and conditional approval by March 2018.

In conjunction with the Master Plan Update, an Airport Environmental Study was performed in tandem with the Master Plan process. This allowed recommendations identified in the Environmental Study to be incorporated into the Master Plan recommendations especially regarding potential future use of 88 acres previously identified as conservation. It is important to note that Conservation on an Airport is not deemed by the Federal or State as a valid or approved airport land use. Thus, TKDA's environmental specialist worked directly with local, state and federal environmental and wildlife organizations and governmental entities to development a Habitat Conservation Plan (HCP) for the Airport.

As a requirement of receiving Federal and State funding for capital improvement projects, airports and their sponsor must comply with FAA and FDOT grant assurances. Therefore, as part of the initial meeting process, some preliminary airport goals were identified including the Airport's long-term sustainability vision statement:

"To maintain and improve the Airport to serve the needs of the Sebastian community and Treasure Coast Region, promote economic growth in the region, while managing and developing the airport in an economically, socially compatible and environmentally sustainable manner that conserves natural resources, protects the environment, promotes airport safety and economic self-sufficiency and compatibility with the local community." (2018 Sebastian Airport Master Plan)

- Design and construction of Taxiways C, D and E
- Expansion of the general aviation apron southwest of the T-hangar aprons to support installation of Shade Hangars and aircraft parking
- Potential installation of helicopter parking facilities adjacent to the GA terminal building
- Construction of large clearspan hangar, designated Hangar C, on the south side of the airport property
- Zoning and potential approach obstruction issues related to residential development
- Upgrade of SuperAWOS to new dual frequency ASOS
- Potential use of airport property currently designated as conservation
- Expansion of Sky Diving facilities
- Potential development near Corporate Park Drive and adjacent to closed runway
- Develop plan to make the airport economically self-sufficient through on-airport development, negotiated lease agreements, expansion of services,
- Identify and Implement Airport Sustainability Initiatives and Targets, etc. Airport sustainability is defined as "a holistic approach to managing an airport to ensure: Economic Viability, Operational Efficiency, Natural Resource Conservation and Social Responsibility."[1]

This was not an exhaustive list but merely a "jumping off point" for the Master Plan process.

Sebastian Municipal Airport caters to recreational users as well as some light and experimental aircraft manufacturers. Due to the Airport's proximity to conservation and residential land uses as well as the Vero Beach Regional and Melbourne International Airports, the Sponsor and Management agreed that the Airport will cater mainly to aviation recreational activities. This along with forecast demand, drove proposed airport development recommendations. Approved demand forecasts and critical design aircraft are illustrated as follows:

[1] Airport Council International – North America and Federal Aviation Administration Environmental Division

AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
PASSENGER ENPLANEMENTS											
On-Demand Air Taxi	3,598	3,822	4,846	6,439	8,546	11,327	6.20%	6.13%	5.99%	7.94%	5.90%
Total Passenger Enplanements	**3,598**	**3,822**	**4,846**	**6,439**	**8,546**	**11,327**	**6.20%**	**6.13%**	**5.99%**	**5.94%**	**5.90%**
OPERATIONS											
Itinerant Operations:											
Air Carrier	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Commuter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Charter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Taxi	1,779	1,852	2,171	2,614	3,144	3,776	4.13%	17.19%	20.41%	20.26%	20.11%
Total Commercial Operations	**1,779**	**1,852**	**2,171**	**2,614**	**3,144**	**3,776**	4.13%	17.19%	20.41%	20.26%	20.11%
5010 General Aviation Operations	14,144	14,178	14,150	13,758	13,049	11,983	0.24%	-0.20%	-2.77%	-5.15%	-8.17%
Other General Aviation Operations (Light Sport and Experimental)	506	524	645	787	986	1,232	3.60%	23.04%	22.09%	25.25%	24.97%
Military	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Total Itinerant Operations	**16,429**	**16,555**	**16,966**	**17,159**	**17,179**	**16,991**	0.76%	2.48%	1.14%	0.11%	-1.09%
Local Operations:											
Recorded (5010) Civil Operations	23,422	24,042	26,801	30,889	35,604	41,011	2.65%	11.47%	15.25%	15.26%	15.19%
Other General Aviation Operations (LS and Experimental)	4,552	4,716	5,216	5,268	5,176	4,928	3.60%	10.61%	0.99%	-1.74%	-4.79%
Military	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Total Local Operations	**27,974**	**28,758**	**32,017**	**36,157**	**40,780**	**45,939**	2.80%	11.33%	12.93%	12.79%	12.65%
TOTAL OPERATIONS	**44,403**	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**	2.05%	8.10%	8.85%	8.71%	8.58%
Day Operations	44,325	45,239	48,902	53,226	57,859	62,819	2.06%	8.10%	8.84%	8.70%	8.57%
Night Operations (19:00 - 23:00)	78	74	81	90	100	111	-5.62%	9.87%	11.08%	10.94%	10.81%

AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
Instrument Operations (NPI)	688	702	759	826	898	975	2.05%	8.10%	8.85%	8.71%	8.58%
Cargo/Mail (enplaned + deplaned tons)	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
PEAK OPERATIONS FORECAST (April 2017)											
Peak Month	4,089	4,173	4,511	4,910	5,337	5,795	2.05%	8.10%	8.85%	8.70%	8.58%
Average Day Peak Month	136	139	150	164	178	193	2.21%	7.91%	9.33%	8.54%	8.43%
Peak Hour	16	16	18	19	21	23	0.00%	12.50%	5.56%	10.53%	9.52%
OPERATIONAL FLEET MIX											
Single-Engine Piston	33,737	34,308	36,673	39,919	43,408	47,149	1.69%	6.89%	8.85%	8.74%	8.62%
Multi-Engine Piston	2,348	2,372	2,463	2,550	2,636	2,722	1.02%	3.84%	3.53%	3.37%	3.26%
Turboprop	3,234	3,366	3,939	4,733	5,680	6,809	4.09%	17.00%	20.17%	20.02%	19.87%
Jet	0	0	14	16	19	23	0.00%	0.00%	0.00%	0.00%	16.00%
Civil Helicopter (CH)	26	27	33	42	53	67	3.85%	22.22%	27.27%	26.19%	26.42%
Light Sport Aircraft	1,517	2,217	3,182	3,877	4,344	4,769	46.14%	43.53%	21.84%	12.05%	9.79%
Other (Experimental Gliders, UAVs, Ultralights, etc.)	3,541	3,023	2,679	2,178	1,818	1,391	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL OPERATIONAL FLEET MIX	**44,403**	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**	**2.05%**	**8.10%**	**8.85%**	**8.71%**	**8.58%**
BASED AIRCRAFT FLEET MIX FORECAST											
Single-Engine Piston	42	53	56	59	63	63	25.72%	5.99%	5.23%	6.96%	0.00%
Multi-Engine Piston	4	4	3	2	0	0	0.00%	-25.00%	-33.33%	0.00%	0.00%
Turboprop	3	3	3	4	4	4	2.00%	8.24%	10.40%	10.40%	10.40%
Jet	0	0	1	1	1	1	0.00%	0.00%	0.00%	0.00%	0.00%
Civil Helicopter	0	1	1	1	1	2	0.00%	9.20%	11.63%	11.63%	11.63%
Light Sport Aircraft	3	5	8	12	17	24	71.19%	61.89%	49.89%	34.19%	43.51%
Other (Experimental, Gliders, UAVs, Ultralights, etc.)	7	7	7	7	7	7	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL BASED AIRCRAFT	**59**	**73**	**80**	**86**	**93**	**101**	23.73%	9.16%	8.22%	7.98%	8.43%
Sources: Airport historical data, 2017 FAA TAF, 2015-34 FDOT FASP, and TKDA 2017											

Current Airport Design Aircraft	Future Airport Design Aircraft
Beechcraft King Air 200 (~ 12,500 lbs.)	Beechcraft King Air 350i (~15,000 lbs.)
	

From this information, it was determined that the following facilities were needed to support forecast demand:

- Taxiway expansion and parallel taxiway to Runway 5-23
- Shade hangars and box/corporate style hangars
- Aircraft tie-down parking
- Utility expansion and upgrades
- Jet A Fuel Facilities
- Roadway and Taxiway infrastructure improvements
- Runway End Identification Lighting
- Parachute drop zone markings
- Helicopter parking pads
- Runway obstruction removal
- Fence relocation and extension, and
- Airfield signage
- Change identifier from X26 to SEB
- Use 88 acres of Airport Property identified in the HPC and incidental take agreement for aviation related development.

A runway length analysis was performed for both Runways 5-23 and 10-28 to determine if an extension to either runway is required. No extension was required to support future aircraft demand. Further, Runway 10-28 is recommended to support small (12,500 lbs. or less) aircraft only. This allowed for runway safety areas associated with Runway 10-28 to decrease, thus eliminating some previously recommended land acquisition and opening up additional space for revenue generating facilities.

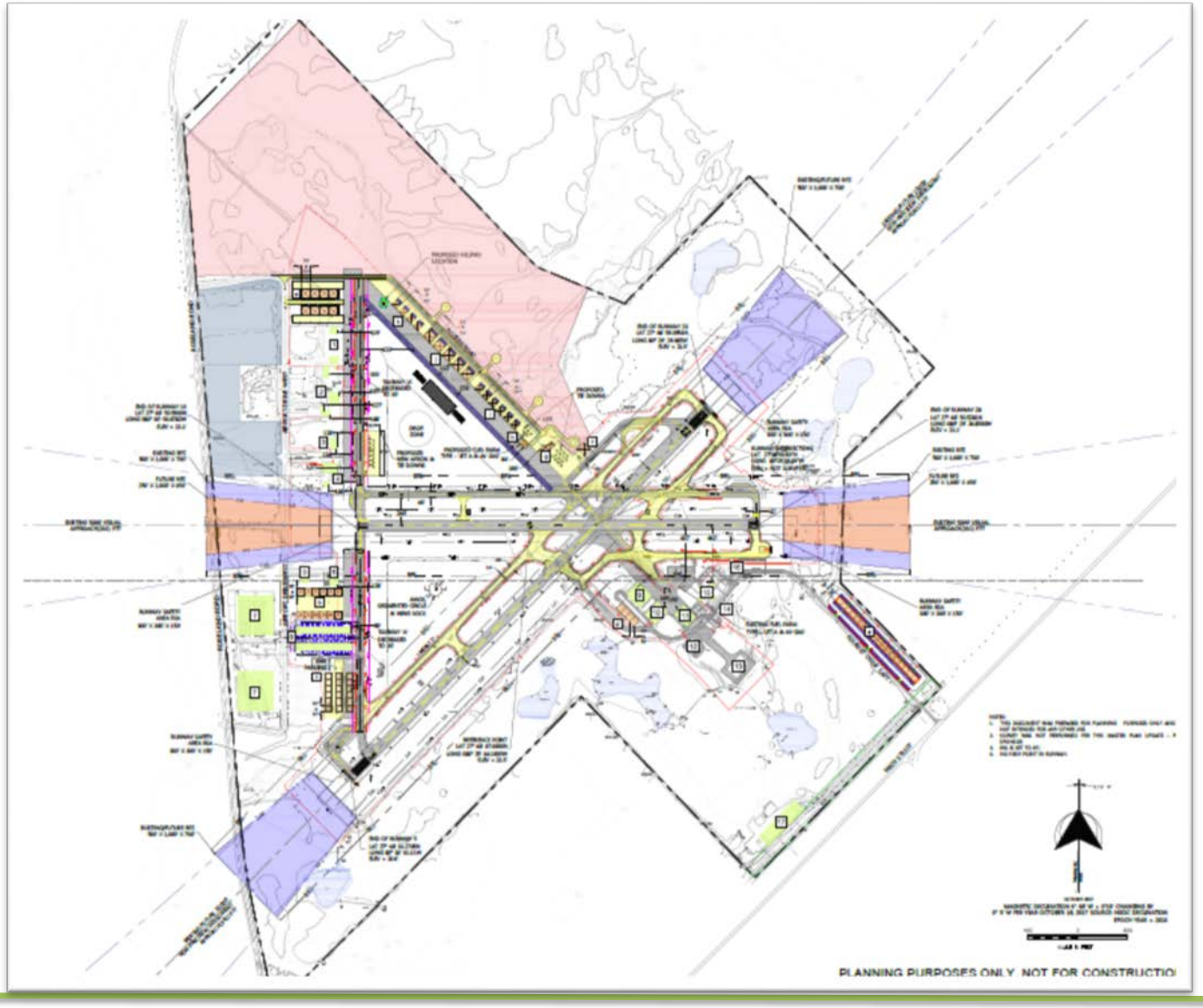
The Planning Team also considered the highest and best use of airport property, and identified aviation and non-aviation revenue generating facilities to support the Airport's long-term operating needs and local capital project participation. Some recommendations included providing flexible building space along Airport East Drive to support potential use by governmental, educational, and private entities. Other recommendations included relocating the City's Public Works complex to airport property, and

possible expansion of Skydive Sebastian support facility development adjacent to Airport Drive West. The following graphic illustrates the 20+-year development plan.

Several capital and maintenance projects at Sebastian Municipal Airport are eligible for FAA AIP entitlement and discretionary funding as well as FDOT funding. It was recommended that the Sponsor/Airport fund site development (i.e. utilities, roadway access, some property clearing, etc.), but have third parties pay for actual hangar and building construction. The cost of the site preparation could be built into the lease agreements. The Airport Capital Improvement Program also considered money from the FDOT Hangar Loan program and economic development programs in addition to their traditional grant participation.

The typical breakdown of Federal, State and Local funding based upon historical data and current funding rates is as follows:

Typical Capital Improvement Funding Participation			
	Federal AIP Share	FDOT Share	Local Share
FAA Eligible Capital Projects	90%	5%	5%
Annual FAA Entitlement Funding (may be saved up to 5 years)	$150,000 annually		
Non-Federally Eligible Projects or Low Valued Federally Funded Projects	Entitlement Funds ($150,000 Annually)	Up to 80% of Project Cost	20%
Economic Development	Not Applicable	Department provides up to 50% of total project costs	50%
Security	Not Applicable	Could be as high as 100% of project costs, but assumed for this study no more than 80%	20%
Sustainability Projects	Potential 90% funding depending upon project	Department provides up to 80% of non-federal share	Remaining Portion (5 or 20%)


PLANNING PURPOSES ONLY. NOT FOR CONSTRUCTIO

In addition to FAA AIP, FDOT Grants, and private third party investment, there are a myriad of other federal and state funding opportunities. The following list provides a sample of some alternative funding sources include monies from the Federal Highway Commission, U.S. Department of Agriculture, the Environmental Protection Agency, US Department of Commerce, Florida Economic Development Transportation Fund Agency, Governor's Office of Tourism, Trade and Economic Development (OTTED), Florida Department of State, Florida Department of Community Affairs; The Secure Airports for Florida's Economy Council ("SAFE Council"); Florida Strategic Intermodal System (SIS) and Florida Jobs Bill (Senate Bill 1752). In addition local funding may be obtained through bond investments or loans or the project may be postponed if money is not-readily available. The Master Plan attempted to identify likely future airport revenues and expenses in an effort to determine if outside City funding is needed to support airport maintenance and development.

Since Airports compete for Federal Discretionary funding even if a project may be eligible for federal funding, it may not receive funding if another Florida airport has a more pressing safety, capacity or maintenance priority. Thus, to provide the Sponsor and Airport a realistic estimate of likely funding, proposed 20-year Capital Improvement Plan (CIP) was conservative in its estimate of likely FAA and FDOT funding. The proposed CIP also includes projects to improve the Airport's overall revenue stream thus allowing the airport to obtain self-sufficiency as required by FAA and FDOT grant assurances. **The ultimate intent of the master plan is try to eliminate the need for the Airport to obtain funds from the City's general fund to support airport capital improvements.**

The CIP in conjunction with the Airport Layout Plan provides the City and Regulatory Agencies a long-range plan for future development. Although specific years and timeframes are provided based upon forecast demand, actual initiation of identified projects is based upon **airport/community needs, available grant funding and City budget allowances and constraints.** For this reason, the Airport annually updates its short-term (5 year) needs in the FDOT's electronic Joint Airport Capital Improvement Plan (JACIP) system.

The tentative 20-year Airport Capital Improvement Program (CIP) for Sebastian Municipal Airport based upon current funding rates, design, materials, and local funding rates is outlined in the Table below. The proposed CIP includes both required and recommended projects. Still proposed development is justified only when the previous factors (need, grant funding, and local match) are met. **Projects are shown in the Airport CIP and Airport Layout Plan specifically so that they may be considered eligible for federal and state funding.** If a project is not identified in the CIP and on the Airport Layout Plan, neither the FAA nor the FDOT can fund the project. Also, like the CIP, the Sponsor has the option to make changes to the Airport Layout Plan at any time if an immediate and unexpected facility need arises. Both the CIP and ALP are designed to provide the Sponsor maximum flexibility regarding future development.

Sebastian Municipal Airport
Master Plan Update

Sebastian Municipal Airport Recommended 20-year Capital Improvement Program.														
			Order of Magnitude Costs		FAA Funding									
FDOT	FAA	Projects	2017	FAA %	AIP	Discretionary	Total	FDOT %	FDOT Funding	Local %	Local Match	3rd Party %	3rd Party	Other Sources
2018	2017	12 Shade Hangars and Minor Pavement Rehabilitation	$625,000	0%	$0	$0	$0	80%	$500,000	20%	$125,000	0%	$0	$0
		Taxiway C, D and E Design	$879,654	90%	$0	$791,689	$791,689	5%	$43,983	5%	$43,983	0%	$0	$0
		Master Plan Update and Environmental Studies	$291,000	90%	$150,000	$111,900	$261,900	5%	$14,550	5%	$14,550	0%	$0	$0
		AWOS Upgrade	$106,000	0%	$0	$0	$0	80%	$84,800	20%	$21,200	0%	$0	$0
		Total 2017	$1,901,654		$150,000	$903,589	$1,053,589		$643,333		$204,733		$0	$0
2019	2018	Taxiway C, D and E Construction	$2,000,000	90%	$150,000.00	$1,650,000.00	$1,800,000.00	5%	$100,000	5%	$100,000	0%	$0	$0
		Republish Runway 10/28 as Utility Runway Only (12,500 lbs. or less)	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0	$0
		Decrease Runway 10-28 primary surface to 250 feet	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0	$0
		Request modification to standards for Airport Drive West and portion of Roseland Road located in Runway 10 RPZ	$400	0%	$0.00	$0.00	$0.00	0%	$0	100%	$400	0%	$0	$0
		Decrease Runway Protection Zones from 500 x 1000 x 700 to 250 x 1000 x 450 feet on both Runway 10 and 28.	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0	$0
		Change airport designator	$400	0%	$0.00	$0.00	$0.00	0%	$0	100%	$400	0%	$0	$0
		Economic Development Refurbishment (on-site restaurant)	$100,000	0%	$0.00	$0.00	$0.00	50%	$50,000	50%	$50,000	0%	$0	$0
		Total 2018	$2,100,800		$150,000	$1,650,000	$1,800,000		$150,000		$150,800		$0	$0

Sebastian Municipal Airport
Recommended 20-year Capital Improvement Program.

FDOT	FAA	Projects	Order of Magnitude Costs 2017	FAA %	FAA Funding AIP	FAA Funding Discretionary	FAA Funding Total	FDOT %	FDOT Funding	Local %	Local Match	3rd Party %	3rd Party	Other Sources
2020	2019	Taxiway C, D, and E Construction	$1,518,616	90%	$150,000	$1,216,754	$1,366,754	5%	$75,931	5%	$75,931	0%	$0	$0
		Add Skydive Landing Area Markings/Identification	$10,000	0%	$0	$0	$0	80%	$8,000	20%	$2,000	0%	$0	$0
		Add lighted wind cone near infield and northwest ramp to support skydiving activity.	$600	0%	$0	$0	$0	80%	$480	20%	$120	0%	$0	$0
		Construct Hangars/T-Hangars	$1,000,000	0%	$0	$0	$0	80%	$800,000	20%	$200,000	0%	$0	$0
		Total 2019	$2,529,216		$150,000	$1,216,754	$1,366,754		$884,411		$278,051		$0	$0
2020	2019	Taxiway C, D, and E Construction	$1,518,616	90%	$150,000	$1,216,754	$1,366,754	5%	$75,931	5%	$75,931	0%	$0	$0
		Add Skydive Landing Area Markings/Identification	$10,000	0%	$0	$0	$0	80%	$8,000	20%	$2,000	0%	$0	$0
		Add lighted wind cone near infield and northwest ramp to support skydiving activity.	$600	0%	$0	$0	$0	80%	$480	20%	$120	0%	$0	$0
		Construct Hangars/T-Hangars	$1,000,000	0%	$0	$0	$0	80%	$800,000	20%	$200,000	0%	$0	$0
		Total 2019	$2,529,216		$150,000	$1,216,754	$1,366,754		$884,411		$278,051		$0	$0
2021	2020	Airport Drive East - Design and Site Work Non-Aviation Development	$2,000,000	0%	$0	$0	$0	50%	$1,000,000	50%	$1,000,000	0%	$0	$0
		Narrow Taxiway A to 35 feet to allow for adjacent movement area and development (pavement remarking and overlay)	$4,896,000	90%	$150,000	$4,256,400	$4,406,400	5%	$244,800	5%	$244,800	0%	$0	$0
		Construct Hangars/T-Hangars	$1,250,000	0%	$0	$0	$0	80%	$1,000,000	20%	$250,000	0%	$0	$0

Sebastian Municipal Airport Recommended 20-year Capital Improvement Program.														
			Order of Magnitude Costs		FAA Funding									
FDOT	FAA	Projects	2017	FAA %	AIP	Discretionary	Total	FDOT %	FDOT Funding	Local %	Local Match	3rd Party %	3rd Party	Other Sources
		South Quadrant - expand Electrical Vault	$50,000	0	$0	$0	$0	80%	$40,000	20%	$10,000	0%	$0	$0
		Total 2020	$8,196,000		$150,000	$4,256,400	$4,406,400		$2,284,800		$1,504,800		$0	$0
2022	2021	Construction - Airport West Access Road	$2,000,000	0%	$0	$0	$0	80%	$1,600,000	20%	$400,000	0%	$0	$0
		Remove obstructions to approach to Runway 23	$10,000	90%	$9,000	$0	$9,000	5%	$500	5%	$500	0%	$0	$0
		Landscaping related to obstruction removal	$200,000	0%	$0	$0	$0	0	$0	100%	$200,000	0%	$0	$0
		Airport drive east - building (18 spaces) - $5 million (50/50)	$3,000,000	0%	$0	$0	$0	50%	$1,500,000	50%	$1,500,000	0%	$0	$0
		Total 2021	$5,210,000		$9,000	$0	$9,000		$3,100,500		$2,100,500		$0	$0
													$0	$0
2023	2022	Pavement rehabilitation of Runway 5-23 (includes remarking) - full depth	$3,000,000	90%	$291,000	$2,409,000	$2,700,000	5%	$150,000	5%	$150,000	0%	$0	$0
		Add Runway End Identifier Lights (REILs) to Runway 5-23 thresholds	$2,200	90%	$0	$1,980	$1,980	5%	$110	5%	$110	0%	$0	$0
		Design and Permitting GA Apron and Shade Hangar Expansion	$220,000	0%	$0	$0	$0	80%	$176,000	20%	$44,000	0%	$0	$0
		Total 2022	$3,222,200		$291,000	$2,410,980	$2,701,980		$326,110		$194,110		$0	$0
													$0	$0
2024	2023	Construct Additional Shade Hangars (6) and Expand Apron	$1,310,000	0%	$0	$0	$0	80%	$1,048,000	20%	$262,000	0%	$0	$0
		Design and Construct Helipad Parking Area South Terminal Quadrant	$60,000	0%	$0	$0	$0	80%	$48,000	20%	$12,000	0%	$0	$0

Sebastian Municipal Airport Recommended 20-year Capital Improvement Program.														
			Order of Magnitude Costs	FAA Funding										
FDOT	FAA	Projects	2017	FAA %	AIP	Discretionary	Total	FDOT %	FDOT Funding	Local %	Local Match	3rd Party %	3rd Party	Other Sources
		Design and Permitting Hangar Development - Southwest Quadrant	$600,000	0%	$0	$0	$0	80%	$480,000	20%	$120,000	0%	$0	$0
		Total 2023	$1,970,000		$0	$0	$0		$1,576,000		$394,000		$0	$0
SUBTOTAL SHORT-TERM DEVELOPMENT (2017-2023)			$25,129,870		$900,000	$10,437,723	$11,337,723		$8,965,154		$4,826,994		$0	$0
SUBTOTAL MIDTERM DEVELOPMENT (2024-2029)			$17,288,400		$600,000	$1,261,560	$1,861,560		$9,372,000		$2,454,840		$3,600,000	$0
SUBTOTAL LONG-TERM DEVELOPMENT (2030-2037)			$17,835,122		$1,500,000	$4,178,310	$5,678,310		$7,197,706		$1,859,106		$3,100,000	$0
TOTAL CAPITAL IMPROVEMENT PROGRAM			$60,253,392		$3,000,000	$15,877,593	$18,877,593		$25,534,860		$9,140,940		$6,700,000	$0

Several of the projects identified in Fiscal Years 2017 through 2019 show actual project costs and funding obtained from the FAA, FDOT and the City of Sebastian. Costs beyond 2019 again are based upon current economic conditions and may increase or decrease based upon various material costs. Further, in order to receive funding, the consultant/contractor must provide actual project bid specifications to the Sponsor and Agencies which identify the real cost of the project. Data provided in the CIP may be higher than actual estimates to allow the Sponsor to obtain maximum funding.

TABLE OF CONTENTS

CHAPTER 1 GOALS AND OBJECTIVES

Project Overview 1-1
Prior Planning Documentation and Recommendations 1-1
Key Issues and Opportunities 1-2
Airport Planning and Sustainability Goals and Targets 1-3
Regulatory Compliance 1-5
City of Sebastian 1-5
FDOT Compliance Overview 1-6
Florida Sunshine Law 1-7
FAA Compliance Overview 1-7
Grant Assurances 1-8
Other Federal Contracting and Procurement Documents 1-13
Special Conditions 1-14
Master Plan Process 1-14
Coordination and Community Involvement 1-15
Technical Advisory Committee 1-17
Public Involvement 1-17
Client and Regulatory Coordination 1-17
Summary 1-18

CHAPTER 2 CURRENT CONDITIONS

Overview 2-1
General Airport Conditions 2-1
Airport National Aeronautical Role 2-3

Treasure Coast Continuing Florida Aviation System Plan Process (CFASPP) Region 2-4
Economic Benefit to the Community 2-7
Current Airport Activity 2-8
Skydive Sebastian 2-9
On-site Aviation Businesses 2-11
Flight Training 2-12
Non-Aviation 2-12
Historical Aviation Activity 2-13
Weather Data 2-14
Existing Airfield Conditions 2-16
Airport Reference Code (ARC) 2-16
Existing Airfield System 2-17
Runways and Taxiways 2-17
Instrument Approaches and Support Equipment 2-23
Air Traffic Management 2-24
Surrounding Airspace 2-28
Nearby Airports 2-29
EXISTING LANDSIDE CONDITIONS 2-32
Swoop Pond 2-34
Mishler Hangars 2-34
Access, Circulation and Auto Parking 2-35
Airport and City Public Works Storage 2-36
Aircraft Rescue and Firefighting Support 2-36
Fuel Storage and Dispersal 2-36
Electrical Vault 2-36
Airport Security 2-37

Airport Utilities 2-37
Drainage and Stormwater Management 2-39
Land Use and Zoning 2-39
On-Airport Conservation and Easements 2-41
Airport Zoning 2-41
Encumbered Airport Property Inventory* 2-42
Environmental Considerations* 2-43
Environmental Overview 2-43
Wildlife Hazard Site Visit* 2-44
Summary 2-44

CHAPTER 3 – AVIATION ACTIVITY FORECASTS AND CRITICAL AIRCRAFT

Introduction 3-1
Historical and Current Air Traffic Activity 3-2
Previous Forecasts of Demand 3-4
Trends and Factors Affecting Activity 3-6
U.S. Economic Conditions and National Trends 3-7
Fluctuations in Oil Prices 3-8
Pilot Demand 3-9
New Technology 3-11
Airport Level Service Factors 3-12
Aviation Activity Forecasts 3-13
Forecasting Methodologies 3-13
Regression Analysis 3-13
Trend Analysis 3-14
Share Analysis 3-15

Exponential Smoothing 3-16
Extrapolation 3-16
Operations per Based Aircraft 3-16
Comparison to other X26 Forecasts 3-17
Based Aircraft Demand 3-17
Based Aircraft Fleet Mix 3-19
Total Operational Demand 3-20
Selected Forecast 3-24
Itinerant Operations 3-26
Local Operations 3-28
Derivative Forecasts 3-33
Day and Night Operations 3-33
IFR/VFR Operations 3-34
Aircraft Fleet Mix 3-36
Peak Period Demand Forecasts 3-38
Air Taxi Enplanements* 3-40
Summary of Forecast Aircraft Activity 3-40
Critical Aircraft Demand 3-48
Next Steps 3-52

CHAPTER 4 – AIRPORT CAPACITY AND FACILITY NEEDS

Chapter Overview 4-1
Airport Demand Capacity Analysis 4-3
Airspace Capacity 4-4
Airfield Capacity Methodology 4-7
Airfield Characteristics 4-7
Runway Configuration and Utilization 4-7

Taxiway Exits 4-9
Aircraft Mix Index 4-10
Operational Characteristics 4-12
Percentage of Aicraft Arrivals 4-12
Meteorological Conditions 4-13
Airfield Capacity 4-18
Hourly Runway Capacity 4-18
Annual Service Volume 4-21
Annual Aircraft Delay Estimates 4-23
Summary 4-25
Facility Requirements 4-26
Airport Development Triggers 4-27
Activity-Based Development Triggers 4-27
Regulatory-Based Development Triggers 4-27
Emerging Trends 4-28
Airport Sustainability 4-28
NextGen 4-30
New Technology 4-31
New Federal Rules and Guidance 4-32
Airport Role and Service Level 4-33
Critical Aircraft 4-34
Airport Reference Code 4-35
Runway Design Code 4-36
Approach Reference Code and Departure Reference Code 4-37
Runway System Requirements 4-39
Runway Length Analysis 4-39

Width Requiremnets 4-43
Pavement Strength and Conditions 4-43
Part 77 Airport Imaginary Surfaces 4-44
Approach and Departure Surfaces 4-46
Declared Distances 4-48
Runway Safety Dimensional Requirements 4-49
Runway Safety Area (RSA) 4-49
Runway Object Free Area (ROFA) 4-50
Obstacle Free Zone (OFZ) 4-51
Runway Protection Zone (RPZ) 4-52
Runway System Requirements Summary 4-55
Taxiway System Requirement 4-58
Taxiway A and B 4-60
New Taxiways C, D and E 4-61
Taxilanes 4-62
Parachute Landing Areas/Drop Zones 4-62
Recommended PLA Markings 4-65
Appraoch and Navigational AIDS 4-65
Instrument Approach Facilities 4-65
Visual Landing Aids 4-65
Weather Reporting 4-66
Airfield Signage and Pavement Markings 4-66
Airfield Signage 4-66
Pavement Markings 4-66
Aircraft Aprons and Tie-Downs 4-67
Aircraft Hangars 4-70

Aircraft Fuel Storage 4-71
Arrival/Departure Building 4-72
Automobile Parking 4-73
Stormwater Drainage 4-78
Land Use and Potential Acquisition 4-78
Summary 4-79

CHAPTER 5 – AIRPORT ALTERNATIVES AND RECOMMENDED DEVELOPMENT

Chapter Overview 5-1
Alternative Development 5-3
Stakeholder and Public Involvement 5-4
Existing and Emerging Trends 5-5
Prior Recommended Development 5-6
Primary Alternative Elements 5-7
Airfield Alternatives 5-8
Critical Design Aircraft and Runway Design Criteria 5-11
Runway Length Needs 5-12
Lower Approach Minima 5-13
Runway Protection Zone Impacts 5-15
Runway Declared Distance Criteria 5-16
Runway Development Options 5-20
General Aviation Alternatives 5-44
Building Restriction Lines 5-45
Secondary Element Alternatives 5-66
Fuel Farm/Self-fueling Facilities 5-66
Utilities 5-67

Stormwater Drainage 5-67
Auto Parking 5-68
Airport Security 5-69
Alternative Revenue Generation- Non-Aviation Use 5-70
Recommended Development 5-72
Airfield Improvements 5-72
GA and Terminal Improvements 5-73
Southwest Quadrant 5-74
Northwest Quadrant 5-75
Northeast Quadrant 5-76
Terminal Area Development 5-77
Landside Improvements 5-79
Non-Aviation Opportunities and Development 5-81
Miscellaneous Facilities 5-83
Next Steps 5-84

CHAPTER 6 – ENVIRONMENTAL REVIEW AND ANALYSIS

Chapter Overview 6-1
Environmental Action Plan 6-1
Environmental Documentation and Guidance 6-1
Wildlife Hazard Site Visit 6-8
Florida Scrub-Jay Assessment 6-19
Wetland Delineations and Recommendations 6-32
General Environmental Assessment 6-19
Habitat Conservation Plan (HCP) Review and Agency Coordination 6-41

CHAPTER 7 - AIRPORT SUSTAINABILITY AND SOLID WASTE MANAGEMENT

Chapter Overview and Introduction 7-1
Airport Sustainability Planning 7-4
Setting the Stage 7-4
Baseline Assessment 7-5
Economy/Financial Status 7-5
Operations 7-6
Community 7-8
Environment 7-9
Plan Development 7-10
Recommended Development 7-10
Initiatives 7-11
Implementation and Performance Monitoring 7-21
Implementation Strategies 7-21
Performance Monitoring and Plan Evaluation 7-21
Next Steps 7-22
Airport Solid Waste Management 7-23
Baseline Waste Audit 7-23
Baseline Solid Waste and Recycling Audit 7-24
Viability of Solid Waste Recycling –Why Implement an Airport Waste Management Plan 7-25
Operationa and Maintenance (O&M) Requirements 7-27
Consutruction and Demolition Waste 7-28
Initiatives and Recommendations to Minimize Waste Generation 7-29
Plans to Minimize Solid Waste Generation 7-30
Summary and Next Steps 7-32

CHAPTER 8 – AIRPORT LAYOUT PLAN

Chapter Overview 8-1

Title Sheet (Sheet 1) 8-2

Airport Data Sheet (Sheet 2) 8-2

Airport Layout Plan Drawing (Sheet 3) 8-2

Airport Airspace Drawing (Sheet 4) 8-3

Inner Portion of the Approach Surface Drawings (Sheet 5 and 6) 8-5

Terminal Area Drawing (Sheet 7) 8-6

Land Use Drawing (Sheet 8) 8-6

Airport Property Map / Exhibit A (Sheet 9) 8-7

Summary 8-7

CHAPTER 9 – AIRPORT CAPITAL IMPROVEMENT PROGRAM AND FINANCIAL SUSTAINABILITY

Chapter Overview and Introduction 9-1

Implementation Plan 9-2

Implementation Criteria 9-3

Implementation Triggers 9-3

Airport Capital Improvement Plan 9-3

Development Considerations 9-4

Project Sequencing and Master Schedule 9-5

FAA Federal Funding 9-7

Project Priorities 9-7

FAA Discretionary Funding 9-8

FAA Apportionment 9-9

Florida Department of Transportation 9-9

Airport Construction Grant Program 9-9

Project Costs 9-10
Airport Master Plan Capital Improvement Plan 9-11
Capital Project Feasibility Summary 9-12
Recommended Capital Improvement Plan 9-13
Financial Feasibility Analysis 9-19
Historical Financial Statements 9-19
Forecast Financial Pro Forma Statement 9-24
Revenue Enhancement Opportunities 9-44
Summary 9-46

Table of Tables

Table 2-1, Treasure Coast Regional Airports 2014 Activity 2-5
Table 2-2, Historical Based Aircraft and Operations 2-14
Table 2-3, X26 Average High and Low Temperatures 2005-2010 2-15
Table 2-4, Wind Coverage 2-16
Table 2-5, Aircraft Approach Categories 2-16
Table 2-6, Airplane Design Group 2-17
Table 2-7, Existing Runway and Taxiway System 2-21
Table 2-8, Existing Approach Characteristics 2-23
Table 2-9, Additional Airport Support Equipment 2-24
Table 2-10, Noise Abatement Procedures 2-25
Table 2-11, Airspace Classifications 2-28
Table 2-12, Alternate Airports with Instrument Capability 2-31
Table 2-13, Landside Facilities 2-35

Table 3-1, Historical Operational Data 3-3
Table 3-2, Airspace Classifications 3-4
Table 3-3, Aviation Operatonal Forecasts 3-5
Table 3-4, Based Aircraft Forecasts 3-6
Table 3-5, Regression Evaluation 3-15
Table 3-6, Historical Operations Per Based Aircraft 3-17
Table 3-7, Based Aircraft Forecast 3-18
Table 3-8, Based Aircraft Fleet Mix Forecast 3-20
Table 3-9, Aircraft Operations Forecast 3-25
Table 3-10, Preferred Operational Forecasts 3-26
Table 3-11, Air Taxi Operations Forecast 3-27

Table 3-12, Itinerant GA Operations Only 3-28
Table 3-13, Local Aircraft Operations Touch and Go Procedures 3-29
Table 3-14, Local Aircraft Operations Skydiving Aircraft Operations 3-31
Table 3-15, Local Aircraft Operstioins "Other" Aicraft Operstions 3-32
Table 3-16, Local and Itinerant Operations 3-33
Table 3-17, Day and Night Operational Activity Forecasts 3-34
Table 3-18, IFR and VFR Operational Activity Forecasts 3-36
Table 3-19, Aircraft Operstioins Fleet Mix Forecasts 3-37
Table 3-20, Peak Period Demand Forecasts 3-39
Table 3-21, Air Taxi Enplanement Forecast 3-40
Table 3-22, Forecast Operations and Based Aircraft Comparison to 2017 FAA TAF 3-41
Table 3-23, Forecast Other* Aircraft Operations Demand 3-42
Table 3-24, Forecast Other* Based Aircraft Demand 3-42
Table 3-25, Airport Planning Forecast Summary 3-43
Table 3-26, Current Aircraft Demand 3-49
Table 3-27, 2037 Forecast Aircraft Demand 3-51

Table 4-1, 2037 Facility Requirements Summary 4-2
Table 4-2, Taxiway Exits 4-10
Table 4-3, Aircraft Demand/Capacity Classifications 4-11
Table 4-4, 2017 Hourly Capacity Matrix Calculations 4-20
Table 4-5, 2037 Hourly Capacity Matrix Calculations 4-20
Table 4-6, Annual Service Volume and Demand 4-21
Table 4-7, Annual Service Volume 4-22
Table 4-8, Annual Aircraft Delay 4-24
Table 4-9, Peak Hour Delay 4-25
Table 4-10, Runway Critical Aircraft 4-35

Table 4-11, Aircraft Approach category (AAC) 4-36
Table 4-12, Airplane Design Group (ADG) 4-36
Table 4-13, Visibility Minimums 4-37
Table 4-14, 2017 Pavement Conditions Report 4-44
Table 4-15, Obstructions to Air Navigation 4-45
Table 4-16, Approach and Departure Surface Standards Table 4-46
Table 4-17, Existing and Future Decleared Distance Lengths 4-48
Table 4-18, Runway Safety Area Dimensions 4-50
Table 4-19, Runway Object Free Area Dimensions 4-51
Table 4-20, Obstacle Free Zone Dimensions 4-52
Table 4-21, RPZ Incompatibilities 4-54
Table 4-22, Runway Protection Zone Dimensions 4-55
Table 4-23, Runway 5-23 Data Table 4-55
Table 4-24, Runway 10-28 Data Table 4-57
Table 4-25, Taxiway and Taxilane Safety Areas 4-59
Table 4-26, Taxiway/Taxilane Critical Aircraft 4-59
Table 4-27, Taxiway/Taxilane Design Criteria 4-60
Table 4-28, Parachute Landing Area Requirements 4-64
Table 4-29, Aircraft Parking Space Requirements 4-68
Table 4-30, Forecast Apron Parking Demand 4-69
Table 4-31, Breakdown of Hangar Demand 4-70
Table 4-32, Forecast Hangar Demand 4-71
Table 4-33, Forecast Fuel – 14 Day Peak Demand 4-72
Table 4-34, Terminal Area Demand 4-74
Table 4-35, Estimated Peak Hour Passenger Demand 4-75
Table 4-36, Handicap Parking Space Ordinance Requirements 4-76

Table 4-37, Automobile Parking Demand 4-77
Table 4-38, Airside Facility Needs 4-79
Table 4-39, Airside Facility Future Needs 4-80
Table 4-40, Landside Facility Needs 4-81

Table 5-1, 2037 Facility Requirements Summary 5-2
Table 5-2, Instrument Approach Requirements 5-12
Table 5-3, Runway Visibility Minima 5-14
Table 5-4, Decleared Distance Estimated Distances 5-18
Table 5-5, 2037 Facility Requirements Summary 5-44
Table 5-6, Evaluation Matrix 5-64

Table 6-1, Environmental Documentation 6-6

Table 7-1, Historical Airport Financials Budget Summary 7-6
Table 7-2, Operational Demand Summary 7-7
Table 7-3, Estimated Fuel Demand 7-8
Table 7-4, Sample Sustainability Tracker 7-16
Table 7-5, Sample Annual Cost V. Benefit Analysis 7-30
Table 7-6, Waste Management Strategies 7-31

Table 9-1, Airport Activity Factors and Actions 9-5
Table 9-2, State of Florida Grant Share Percentages 9-10
Table 9-3, Federal Grant and State Percentages Estimates 9-10
Table 9-4, Construction Engineering Soft Cost Percentages 9-11
Table 9-5, CIP Summary 9-13
Table 9-6, Twenty Year Capital Improvement Program 9-15

Table 9-7, Historical Revenues and Performance Managements 9-20
Table 9-8, Historical Expenses 9-22
Table 9-9, Historical and Short Term Pro Forma Cash Flow Analysis 9-25
Table 9-10, Mid-Term Pro Forma Cash Flow Analysis 9-31
Table 9-11, Long-Term Pro Forma Cash Flow Analysis 9-38
Table 9-12, Available Land Lease Revenues 9-44

TABLE OF EXHIBITS

Exhibit 2-1, Roseland Satellite Field Photograph 2-2
Exhibit 2-2, Skydive Sebastian Camping Area 2-10
Exhibit 2-3, Skydive Sebastian 2-11
Exhibit 2-4, Taxiway A Connectors and Compass Rose 2-19
Exhibit 2-5, Corporate Hangar Area – Southeast Airport Quadrant 2-20
Exhibit 2-6, Existing Airfield Facilities 2-22

TABLE OF FIGURES

Figure 1-1, FAA Sustainability Guidance 1-4
Figure 1-2, Steps in the Master Planning Process 1-16

Figure 2-1, Treasure Coast CFASPP Region 2-6
Figure 2-2, East Central CFASPP Region 2-7
Figure 2-3, Airport Economic Impacts 2-8
Figure 2-4, Runway 5 Voluntary Noise Procedures Pattern 2-26
Figure 2-5, Runway 23 Voluntary Noise Procedures Pattern 2-26
Figure 2-6, Runway 10 Voluntary Noise Procedures Pattern 2-27

Figure 2-7, Runway 28 Voluntary Noise Procedures Pattern 2-27
Figure 2-8, Surrounding Airspace 2-29
Figure 2-9, Nearby NPIAS Airports 2-30
Figure 2-10, Airport Administration and Corporate Facilities 2-32
Figure 2-11, Southwest Quadrant Airport Facilities 2-33
Figure 2-12, Northwest Quadrant Airport Facilities 2-34
Figure 2-13, Land Use 2-40
Figure 2-14, Zoning Map 2-42

Figure 3-1, Touch and Go Procedures 3-29
Figure 3-2, Forecast Aircraft Fleet Mix 3-38
Figure 3-3, Next Steps 3-53

Figure 4-1, U.S. Airspace Classes 4-5
Figure 4-2, Sectional Map 4-6
Figure 4-3, Airfield Layout 4-8
Figure 4-4, VFR Wind Rose 4-15
Figure 4-5, IFR Wind Rose 4-16
Figure 4-6, All Weather Wind Rose 4-17
Figure 4-7, Airport Annual Service Volume 4-23
Figure 4-8, 75 Percent of Fleet at 60 or 90 Percent Useful Load 4-40
Figure 4-9, Small Airplanes Having 10 or More Passenger Seats 4-42
Figure 4-10, Airport Drop Zone 4-63

Figure 5-1, Runway Extension Options 5-9
Figure 5-2, Runway 5 200 ft. Displaced Threshold 5-10
Figure 5-3, 2007 Airport Layout Plan Update Recommended Development 5-39

Figure 5-4, Airport Drop Zone 5-40
Figure 5-5, Sample Runway Visibility Zone 5-43
Figure 5-6, Alternative 1 5-47
Figure 5-7, Alternative 2 5-49
Figure 5-8, Alternative 1 5-51
Figure 5-9, Alternative 2 5-53
Figure 5-10, Alternative 1 5-56
Figure 5-11, Alternative 2 5-58
Figure 5-12, Alternative 1 5-60
Figure 5-13, Alternative 2 5-61
Figure 5-14, Non-Aviaiton Development 5-71
Figure 5-15, Recommended Southwest Quadrant Development 5-74
Figure 5-16, Recommended Northwest Quadrant Development 5-76
Figure 5-17, Recommended Northeast Quadrant Development 5-77
Figure 5-18, Recommended Terminal Area Development 5-79
Figure 5-19, Skydive Sebastian Leasehold and Expanded Facilities Request 5-80
Figure 5-20, Non-Aviation Development – Airport Drive East 5-82

Figure 6-1, Typical Categorical Exclusion Process 6-2
Figure 6-2, Typical Environmental Assessment Process 6-4
Figure 6-3, Typical Environmental Impact Statement Process 6-5

Figure 7-1, Airport Sustainability 7-2
Figure 7-2, Voluntary Noise Abatement Procedures 7-9
Figure 7-3, Planned Airport Development 7-11
Figure 7-4, Airport Sustainability Planning 7-22

Figure 7-5, Sample Waste Management Approach 7-26

Figure 9-1, Airport Revenue Diversification 9-45

APPENDIX A – GLOSSARY OF TERMS

APPENDIX B – STAKEHOLDER INVOLVEMENT

APPENDIX C – PROPERTY ENCUMBRANCE REPORT

APPENDIX D – WILDLIFE SITE VISIT

APPENDIX E – AVIATION ACTIVITY FORECASTS

APPENDIX F - TAXIWAY C, D, AND E PLANNING SUPPORT

APPENDIX G – FAA SOP CHECKLISTS 2.00 AND 3.00

APPENDIX H – FDOT AIRPORT INSPECTION RECORD, 2017

This Page was Intentionally Left Blank

CHAPTER ONE
Goals and Objectives

Project Overview

The Sebastian Municipal Airport (Federal Aviation Administration identifier X26) is owned and operated by the City of Sebastian. The Airport is a busy general aviation airport located in northeast quadrant of Indian River County. The airport supports a variety of aviation activity including skydiving, flight training, aircraft manufacturing and testing, recreational use, and sightseeing operations.

The last master plan was approved in 2002. Since that time, the City has made several updates to their airport layout plan (ALP), which is the graphical representation of existing and proposed airport development. The last ALP update was completed and conditionally approved by the Federal Aviation Administration and Florida Department of Transportation in 2010.

Since 2010, the airport has completed a number of pavement and hangar projects and is currently in the design process for the construction of Taxiways C, D and E. Airport management also has plans to construct another corporate style hangar, designated Hangar C, in the southeast quadrant near corporate Hangar B, and is also evaluating adding shade hangar storage facilities to support small aircraft demand. Further, since the last ALP update in 2010, a number of Federal and State regulations, funding and design criteria guidance were updated which included a number of operational, sustainability land use compatibility, zoning, and environmental mandates and provisions associated with the FAA Modernization and Reform Act of 2012. As a result, both the FAA and FDOT recommended that the City of Sebastian complete a Master Plan Update to conform to new State and Federal guidance as well as provide the foundation and justification for future airport development.

It is important to state that the Airport sponsor is ultimately responsible for approval of the Master Plan documentation based upon accuracy of data and plan contents. FAA and FDOT conditionally approve the Master Plan and Airport Layout Plan based upon federal and state standards and guidance.

Prior Planning Documentation and Recommendations

The last full master plan update was completed and approved in 2002. Since then, the Sponsor has done periodic sheet updates to its airport layout plan set (ALP) in 2007 and 2010 to illustrate new and planned airport infrastructure and land use needs. Airport infrastructure recommendations were also provided in the 2016 Florida Aviation System Plan, based upon anticipated demand and the airport's role in the Florida aviation system.

Previous recommendations included:

- Construction of taxiway into North Quadrant of the Airport
- Add Medium Intensity Runway Lights (MIRLs) to Runway 10/28
- Add Medium Intensity Taxiway Lights (MITLs) to all taxiways
- Construct interior perimeter road
- Construct side access road to Airport North Quadrant
- Construct up to 40 T-Hangars
- Construct 12 multi-unit clearspan hangars
- Construct up to 3 FBO/large clearspan hangars
- Add Runway End Identifier Lights (REILs) to Runways 05, 23, 10, and 28
- Add lighted airport signage (16 signs)
- Acquire airport maintenance equipment
- Land for environmental mitigation, and
- Periodic completion of Airfield Maintenance, Planning and Environmental documentation

Since the 2002 Master Plan, several recommendations were implemented including adding Precision Approach Path Indicator (PAPIs) to both Runway 10 and 28, construction of two large clearspan hangars, construction of additional fuel facilities, construction of the General Aviation Terminal facilities as well as airfield rehabilitation, pavement marking, and airport equipment acquisition.

As part of this master plan, previous recommendations and cost estimates, updated to Today's dollars, will be reevaluated to determine their need given current and forecast demand, as well as social, political and economic conditions. In addition, several other planning and development reports were reviewed to determine if recommendations were still warranted for inclusion as part of this plan.

Key Issues and Opportunities

As part of the project scoping process and initial meeting with the client and Technical Advisory Committee members (TAC), several key issues and opportunities were discussed. These issues will shape policy decision, influence technical requirements and assist in development of airport alternative options. Therefore, in order to track that key issues are being addressed within this study, critical issues were grouped into major functional areas, such as facilities, business, operational, property and environmental issues. Grouping key issues and opportunities into functional categories will allow the project team to understand and effectively incorporate stakeholders' concerns. Issues and opportunities may arise during this master plan process; thus, coordination with the project team is critical to incorporating these concerns into the master plan process.

Some key opportunities and issues raised during the November 11, 2016 initial Technical Advisory Committee and in subsequent meetings with the client included:

- Design and construction of Taxiways C, D and E
- Expansion of the general aviation apron southwest of the T-hangar aprons to support installation of Shade Hangars and aircraft parking
- Potential installation of helicopter parking facilities adjacent to the GA terminal building
- Construction of large clearspan hangar, designated Hangar C, on the south side of the airport property
- Zoning and potential approach obstruction issues related to residential development
- Upgrade of SuperAWOS to new dual frequency ASOS
- Potential use of airport property currently designated as conservation
- Expansion of Sky Diving facilities
- Potential development near Corporate Park Drive and adjacent to closed runway
- Develop plan to make the airport economically self-sufficient through on-airport development, negotiated lease agreements, expansion of services, etc.

This is not an exhaustive list, but allows the project planning team to focus on high priority projects and needed development. The team has and will continue to work with the client to identify and obtain both state and federal funding for high priority projects.

Airport Planning and Sustainability Goals and Targets

In 2010, the FAA initiated the Sustainable Master Plan Pilot Program with the goal of incorporating sustainability as part of an airport's comprehensive and long-range planning. The FAA's goals are to continue to assist public airports to attain their planning, operational and infrastructure objectives while also providing input regarding reducing environmental impacts, achieving environmental benefits, and improving relationships with local communities. **Figure 1-1** illustrates the FAA's vision of airport sustainability as it relates to the Airport Consultant International – North American definition - "Airport sustainable planning is a holistic approach to managing an airport to ensure: Economic Viability, Operational Efficiency, Natural Resource Conservation and Social Responsibility."[1]

[1] Airport Council International – North America

Figure 1-1

FAA Sustainability Guidance

Source: Federal Aviation Administration, Environmental Division, Airport Sustainability, November 2016



Based upon discussions during the initial project meeting with the Technical Advisory Committee, a draft airport mission statement was created to drive future development at the Airport.

> *To maintain and improve the Airport to serve the needs of the Sebastian community and Treasure Coast Region, promote economic growth in the region, while managing and developing the airport in an economically, socially compatible and environmentally sustainable manner that conserves natural resources, protects the environment, promotes airport safety and economic self-sufficiency and compatibility with the local community.*

From this, several planning and sustainability goals were identified including:

- Focus on initiatives that achieve objectives with low implementation costs.
- Develop simple tools to support implementation and monitoring of sustainability objectives.
- Prioritize airport economic sustainability and resource conservation

- Plan for initiatives that can be incorporated as airports expand
- Encourage sustainable solutions for project design and construction, including recycling and solid waste management
- Encourage airport tenant and user participation
- Provide users general guidance and contact information for implementing sustainability initiatives, etc.
- Identify and weigh sustainability targets based upon local priorities, environmental criteria, and stakeholder input, etc.

Airport sustainability guidance will be provided throughout this master plan process while using the Airport's mission statement to craft recommended development. A baseline assessment and sustainability recommendations related to forecast facility needs and proposed airport development is provided in Chapter 7, *Airport Sustainability and Solid Waste Management*, of this report. Costs and implementation recommendations based upon the findings outlined in this chapter along with Chapters 5, *Airport Alternatives and Recommended Development*, and Chapter 6, *Airport Environmental Evaluation*, are included in the airport implementation plan and recommended twenty-year capital improvement plan (CIP) provided in Chapter 9 of this report. As technology continues to change, other opportunities for resource and economic sustainability will be available to the airport. The plans outlined in this document were designed to provide the City and airport management flexibility to incorporate these opportunities.

Regulatory Compliance

As a federally-obligated airport, both the FAA and FDOT encourage airport sponsors to implement programs that promote sound operating practices and comply with regulatory requirements. The FAA currently recommends that compliance be addressed during the airport planning process through the review of airport documents, plans, and other records, such as an approved ALP, Exhibit" A" Property Map, Airport Ordinance, Zoning Ordinance, Rules and Regulations, Minimum Standards, airport budgets, leases, easements, permits, and other documents.

City of Sebastian

The City of Sebastian maintains a high degree of control over the operation of the Sebastian Municipal Airport. The City meets all applicable financial reporting and record keeping requirements and employs several "best practices" including formal procurement and contracting practices, airport minimum standards, land use planning, coordination with environmental agencies, regulatory agencies and the community.

There are no known compliance issues associated with airport development, tenant leases, land use or other items. In addition to the master plan, the City initiated Airport Environmental Studies (Environmental Assessment on several locations, Scrub Jay Assessment and Identification along with

Wetland delineation and mitigation recommendations) which are being developed in parallel with the master plan. As a result, data and findings from all studies will be incorporated into all documents to provide the Sponsor, FDOT and FAA a complete picture of existing conditions and proposed airport development.

FDOT Compliance Overview

Florida Statutes (F.S.) Chapter 332 "It shall be the duty, function, and responsibility of the Department of Transportation to plan airport systems in this state." There are also 24 FDOT Aviation Program Assurances that are used as part of JPAs and SJPAs between FDOT and the Sponsor. For more information on FDOT's Grant Assurance Program, see:

https://www2.dot.state.fl.us/proceduraldocuments/forms/informs/72504015.pdf.

In general, compliance with FDOT assurances are required as part of the Joint Participation Agreement (JPA) and Supplemental Joint Participation Agreement (SJPA) between the State of Florida, Department of Transportation and the airport's sponsor. The Parties to this agreement must ensure their compliance with specific provisions including project descriptions, budget, and responsibilities. Compliance is warranted to protect the state's public investment in public use airports and to support the Florida Aviation System. The terms of the grant assurance agreement will remain in force throughout the "useful life of a facility developed; equipment acquired; or project items installed within a facility for airport development or noise compatibility…but shall not exceed 20-years from the effective date of the (grant) agreement."[2]

Therefore, as part of this program, FDOT grant assurances will be considered as part of airport alternatives development, the ALP and the project implementation plan. Further as required under FDOT Grant Assurance #21: *Planning Projects*, the Airport sponsor will complete the project based upon the approved scope or with approved modifications to the initial scope of work; will provide project documentation and work activity reports to the FDOT District Airport Representative and to the Aviation Program Development Manager at FDOT Headquarters; and make planning materials available for public review with the exception of airport security. In addition, planning documents must be consistent with the Florida Aviation System Plan and the FDOT's Airport Master Planning Guidebook, 2016.

In addition, the Sponsor must provide the following data to FDOT to maintain compliance with the master planning process:

> "(1) Provide copies, in electronic and editable format, of final project materials to the Department, including computer-aided drafting (CAD) files of the Airport Layout Plan.

[2] State of Florida Department of Transportation, Exhibit C, Aviation Program Assurances, 725-040-15 AVIATION OGC (published) - 03/15

(2) Develop a cost-feasible financial plan, approved by the Department, to accomplish the projects described in the Airport Master Plan or depicted in the Airport Layout Plan, and any updates thereto. The cost-feasible financial plan shall realistically assess project phasing considering availability of state and local funding and federal funding under the FAA's priority system.

(3) Enter all projects contained in the cost-feasible plan in the Joint Automated Capital Improvement Program (JACIP)" [3], and

(4) 'Submit master planning draft and final deliverables to the FDOT for review and conditional approval.'[4]

Florida Sunshine Law

Florida Statutes Chapter 286.011, Public Meetings and Records; Public Inspection; Criminal and Civil Penalties, the "Florida Sunshine Law," is a required component of the master plan public information program. Public use airports in the state are typically owned by city or county governments or by airport authorities created under state statutes. Therefore, airport meetings are subject to the "Florida Sunshine Law." Thus, according to the statute, any gathering of two or more members of the same public entity is considered a meeting. Since most meetings conducted as part of a Master Plan public input program (PIP) are subject to the provisions of the statute because they are advisory in nature since the planning team will be asking for opinions and soliciting advice during meetings. For more information on the Florida Sunshine Law see: www.leg.state.fl.us/statutes/.

FAA Compliance Overview

FAA recommends that airports implement a management program based upon their "Planning for Compliance" guidance in addition to adopting relevant airport management "Best Practices." Compliance with both FAA and FDOT requirements allows the Airport to receive funding and support from the agencies. As part of this master plan update, recommendations will be provided for improving the Airport's current operational and management program to comply with FAA and FDOT regulatory requirements.

Airport sponsors must comply with various federal obligations as outlined in FAA Order 5190.6B, Airport Compliance Manual. The contractual federal obligations that a sponsor accepts when receiving federal grant funds or transfer of federal property is outlined in the following documents:

- Grant agreements issued under the Federal Airport Act of 1946, the Airport and Airway Development Act of 1970, and the Airport lmprovement Act of 1982. Included in these agreements is the requirement for airport sponsors to comply with:

[3] FDOT Grant Assurance 21: Planning Projects, State of Florida Department of Transportation, Exhibit C, Aviation Program Assurances, 725-040-15 AVIATION OGC (published) - 03/15
[4] Ibid

  - Grant Assurances
  - Advisory Circulars
  - Application commitments
  - FAR procedures and submittals
  - Special conditions
- Surplus airport property instruments of transfer
- Deeds of conveyance
- Commitments in environmental documents prepared in accordance with FAA requirements
- Separate written requirements between a sponsor and the FAA

Land use compliance and compatible land use planning is often a significant compliance issue for airports. Compliance and suggested best practices are discussed under the following subheadings in this chapter:

- Airport Compliance with Federal and State Grant Assurances
- Environmental Compliance
- Airport User Compliance
- Other Airport Operational Policies and Procedures

Grant Assurances

The City of Sebastian (Sponsor) and its airport are recipients of both federal and state airport improvement grant funds, which contractually binds them to comply with various sponsor obligations generally referred to as "Grant Assurances." These assurances document the commitments made by the airport sponsor to fulfill the intent of the grantor (FAA and FDOT) required with acceptance of necessary federal and state funding for airport improvements. Failure to comply with grant assurances will result in a finding of noncompliance and forfeiture of future funding. Upon accepting Federal funds, an airport is obligated to a set of grant assurances, highlighted in the FAA document Assurances: Airport Sponsors. In total, there are 39 grant assurances that airports must comply with. The terms, conditions and assurance of a grant agreement with the FAA remain in effect for the useful life of a development project, which is typically 20 years from the receipt of the last grant. However, terms, conditions, and assurances associated with land purchased with federal funds do not expire.

The airport sponsor should have a clear understanding of and comply with all assurances. The following sections describe the selected assurances in more detail. Additional information on Federal Grant Assurances can be found at: www.faa.gov/airports/aip/grant_assurances/.

Project Planning/Design and Contracting Assurances

Assurance #3: Sponsor Fund Availability

Once a grant is given to an airport sponsor, the receiving sponsor commits to providing the funding to cover their portion of the total project cost. Currently, this amount is ten percent of the total eligible project cost; although, it may be higher depending on the particular project components or makeup. Once the project has been completed, the receiving airport also commits to having adequate funds to maintain and operate the airport in the appropriate manner to protect the investment in accordance with the terms of the assurances attached to and made a part of the grant agreement.

Assurance #6: Consistency with Local Plans

All projects must be consistent with city and county comprehensive plans, transportation plans, zoning ordinances development code, and hazard mitigation plans. The airport sponsor and planners should all familiarize themselves with local planning documents before a project is considered and ensure that all projects follow local plans and ordinances.

In addition to understanding local plans, airport sponsors should be proactive in order to prevent noncompliance with this assurance. The airport sponsor should assist in the development of local plans that incorporate the airport and consider its unique aviation related needs. Sponsor efforts should include the development of goals, policies, and implementation strategies to protect the airport as part of local plans and ordinances.

Assurance #13: Accounting System Audit and Record Keeping

All project accounts and records must be made available at any time. Records should include documentation of cost, how monies were actually spent, funds paid by other sources and any other financial record associated with the project at hand. Any books, records, documents, or papers that pertain to the project should be available at all times for an audit or examination.

General Airport Compliance

Assurance #4: Good Title

The airport owner must have a Good Title to affected property when considering projects associated with land, building, or equipment. Good Title means the sponsor can show complete ownership of the property without any legal questions, or show it will soon be acquired.

Assurance #5: Preserving Rights and Powers

No actions are allowed which might take away any rights or powers from the sponsor which are necessary for the sponsor to perform or fulfill any condition set forth by the assurance included as part

of the grant agreement. If there is an action taken or activity permitted that might hinder any of those rights or powers, it should be discontinued. An example of an action which can adversely affect the rights and powers of the airport is a Through-the-Fence (TTF) activity. TTF activities allow access to airport facilities from off-airport users. In many instances, the airport sponsor cannot control the activities of those operating off the airport resulting in less sponsor control. This loss of control can potentially have an adverse impact to airport users. For example, TTF activities many times do not pay the same rates and charges as on-airport users, resulting in an unfair competitive advantage for businesses/users located off airport versus those on-airport.

Assurance #29: Airport Layout Plan (ALP)

The airport should at all times keep an up-to-date ALP which should include on it both current and future boundaries, facilities/structures, and the location of any non-aviation areas and existing improvements. No changes should be made at the airport to hinder the safety of operations; also, no changes should be made to the airport that is not in conformity with the ALP. Any changes of this nature could adversely affect the safety, utility, or efficiency of the airport. If any changes are made to the airport without authorization, the alteration must be changed back to their original condition, or the airport will have to bear all cost associated with moving or changing the alteration to an acceptable design or location. Additionally, no federal participation will occur for improvement projects not shown on an approved ALP.

Assurance #31: Disposal of Land

Land purchased with the financial participation of an FAA Grant cannot be sold or disposed of by the airport sponsor at their sole discretion. Disposal of such lands are subject to FAA approval and a definitive process established by the FAA. If airport land is no longer considered necessary for airport purposes, and the sale is authorized by the FAA, the land must be sold at fair market value. Proceeds from the sale of the land must either be repaid to the FAA or reinvested in to another eligible airport improvement or noise compatibility project. Land disposal requirements typically arise when a community is building a new airport and the land on which the airport was located is sold with the proceeds used to offset costs of the new airport. In general, land purchased with FAA funds is rarely sold by a sponsor.

Airport Operations and Land Use

Assurance #11: Pavement Preventative Maintenance

Since January 1995, the FAA has mandated that it will only give a grant for airport pavement replacement or reconstruction projects if an effective airport pavement maintenance-management program is in place. The program should identify the maintenance of all pavements funded with federal

financial assistance. The report provides a pavement condition index (PCI) rating (0 to 100) for various section of aprons, runways, taxiways, and a score for overall airport pavements.

Assurance #19: Operations and Maintenance

All federally funded airport facilities must operate at all times in a safe and serviceable manner. The airport sponsor should not allow for any activities which inhibit or prevent this. The airport sponsor must always promptly mark and light any hazards on the airport, and issue Notices to Airmen (NOTAMs) to advise of any conditions which could affect safe aeronautical use. Exceptions to this assurance include when temporary weather conditions make it unreasonable to maintain the airport. Further, this assurance does not require the airport sponsor to repair conditions which have happened because of a situation beyond the control of the sponsor.

Assurance #21: Compatible Land Use

Land uses around an airport should be planned and implemented in a manner which ensures surrounding development and activities are compatible with the airport. To ensure compatibility, the sponsor is expected to take appropriate action, to the extent reasonable, including the adoption of zoning laws to guide land use in the vicinity of airports under their jurisdiction. Incompatible land use around airports represents one of the greatest threats to the future viability of airports.

Airport Management

Assurance #22: Economic Non-Discrimination

Any reasonable aeronautical activity offering service to the public should be permitted to operate at the airport as long as the activity complies with airport-established standards for that activity. Any contractor agreement made with the airport will have provisions making certain the person, firm, or corporation will not be discriminatory when it comes to services rendered as well as rates or prices charged to customers. Provisions include:

- All Fixed Base Operators (FBOs) on the airport should be subject to the same rate fees, rentals, and other charges.
- All persons, firms, or corporations operating aircraft can work on their own aircraft with their own employees.
- If the airport sponsor at any time exercises the rights and privileges of this assurance, they will be under all of the same conditions as any other airport user would be.
- The sponsor can establish fair conditions which need to be met by all airport users to make the airport safer and more efficient. The sponsor can prohibit any type, kind, or class of aeronautical activity if it is for the safety of the airport. It is important to point out that the FAA will review such prohibitions and will make the final determination as to whether or not a particular activity type is deemed unsafe at the airport based on current operational dynamics.

Assurance #23: Exclusive Rights

Exclusive Rights at an airport is often a complicated subject usually specific to individual airport situations. The assurance states the sponsor "will permit no exclusive right for the use of the airport by any person providing, or intending to provide, aeronautical services to the public..." There are exceptions to this rule. If the airport sponsor can prove that permitting a similar business would be unreasonably costly, impractical, or result in a safety concern, the sponsor may consider granting an exclusive right. To deny a business opportunity because of safety, the sponsor must demonstrate how that particular business will compromise safety at the airport. Exclusive rights are very often found in airport relationships with FBOs, but exclusive rights can also be established with any other business at the airport which could as in the operation of an aircraft at the airport. If an unapproved exclusive rights agreement exists, it must be dissolved before a future federal grant is awarded to the airport.
If a sponsor is contemplating denial of a business use at the airport, it is strongly encouraged that they contact their FAA Airport District Office (ADO) in order to ensure that they have all necessary information and that denial of access is not going to be seen as unjust discrimination. For more in depth information on exclusive rights reference Advisory Circular 150/5190-6, "Exclusive Rights at Federally Obligated Airports."

Financial Assurances

Assurance #24: Fee and Rental Structure

The fee and rental structure at the airport must be implemented with the goal of generating enough revenue from airport-related fees and rents to become self-sufficient in funding day to day operational needs. The airport sponsor should routinely monitor its fee and rental structure to ensure reasonable fees are being charged to meet this goal. Common fees charged by airports include fuel flowage, tie-down, and hangar rent.

Assurance #25: Airport Revenue

All airport revenue and local taxes on aviation fuel should be used toward the operating costs of the airport, the local airport system, or other local facilities which are owned by the same owner of the airport which will directly impact air transportation passengers or property or for noise mitigation on or off airport property. In other words, revenue generated by airport activities must be used to support the continued operation and maintenance of the airport. Use of airport revenue to support or subsidize other non-aviation activities or functions of the sponsor is not allowed and is considered revenue diversion. Revenue diversion is a significant compliance issue subject to cause scrutiny by the FAA.

Public Involvement Program

Assurance #7: Consideration of Local Interest
Ensures that the sponsor has given fair consideration of the communities in or near where the project may be located.

Assurance #8: Consultation with Users
This grant assurance ensures that the sponsor, in making a decision to undertake any airport development project under Title 49, United States Code, has undertaken reasonable consultations with affected parties using the airport at which project is proposed.

Assurance #9: Public Hearings
In projects involving the location of an airport, an airport runway, or a major runway extension, Public Hearings are required to allow the community the opportunity to provide input with consideration of the economic, social, and environmental effects of the airport or runway location and its consistency with goals and objectives of the community. Transcripts of such hearings should be included as part of the Planning document and provided to FAA Secretary if requested.

Other Federal Contracting and Procurement Documents

In addition to compliance with Federal grant assurances, the sponsor also agrees to adhere to all applicable federal contracting and procurement requirements. As a condition of receiving FAA Airport Improvement Program (AIP) grant funding, compliance with applicable advisory circulars, orders and standard operating procedures is required. Each grant request includes a funding checklist that identifies the airport requirements. Sample checklist item requirements include:

- ALPs should be up to date. Projects must be shown on a conditionally approved ALP drawing in order to be eligible to receive federal AIP funding.
- Land Use Inventory, Airport Property Encumbrance Report, and Exhibit "A" Property Map must be updated and kept up to date with any transfer or acquisition of airport property. The airport must hold good title to airport property and property easements must be identified and illustrated on the Exhibit "A" Property Map. All exhibits must comply with FAA Standard Operating Procedures (SOPs), and release of Airport Property must be accompanied by FAA documentation approving the transfer.
- Appropriate signage and markings must be in place
- Runway Protection Zone (RPZ) and approach surface deficiencies must be identified and steps to address deficiencies noted
- Runway Safety Areas (RSAs) must meet FAA standards or the FAA has provided a modification to standards if warranted.

- Disadvantaged Business Enterprise Program (DBE) goals must be met on projects and grants more than $250,000.
- Procedures should be in place to handle bid protests
- Open AIP grant projects need to be identified
- Project closeout forms must be submitted within 90 days of work completed
- A "Certification of Economic Justification" must be included for routine pavement maintenance projects
- A "Revenue Generating Facility Eligibility Evaluation" must be completed for hangar constructing or fueling facilities
- A "Reimbursable Agreement" and "Non-Fed Coordination" must be completed for navigational aid projects
- A "Relocation Plan" must be completed if a project requires residences or businesses to be relocated.

Special Conditions

In addition to standard grant assurances, the State of the FAA may require "Special Conditions" be applied to individual grants which supplement the standard grant assurance requirements. Special conditions are unique to an individual airport and may be project or administrative in nature. Airport sponsors need to be aware of such conditions, and each Sponsor and employee involved in the oversigh of grants has read and understands the regulations as a whole so that the Sponsor and employee are protected.

Because the Airport is partially bordered by environmentally sensitive lands, portions of the Airport property, as identified in the 2010 ALP, include a wildlife buffer and Scrub Jay Conservation Area. As part of this master plan and the concurrent environmental studies, these special conditions will be evaluated to allow for other options to be considered in compliance with FDOT and FAA funding assurances.

Master Plan Process

Since the FAA and FDOT have taken a more holistic approach to airport planning, this master plan update was structured to address the Sponsor's specific needs. The master plan was scoped to effectively use the Sponsor's resources while addressing the requirements and goals established by the FAA and FDOT. A Master Plan is the framework of an airport's conceptual short-, medium-, and long-term facility development requirements and strategy based on current and future conditions of the airport and aviation industry, based on a variety of factors considered during the development of the plan. Airport Master Plans are regularly updated to support maintenance, development, expansion, and

modernization of existing airports, as well as to justify construction of additional airports needed to accommodate growth in demand for aviation services on a local, regional and national basis.

The Sebastian Municipal Airport Master Plan update was prepared in accordance with the most recent FAA Advisory Circulars including but not limited to AC 150/5070-6B, *Airport Master Plans* and AC 150/5300-13A, *Airport Design,* Orders, Standard Operating Procedures (SOPs) as well as National Environment Protection Agency (NEPA) and FDOT *Guidebook for Airport Master Planning*. In addition, City, county, regional, state, and national planning, environmental and sustainability efforts including solid waste management audit were incorporated into the Master Planning effort to provide the Sponsor and Agencies a comprehensive approach for future airport growth and to populate the FDOT Joint Automated Capital Improvement Plan (JACIP) which is used to program airport development grants .

The Master Plan was tailored to X26's size, setting, environmental conditions, and forecast aviation activity. The process used to develop the master plan is illustrated in **Figure 1-2**

The final master plan documentation will be approved by the City of Sebastian, which owns and operates the airport. In addition to the narrative report, the master plan will include a graphical representation of ultimate development, referred to as the Airport Layout Plan, and an updated financial analysis and Capital Improvement Program based upon planned development.

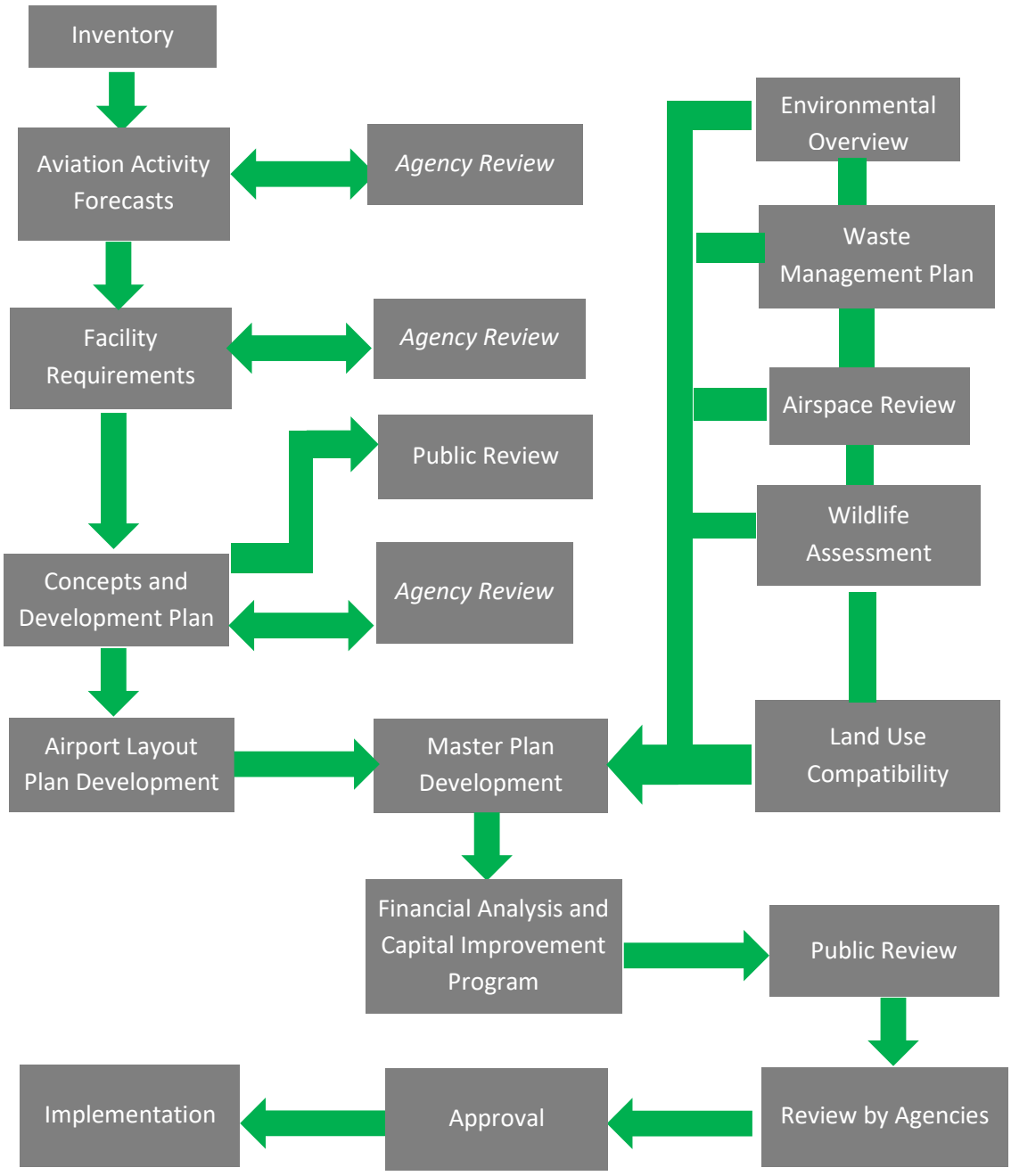
Coordination and Community Involvement

The master plan process requires a public involvement program to conform to both FAA and FDOT grant assurance criteria. However, the level of public involvement is proportional to the complexity of the study and public interest. Comments obtained from the Technical Committee, City Council, tenants, and the public will be provided in **Appendix A,** *Key Participants and Public Involvement,* of this report.

Figure 1-2

Steps in the Master Planning Process

SOURCE: FAA ADVISORY CIRCULAR 150/5070-6B, CHANGE 2, AIRPORT MASTER PLANS



Technical Advisory Committee

A technical advisory committee (TAC) was created consisting of City, County and local aviation experts to provide input and insight regarding technical issues. Three technical advisory meetings will be held during key points in the planning process. The first Technical Advisory Committee meeting is planned for March 17th. The consultant will present the project goals and objectives, discuss existing conditions including current and upcoming projects, existing aviation activity, as well as wildlife and environmental concerns. The consultant will also provide the preliminary forecasts of demand including existing and future critical aircraft, and facility needs. This meeting will provide the baseline for proposed airport development. Therefore we will be soliciting suggestions and opinions regarding future infrastructure and operational wants in relation to demand and need.

The TAC is scheduled to meet two more times following this meeting. The next meeting will occur following submittal of the preliminary alternatives analysis and prior to the planned public meeting with City Council. The third meeting will occur during finalizations of recommended development and as part of the implementation step in the process. This will allow the team to obtain insight regarding project phasing, funding, and the overall financial strength of the airport.

Public Involvement

As noted, public involvement is required as part of any planning and environmental project. To facilitate public participation, drafts of the report will be uploaded to the City's website. In addition, to encourage information sharing and collaboration, the project team will periodically meet, typically following each TAC meeting, with airport tenants, users and local agencies.

Public involvement is planned to occur during the preliminary alternative stage of the process. This will allow stakeholder to provide input for any major commitments made, and will allow the project team to address community concerns and obtain consensus. The Public Meeting is scheduled to occur during one of the evening City Council meetings to allow coordination with elected and appointed public officials, residents, and the general public.

Client and Regulatory Coordination

Throughout the planning process, the team will meet with the client and regulatory agencies. Coordination in person, by phone and other electronic means between the client and the consultant will be kept confidential unless requested otherwise. Although the regulatory agencies are considered part of the Technical Advisory Committee, it is unlikely that they will attend the on-site technical meetings with the other participants. Therefore, after each key deliverables, such as the forecasts, the facility requirements, alternatives, etc. the project team will meet with the FAA and FDOT program managers to address any concerns while keeping the project both on track and budget. FAA and FDOT comments, responses and other documentation as required by compliance will be placed in an appendix to this report.

Summary

While the national outlook for aviation over the next twenty years appears strong, what impact it will have on Sebastian Municipal Airport remains to be seen. Strong aviation growth within the region, based upon federal and statewide forecasts will remain higher than the national average, potentially as a result of lower fuel costs, flight training demand, and business growth. Local growth will likely continue to drive demand for aviation and other transportation facilities. Thus, this Master Plan Update is intended to assist decision makers to make decisions regarding airport development that are in line with users and community objectives.

CHAPTER TWO
Current Conditions

Overview

Since an airport does not operate in a stagnant environment, a periodic inventory of existing conditions including airfield and landside facilities, operations, fleet mix, etc. is required. For example, since the previous ALP Drawing Set was approved by the FAA in May 2010, several projects were completed at Sebastian Municipal Airport (X26) including construction of two large clear span hangars and site preparation for a third large hangar, both runways were remarked from 4-22 to 5-23 and 8-26 to 10-28 due to changes in magnetic declination, a swoop pond was constructed to support skydiving operations, and the Airport is currently designing new Taxiways C, D and E. Therefore, the baseline information in this chapter serves as the foundation for future steps in the planning process.

General Airport Conditions

X26 is located in North Indian River County on the East Coast of Florida. The airport supports a variety of general aviation activity including: corporate/business activity, aircraft sales and manufacturing, flight training, as well as recreational and sport activity including skydiving and motorized gliders. The airport currently is equipped with two intersecting runways, designated as 5-23 and 10-28. The primary runway 5-23 has a published length of 4,023 and weight bearing capacity of 22,000 lbs. single wheel. This length is adequate to support multi-engine piston and turboprop aircraft as well as lighter jet aircraft (e.g. Phenom 300) under dry, uncontaminated pavement conditions.

The airport was initially constructed by the United States Navy in 1943 for flight training during World War II. The 1,025 acre airport was initially known as Roseland Satellite Field, and support naval flight training from Naval Air Station Vero Beach and Naval Air Station Melbourne. The airport was constructed with four runways: 13-31, 18-36, 4-22 (now 5-23) and 8-26 (now 10-28) along with partial parallel taxiways as illustrated in **Exhibit 2-1.**

Exhibit 2-1
Roseland Satellite Field
Original Construction Photograph
Source: City of Sebastian, Sebastian Municipal Airport Website, http://www.sebastianairport.com



At the time, the U.S. Military paid $1,300 for the property, and then was transferred by the War Assets Administration as part of the Surplus Property Act of 1944. On January 29, 1959, the United States transferred the property to the City of Sebastian. As part of the Federal Surplus Property Act, the airport would be used without unfair discrimination solely for aviation purposes. In any case of proven non-compliance with the terms and conditions of the deed, the property would revert back to the United States.[1]

In 1981, a championship public golf course, Sebastian Municipal Golf Course, and restaurant facility was constructed on 155 acres of the current airport property. The airport receives revenue from this leasehold, and has since constructed an Airport terminal building and associated apron, fuel facilities, T-hangar storage, as well as corporate style clear span storage hangars in the southwest quadrant of the airport. The fixed based operator (FBO) at X26 is currently Pilot's Paradise which has facilities located on the west side of the airfield, and Sebastian Sky Diving facilities are also located on the west northwest quadrant of the airport.

[1] Historical data obtained from Airport Website, www.sebastianairport.org, and Wikipedia and google scholar websites, February 2017

According to the FAA's 5010 (Airport Master Record) database, dated January 9, 2016, the airport property consists of 620 acres. The airport elevation above mean sea level (MSL) is surveyed at 21.5 feet, and the airport reference point (ARP) is latitude 27-48-47.70000 north, estimated, and longitude 080-29-44.1000 west. The airport is attended Monday through Friday from 0800 to 1700. The City of Sebastian and Pilots Paradise provide 100LL fuel with the City also providing a self-service fuel station adjacent to the Terminal Apron.

The Sponsor has and is in the process adding infrastructure at the Airport to support interested parties and existing demand. Projects completed over the years included:

- Closing of Runway 13/31 and Re-Opening of Runway 10-28
- Reconstruction of portions of Runway 5-23 as well as pavement reseal and rejuvenation (1997)
- Installation of Low Intensity Runway Lights on Runway 5-23
- Closure of Runway 18/36 as an active runway and converting to taxiway and apron.
- Installation of new AWOS II at the airport with dual frequencies (est. 2017)
- Design and Construction of Taxiways C, D and E (est. 2016-2019), and
- West quadrant apron expansion and shade hangar installation (est. 2017-2018)

There is also been interest in developing helicopter parking facilities on the airport to support transient and potential based helicopter operations (sight-seeing and/or medical). Therefore, helicopter parking facilities near the proposed Hangar C and Taxiway C is currently being evaluated. It was recommended that an approach and departure helicopter procedures be implemented by FAA to both Runways 5-23 and 10-28. Proposed helicopter parking design would allow for wheeled taxi or hover taxi helicopter operations.

Airport National Aeronautical Role

General Aviation (GA) airports are a critical component of the National Aviation System. To show the importance of these facilities, the FAA developed two studies: *General Aviation Airports: A National Asset* (2012) and *Asset 2: In-Depth Review of 497 Unclassified Airports* (2014). Both reports document the role that GA airports 'play in our society, economy and aviation system'[2] and defined four categories of airports: National, Regional, Local and Basic, based on their existing activity levels.

This data was then incorporated into the FAA's National Plan of Integrated Airport System (2017-2021) report to congress, which is used to identify Airport Improvement Program (AIP) funding needs over the next 5 years. To date, the NPIAS identified 3,340 public-use airports (3,332 existing and 8 proposed) that are important to the national air transportation system. The report estimates a need for

[2] FAA *General Aviation Airports, A National Asset Study*, 2012, pg. 6

approximately $32.5 billion in AIP-eligible airport projects to support the National Airspace System between 2017 and 2021.

According to FAA data, 88 percent (88%) of NPIAS airports are classified as non-primary and primarily serve general aviation activity. General Aviation encompasses a diverse range of commercial, governmental, and recreational uses. In other words, anything other than scheduled commercial airline operations.

Recent national airport survey data shows that 29.5 percent of general aviation aircraft operations are associated with personal or recreational use. However, 54.8 percent of national GA operations are used for non-personal use, such as flight instruction, corporate, business, aerial observation, sight-seeing, air medical and other. The remaining 15.7 percent of national GA activity, according to the 2017 NPIAS is associated with on-demand Title 14 CFR Part 135 operations, such as air taxi, air tours and Part 135 medical operations.

Since the majority of civilian pilots are now trained through civilian programs rather than the military, and there continues to be high worldwide demand for pilots, instructional GA activity represents the second largest GA use category. Pilot training is best conducted away from commercial service airports to preserve commercial airport capacity and safety between differing types and approach speed of aircraft. Therefore, instructional flight training will remain focused on general aviation airports.

X26 is classified as a public use-local airport within the FAA system. Local use airports "supplement local communities by providing access primarily to intrastate and some interstate markets."[3] Most of the operations are represented by piston engine aircraft. FAA criteria used to define a local airports is: 10+ instrument operations and 15+ based aircraft; or 2500+ passenger enplanements. According to 2017-2021 NPIAS report, X26 has 36 based aircraft and will require $5,513,889 in AIP funding over the next 5 years.

Treasure Coast Continuing Florida Aviation System Plan Process (CFASPP) Region

The Florida Department of Transportation Treasure Coast CFASPP Region (Region 8) encompasses Indian River, Martin, Okeechobee, St. Lucie counties. The region continues to see growth from population going north from the Miami-Dade and Palm Beach area as well as from Flagler and Volusia Counties. According to the Florida Aviation System Plan 2012 population within the Treasure Coast Region may be upwards to 1 million people by 2040.

Aviation activity remains fairly strong due to corporate/business activity as well as extensive flight training activity associated with Flight Safety International and Paris Air at Vero Beach Regional Airport, Aviator College at Treasure Coast International Airport, and Treasure Coast Flight Training at Witham

[3] Federal Aviation Administration, General Aviation Asset Study, Vol. 1, 2012

Field. In addition, several aircraft manufacturers are based in the region including Piper Aircraft, Velocity, Inc. and LoPresti Aviation. A breakdown of historical activity associated with each of the Public Airports in the Treasure Coast region is illustrated in **Table 2-1**.

TABLE 2-1
TREASURE COAST REGIONAL AIRPORTS
2014 ACTIVITY

FACILITY	GA BASED AIRCRAFT	PERCENTAGE OF REGIONAL GA AIRCRAFT	GA OPERATIONS	PERCENTAGE OF REGIONAL GA OPERATIONS
Indiantown Airport	59	7.54%	5,000	0.87%
New Hibiscus Airpark	13	1.66%	22,000	3.82%
Okeechobee County Airport	26	3.32%	50,000	8.68%
Sebastian Municipal Airport*	40	5.11%	37,240	6.47%
Treasure Coast International Airport	214	27.33%	157,308	27.32%
Vero Beach Regional Airport	231	29.50%	222,128	38.58%
Witham Field	200	25.54%	82,094	14.26%
TOTAL	783		575,770	

**Note: Sebastian Based Aircraft and Operations were taken from the 2016 TAF historical data*

Sources: Florida Aviation System Plan, 2015-2040 and FAA Terminal Area Forecasts (TAF), 2016

Sebastian Airport is located on the far Northeast corner of the Treasure Coast region. As a result, it attracts activity from FDOT identified Treasure Coast airports as well as the East Central Florida CFASPP Region. Since the East Coast of Florida supports extensive aeronautical and aerospace research as well as flight training related to the Kennedy Space Center, Florida Institute of Technology (FIT) and Embry-Riddle Aeronautical University (ERAU), the Airport can and does draw flight activity from both CFASPP regions.

Figure 2-1

Treasure Coast CFASPP Region

Source: 2012 Florida Aviation System Plan, Florida Department of Transportation

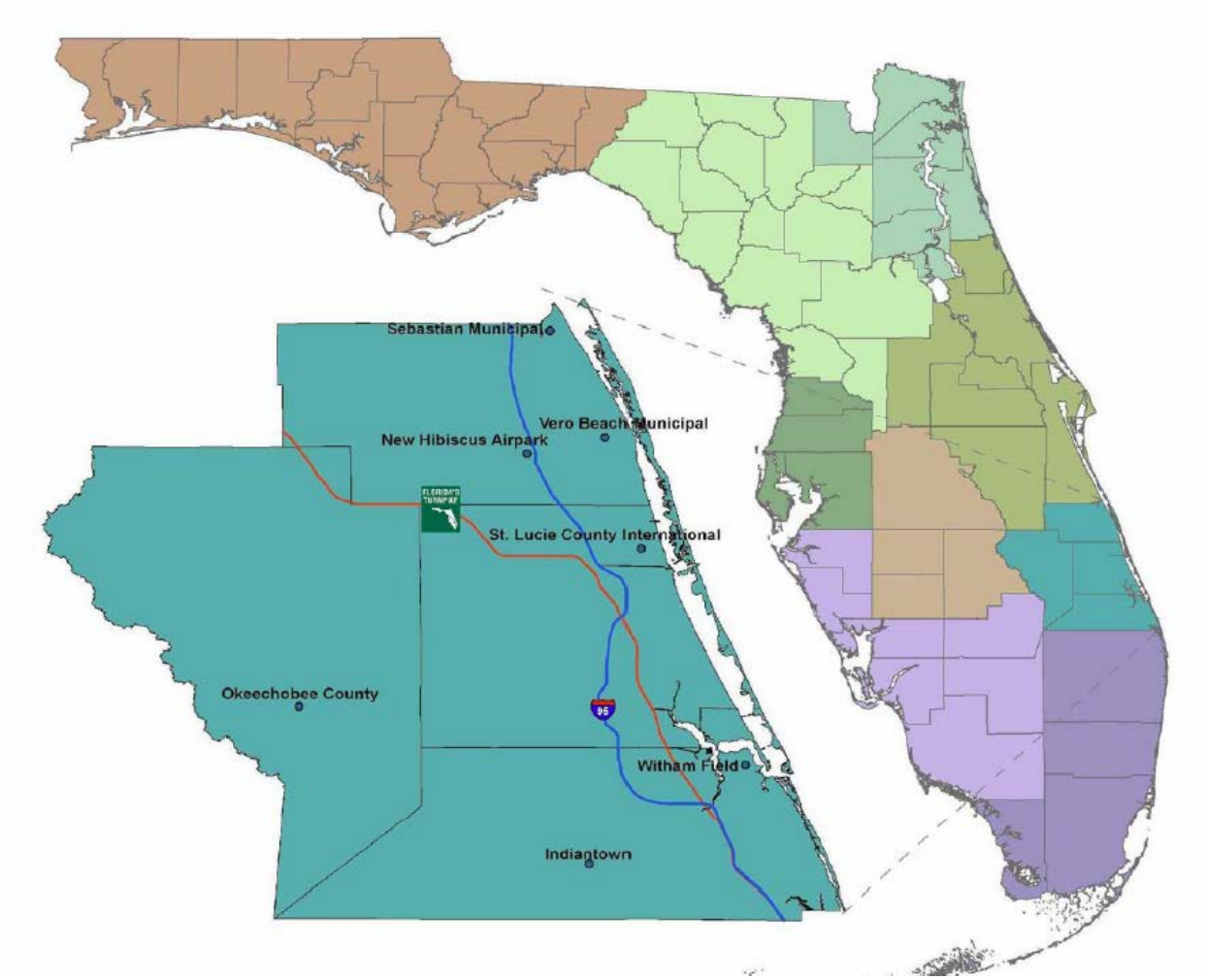
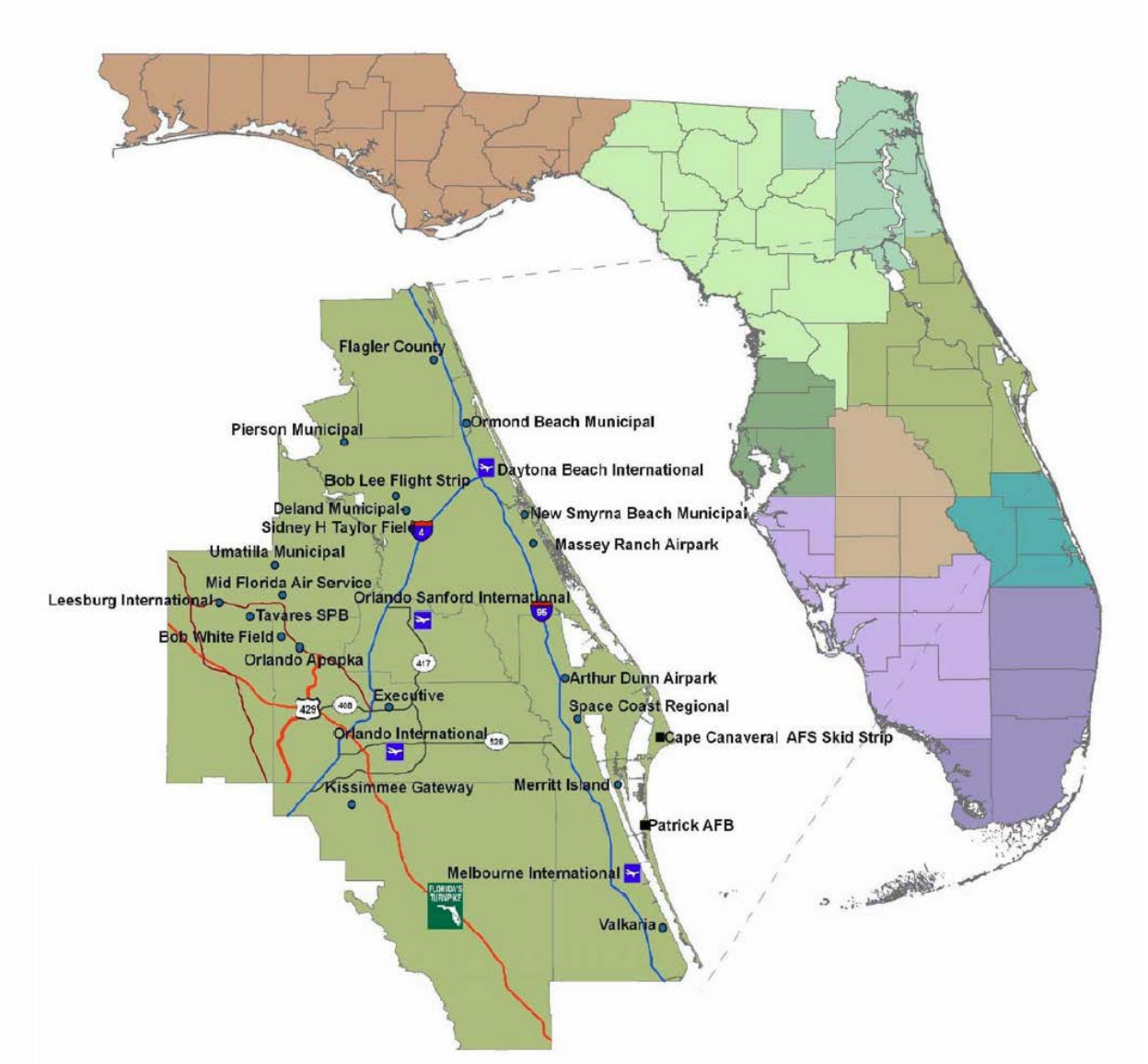


Figure 2-2

East Central CFASPP Region

Source: 2012 Florida Aviation System Plan, Florida Department of Transportation



Economic Benefit to the Community

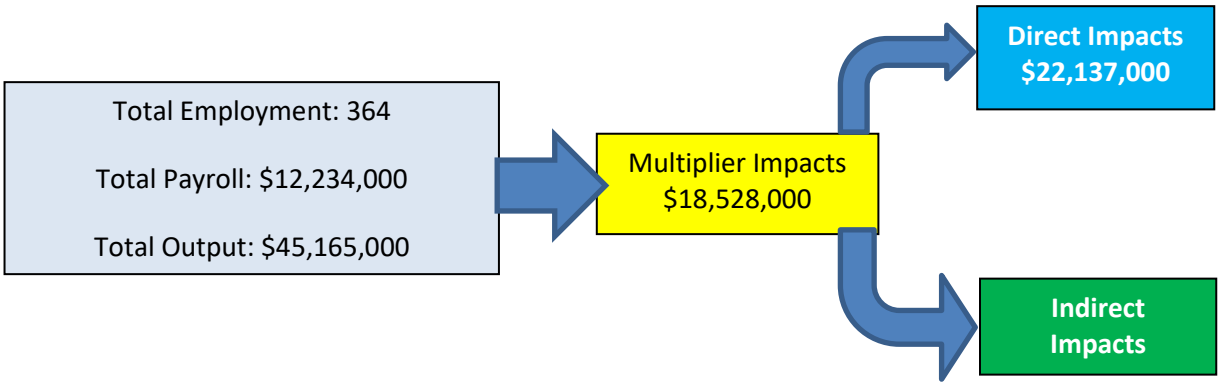
The Florida Department of Transportation (FDOT) in 2014 completed a Statewide Economic Impact Study in addition to individual airport summary reports to illustrate both the direct, indirect and induced impacts of the local airports to local and regional economies. Economic benefits identified include total

economic activity, employment and earnings. Since the Statewide Economic Impact Study is tied to the Florida Aviation System Plan, new data may become available during preparation of this plan. At that time, the new data will also be provided.

As noted earlier, X26 is home to two aircraft manufacturers, Velocity Inc. and LoPresti Aviation. The airport also supports several other businesses including National Aperture, Sebastian Aero/Pilot's Paradise, Skydive Sebastian, Sheltair, Sebastian Municipal Golf Course and All About Storage. This is in addition to providing on-site aircraft storage for personal and recreational aircraft. These tenants provide varying revenue streams which all contribute to the Airport's local and regional impact.

Direct economic impact for the airport is based upon employment, payroll and financial output including any construction projects associated with the Airport and its tenants. Indirect impacts were determined based upon likely spending from visitors who arrive in the area via general aviation aircraft. According to FDOT's 2014 Economic Impact Analysis, direct economic impacts from X26 are $22,137,000 and indirect impacts are $4,500,000.

Figure 2-3
Airport Economic Impacts
Source: Florida Department of Transportation Impact Study



Current Airport Activity

Throughout this master plan process, the project team met and spoke with users and current tenants to identify their current facilities and needs for the future. Initial inventory meetings were held in November and December 2016 with management of Skydive Sebastian, LoPresti Aviation, National Aperture, and Sebastian Aero/Pilot's Paradise. Calls to Velocity, Inc., Sheltair, Mr. Ken Mischler and All

About Storage were never returned. Therefore, a general meeting with current tenants and users to obtain their input will be scheduled on the same day as the Technical Advisory Committee, City Council or other meetings at the Airport.

Approximately 45 percent of the airport's based aircraft are owned and operated by local businesses. The remainder of the traffic is related to recreational including some sight-seeing and flight training operations associated with Florida Institute of Technology (FIT), Paris Air and Flight Safety International students. An overview of activity as well as information obtained from the late 2016 meetings are provided in the following sections.

Skydive Sebastian

Skydive Sebastian is one of the Airports major tenants. Their facilities are located on approximately 7 acres in the west quadrant of the airport. Buildings include their main hangar, a large team building including bathroom and shower facilities as well as an on-site restaurant and Tiki Hut. Contiguous to the parking lot adjacent to Airport Road West is a wooded area used for Skydive Sebastian users for camping (see **Exhibits 2-2 and 2-3**).

During the project team's initial discussion with this tenant, there is strong interest in expanding both their airside and landside facilities including adding another building. Further, with the City adding the Swoop Pond near the jump zone north of Runway 10-28, the business continues to see an increase in skydiving demand especially from Europe. In 2016, the Airport supported a skydiving event at the airport. This type of activity based upon our discussion with the operator is expected to continue to grow. Currently, skydiving activity occurs seven days a week throughout the year.

Exhibit 2-2

Skydive Sebastian Camping Area

Source: TKDA December 2016



Exhibit 2-3

Skydive Sebastian

Source: Google Earth Aerial Image, Europa Technologies, 2016



On-site Aviation Businesses

In addition to Skydive Sebastian, other major aviation tenants include LoPresti Aviation, Velocity Inc, Sebastian Aero/Pilot's Paradise and Sheltair. LoPresti Aviation, a manufacturer of airport accessories, moved to X26 in 2009. They currently lease a 'wing' in the Airport Administration/Terminal building as well as lease Hangar A, a 15,000 sf hangar with offices built in 2009. LoPresti has a 15 year lease with the airport for that facility.

Velocity Inc. is an aircraft manufacturer of single and twin engine "sport" aircraft. Velocity currently has five models of aircraft available, all designed with a pusher propeller system. According to the company, the aircraft have a range of 1,000 NM with four passengers and baggage and top speed of 200 knots. Velocity has seen strong growth, and currently leases three facilities on the airport. Their manufacturing hangar and other facilities are located on the west ramp, and they recently leased corporate hangar B, on the southeast side of the field. This facility includes both hangar and office space and is approximately 12,000 sf. It is used as the showroom and administrative offices for the Velocity Inc. One of the issues mentioned during our discussion with airport management was that there is no internal road; therefore, Velocity personnel tend to drive across the runways and taxiways between the west and southeast facilities. However, the Airport and the City rectified this issue by constructing an interior milled road to help eliminate runway crossing.

Sebastian Aero Services is under new management under the name of Pilot's Paradise. Pilot's Paradise is designated as the airport's fixed based operator (FBO). This company provides pilot facilities, fuel, aircraft maintenance, flight instruction, aircraft rentals and charter flights. Their office, maintenance and fuel facilities are located off of Airport Drive West and Taxiway A in the west airport quadrant north of Runway 10 and Taxiway B. During initial inventory discussion, management was potentially interested in expanding their facilities and negotiating a new lease agreement with the Airport.

Sheltair does not have office space at the Airport but handles the lease administration of the two, 20-unit t-hangars located on the southwest apron area. Initial phone discussions with this tenant were limited. However, according to airport management, there is demand for aircraft storage facilities but at a lower fee than what is currently charged for the t-hangars bays. As part of this master plan, the project team will work with the client to identify alternative storage options, costs and locations to support this demand.

Another business tenant at X26 is Mr. Ken Mishler. Mr. Mishler currently leases two gray metal hangars in the Northwest quadrant of the airport, north of Skydive Sebastian's facilities. The two buildings are approximately 3,000 sf and are currently subleased to two individuals.

Flight Training

X26's location to both Melbourne International and Vero Beach Regional Airports makes it a prime location for flight training. Students from FIT in Melbourne, Paris Air and Flight Safety International, both from VRB, regularly use the airport to practice training maneuvers including touch and go procedures. Because of the extensive low altitude flight training, the Airport has implemented voluntary noise abatement procedures and does not allow touch and go operations on Sundays. An issue of the extensive flight training is that students use the facilities but do not purchase any fuel or provide any other economic benefits to the community. In addition, other airport users have mentioned that during peak operating hours, it may be difficult to operate at X26 because of the extensive flight training operations. During the project team's initial air traffic inventory in January 2017, approximately 50 percent of daily operations were attributed to flight training activity. The impacts of flight training on the airport's facilities as well as mitigation options will be discussed in later sections of the report.

Non-Aviation

Non-aviation businesses that are currently based at the airport include National Aperture Inc, All About Storage, as well as the Sebastian Municipal Golf Course facilities. National Aperture Inc. leases space in one of the "wings" of the airport administration building. They are manufacturers of precision micro-apertures, pinholes, slits, bar patterns and custom configurations used in manufacturing for applications such as spatial filtering, gas/liquid flow control, spectrometry, astronomy, and general optics. They specialize in micro-miniature pinholes and slits.

The project team met with the owners and management of National Aperture to determine the existing and future needs. They noted that their facilities are adequate to fit their needs and that they hope that the airport doesn't grow too large. Some of their customers fly to the airport because of the Florida Atmosphere and usually spend a few days in town when here on business.

All About Storage is a franchise business that rents property between Roseland Road and Airport Drive West on the southwest side of the airport. These facilities have no direct access to the airport operating area and our outside the security fence. This facility provides storage for large trucks, recreational vehicles, boats and trailers as well as other large vehicles.

Sebastian Municipal Golf Course is an 18-hole championship golf course located on 155 acres of airport property primarily in the south quadrant of the airport. Access to the golf course and facilities is off of Airport Drive East and East Airport Road. The course includes a pro shop as well as Eagle Nest Restaurant. Rates fluctuate depending upon the season, but the highest rate is $50.00 for all 18-holes including a cart. The golf course operates seven days per week until 5:30 and 6:00 pm EST. The majority of the course is south of Runway 5-23. However, portions of the course wrap around the approach ends of Runway 28 and 23. The Golf Course has a long-term lease for this property.

Historical Aviation Activity

Historical activity as reported to the FAA through the Terminal Area Forecasts and Airport Master Record 5010 for the Airport were different than operational and based aircraft recorded in the most recent Florida Aviation System Plan (FASP) and in the Florida Aviation Database (FAD). Airport management also provided a list of based aircraft for 2016 which was significantly higher than that reported in either the FAA or FDOT databases.

Because of these discrepancies, on-site inventory of week-long operations were performed in early January 2017 and again in April 2017. During the January inventory, flight training associated with Paris Air and Flight Safety, both based at Vero Beach Regional Airport, was recorded as the majority of operations. Skydive Sebastian performed at least 6 operations daily during the week, approximately every two hours, but their operations increased to every half hour on Saturday. In discussions with Ms. Owens, Skydive Sebastian Management, January is still the slow season. Operations will begin to significantly increase starting in late February through April.

Therefore, based upon operations observed, data provided by management, as well as discussions with existing tenants about their operations, baseline data was established for the year 2016. Calendar year (CY) 2016 was established as the baseline for future activity forecasts at X26, which is provided in Chapter 3, Aviation Activity Forecasts, of this document.

TABLE 2-2 HISTORICAL BASED AIRCRAFT AND OPERATIONS		
YEAR	OPERATIONS	BASED AIRCRAFT
2012	38,631	42
2013	39,346	42
2014	40,073	40
2015	40,815	38
2016	41,570	62
2017	**46,477**	**78**
*Notes: *2017 data was based upon on-site inventory of based aircraft and annual operations* *Sources: 2012-2015 data was obtained from the Florida Aviation System Database, FAA Terminal Area Forecasts, Airport Master Record, and TKDA 2017*		

An inventory of current based aircraft at X26 during Spring 2017 revealed:

- 55 Single engine piston,
- 4 Multi-engine piston
- 3 Turboprop
- 0 Jets
- 0 Rotorcraft (helicopters)
- 10 Experimental
- 6 Light Sport and
- 0 other aircraft are currently based at X26

Discussions with the Sponsor, tenants and other users showed a high need for additional aircraft storage facilities including conventional, corporate, T-Hangar and shade hangar facilities. Therefore, as part of the master plan process, locations for expanded aircraft storage to support current and anticipated demand were evaluated. One option includes expanding the west apron area to support 14 aircraft shade hangars. Since design for taxiways C, D and E are currently ongoing with plans to construct in FY 2018 and 2019, possible apron and other short term pavement needs to support additional aircraft storage should be included in the taxiway grants in order to mitigate impacts to the environment and overall project costs.

Weather Data

The local climate of an airport is important because it impacts aircraft takeoff and landing performance. An analysis of historical wind data helps determine if existing runways provide adequate coverage for aircraft activity (defined as 95 percent coverage), and is also used to establish preferred alignments for

new runways. Temperature, airport elevation (21.5 feet AMSL at X26), and runway pavement conditions affect the length required for aircraft takeoff and landing. In general, as temperature and elevation increase, aircraft require additional runway length to operate.

According to National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC), the hottest month is typically July and the coldest is typically January as illustrated in **Table 2-3**.

TABLE 2-3
X26 AVERAGE HIGH AND LOW TEMPERATURES
2005-2010 (LAST YEAR OF DATA)

Month	Av High Temp (°F)	Av Low Temp (°F)	Monthly Average (°F)
January	71.8	**51.3**	61.6
February	73.7	54	63.8
March	76.7	57.7	67.2
April	80.2	61.1	70.7
May	84.4	67.3	75.9
June	87.8	72.1	79.9
July	**90.1**	73.6	81.9
August	89.1	73.7	81.4
September	87.6	73.2	80.4
October	83.8	68.2	76
November	78.5	61.2	69.8
December	73.7	54.9	64.3
Average	81.4	64.0	72.7

Source: Vero Beach Weather Station GHCND:USC00089219, NCDC Climate Data Online, 2005-2010 (last date available)*

Wind data was calculated for X26 using the ASOS from Vero Beach Regional Airport. Although X26 is equipped with a SuperAWOS, it was not transmitting or recording information. Since the airport supports aircraft less than 12,500 lbs. and supports extensive flight training operations, a 10.5 knot and 13 knot crosswind conditions were modeled based upon historical data. **Table 2-4** illustrates our findings.

TABLE 2-4 WIND COVERAGE			
	CROSSWIND COMPONENTS		
RUNWAY	10.5 KNOT	13 KNOT	CONDITIONS
5-23	90.27%	95%	All Weather
10-28	90%	91%	All Weather
Both Runways	97.02%	98.01%	All Weather
Sources: VRB ASOS Data 2007-2016, NOAA/NCDC database and TKDA 2017			

Existing Airfield Conditions

This section presents an overview of X26's existing airfield components including the Airport Reference Code (ARC), runway and taxiway system, surrounding airspace, and relevant support equipment. Specific design standard features, such as Runway Protection Zones (RPZ) and Runway Safety Areas (RSA), are described during the facility requirements analysis.

Airport Reference Code (ARC)

Airside facilities are designed to support the movement and operation of the most demanding (critical) aircraft which meets the substantial use threshold of 500 annual operations. **FAA Advisory Circular (AC) 150/5300-13**, *Airport Design*, determines the ARC based upon operational and physical attributes of the critical design aircraft. The ARC consists of two components: aircraft approach category (i.e., approach speed in knots), which is designated by a letter and airplane design group (i.e., wingspan and tail height in feet), which is designated as a Roman numeral. The ranges for each category are provided in **Tables 2-5** and **2-6**.

TABLE 2-5 AIRCRAFT APPROACH CATEGORIES	
GROUP CATEGORY	APPROACH SPEED (IN KNOTS)*
A	less than 91 knots
B	91 knots or greater but less than 121 knots
C	121 knots or greater but less than 141 knots
D	141 knots or greater but less than 166 knots
E	166 knots or greater
Source: AC 150/5300-13a, Airport Design. **Based upon 1.3 times aircraft stall speed in landing configuration at maximum landing weight.*	

TABLE 2-6 AIRPLANE DESIGN GROUP		
GROUP NUMBER	**TAIL HEIGHT (FT)**	**WINGSPAN (FT)**
I	<20	< 49
II	20-<30	49 ≤ 79
III	30-<45	79 ≤ 118
IV	45-<60	118 ≤ 171
V	60-<66	171 ≤ 214
VI	66- <80	214 ≤ 262
Source: AC 150/5300-13a, Airport Design.		

The conditionally approved 2010 Airport Layout Plan Update denoted that the current critical aircraft, most demanding aircraft regularly using the runway, for Runway 5-23 was the DH6-300, Twin Otter Aircraft, which is owned and operated by Skydive Sebastian. The Twin Otter has an aircraft reference code (ARC) of A-II, based upon wingspan and approach speed.

The established critical aircraft for Runway 10-28 was the King Air B-100 with an ARC of B-I small (i.e. supports aircraft less than or equal to 12,500 lbs.). The Airport Reference Code along with critical aircraft operating requirements and new taxiway design group criteria drives specific facility requirement dimensions at an airport. Although some facilities may be designed to support smaller or larger aircraft, the airfield itself is designed to support the most demanding operations. For this reason, the current airport reference code and airfield design criteria for X26 is B-II, based upon the combination of the most demanding characteristics of the critical aircraft operating at the airport.

A complete discussion of existing and critical aircraft demand is provided in **Chapter 3**, *Aviation Activity Forecasts*, and determination of facility needs to support anticipated demand is provided in **Chapter 4**, *Airport Demand Capacity and Facility Needs.* The information provided these chapters in addition to the existing airport inventory data is used to create airport alternatives and recommended short and long-term airport development.

Existing Airfield System

Runways and Taxiways

When originally constructed, X26 included 4 runways. Today it is equipped with two intersecting, asphalt runways designated as 5-23 and 10-28. Runway 5-23 is 75 feet wide and 4,023 feet long. It has a single wheel weight bearing capacity of 22,000 lbs., and the runway pavement was rehabilitated in 2009. The runway is equipped with low intensity runway lights, two-light precision approach path indicators (PAPIs) on the left side of both Runway 5 and 23 as well as is equipped with a GPS/RNAV approach. Because of the addition of the GPS/RNAV approach, the runway markings are shown as non-precision.

Although the runway is not currently equipped with a parallel taxiway, plans are on-going to add a partial parallel taxiway on the Northeast end of Runway 23 as well as a full parallel taxiway on the north side of Runway 5-23.

Runway 10-28 is an asphalt runway with 3,199' x 75' dimensions. The runway strength is unpublished; therefore a single wheel minimum strength of 12,500 lbs. was estimated. Although depending upon when the last rehabilitation occurred, it could exceed that weight limit. The runway is not equipped with any edge lighting and is marked for a visual approach only (i.e. basic markings). Both runway ends are equipped on the left side with 2-light precision approach path indicator systems (PAPIs). However, it is important to note that unlike Runway 5-23, the PAPIs do not operate at night on Runway 10-28.

Runway 10-28 is equipped with a parallel taxiway designated Taxiway B, which is approximately 35 feet wide and a centerline separation of 240 feet. The taxiway is marked with hold lines and is equipped with a paved run-up area adjacent to Runway 28. Pavement is in good shape, and the runway was numbers were remarked to comply with new magnetic declination data.

Taxiway A is the edge taxiway that runs along the apron area on the west side of the airfield. It provides access to and from Runway 5 and Runway 10. The west apron area including Taxiway A originally was a runway that has now been converted to apron and a taxiway to support GA demand. This taxiway is approximately 35 feet wide and spans the entire west side of the airfield, approximately 3,600 feet in length. Near the intersection of Taxiways B and A on the Runway 10 end, there is another paved run-up pad. Taxiway A is also equipped with two taxiway connectors to Runway 5 as illustrated in **Exhibit 2-4**. Another paved run-up pad was constructed at the end of Taxiway A, and it is equipped with a magnetic compass rose painted on the pavement.

Exhibit 2-4

Taxiway A Connectors and Compass Rose

Source: Google Earth Aerial Image, Europa Technologies, 2016



Paved portions of other closed runways are used to provide taxilane access to the Airport Administration apron facilities as well as new large corporate hangar facilities on the southeast side of the airfield. A noted in **Exhibit 2-5**, Skydive Sebastian initially wanted to rent proposed Hangar C to support their operations and aircraft. However, due to an accident that reduced their aircraft fleet from two twin otter aircraft to one, they chose to not pursue. The site work has already been completed for this new 15,000 SF hangar, and the airport and sponsor are looking for perspective tenants to lease this facility.

Exhibit 2-5

Corporate Hangar Area – Southeast Airport Quadrant

Source: Google Earth Aerial Image, Europa Technologies, 2016



In addition to runways, taxiways and apron facilities, X26 has also designated an on-airport landing area or parachute drop zone on the airport. The drop zone is located north of Taxiway B and east of Taxiway A and west of the swoop pond as shown by the blue circle in **Exhibit 2-3**, which is also used for parachute activities. According to DOT/FAA/AR-11/30, *Development of Criteria for Parachute Landing Areas on Airports*, specific recommendations are provided for installing a jump zone on an airport. The parachute landing areas (PLA's) must be hazard free. Hazards include: telephone and power lines, water features, trees, buildings, fencing, paved surfaces (ramps/aprons, taxiways and runways), aircraft tie-down areas, and equipment necessary for airport operations. The size of the PLA is dependent upon the parachutists experience and type of activity.

Parachute Landing Area

According to Skydive Sebastian Management, all sky diving personnel must provide appropriate credentials before the company allows them to jump or perform tandem jumps. Tandem PLA dimensions and experienced/certified PLA dimensional recommendations are listed as follows:

- Tandem PLAs and requires (50 meter radius from hazards)^2 x π≈ 84,500 SF
    - 292- by 292-ft square

- 328-ft-diameter circle
- 340- by 250-ft rectangle
- Any other shape with an area equaling 84,500 sq. ft.

- All Other Activity PLAs and requires ((12-m radius from hazards)^2 x π ≈ 5000 sq. ft.).
  - 70- by 70-ft square
  - 80-ft-diameter circle
  - 85- by 60-ft rectangle
  - Any other shape with an area equaling 5000 sq. ft.

The edge of the PLA must be located at a minimum of 40 feet from any hazard. PLAs should not be located within a runway safety area or object free areas.

Existing airfield facilities and published dimensional data is summarized in **Table 2-7**.

TABLE 2-7
EXISTING RUNWAY AND TAXIWAY SYSTEM

PAVEMENT	EST. DIMENSIONS	CONDITION	LIGHTING	NOTES
Runway 5	El. 18.4' AMSL	Good	PAPI-2L	Nonprecision Markings; Runway Usage 55%
Runway 23	El. 21.5' AMSL	Good	PAPI-2L	Nonprecision Markings; Runway Usage 10%
Runway 10	El. 18.3' AMSL	Good	PAPI-2L	Basic Markings; Runway Usage 20%
Runway 28	El. 20.8' AMSL	Good	PAPI-2L	Basic Markings; Runway Usage 15%
Runway 5-23	4,023' x 75'	Good	LIRL	ARC B-II, Strength: 22 SW
Runway 10-28	3,199 x 75'	Good	None	ARC B-I (light aircraft only), Est. Strength: 12.5 SW
Taxiway A	~3600' x 45'	Good and Fair	None	Runs along the apron edge of the west quadrant. Provides access to Runway 5 and Runway 10. Note former runway.
Taxiway B	~4,000' x 35'	Good	None*	Parallel Taxiway to Runway 10-28
Taxiway C	In Design	NA	Reflectors	Planned partial parallel to Runway 5-23
Taxiway D	In Design	NA	Reflectors	Planned parallel taxiway to Runway 5-23
Taxiway E	In Design	NA	Reflectors	Connector taxiway Runway 23 and 28
Taxilane	~540' x 34'	Good	None	Taxilane to Terminal/Administration Area
Taxilane	~900' x 34'	Good	None	Taxilane to southeast corporate facilities
Jump Zone		Good	None	Grassy area north of Taxiway B and east of Taxiway A

**Note: Taxiway lighting is not required for airports with non-lighted or low intensity runway lights (LIRLs)*
Sources: Airport Management, AIRNAV.com Website, 2016 Airport Master Record and TKDA 2017

Exhibit 2-6

Existing Airfield Facilities

Source: Google Earth Aerial Image, Europa Technologies, 2016



Instrument Approaches and Support Equipment

X26 traditionally supports smaller single engine piston and multi-engine piston and turbine engine aircraft. The airport does support some limited rotorcraft transient traffic, but to date, no rotorcraft are based at X26. Only Runways 5 and 23 are equipped with GPS approaches, which allows lower approach minima and decision altitude requirements. Runway 5-23 is the only runway equipped with edge lighting in addition to 2-light PAPIs which assist pilots in discerning the runway threshold during low light conditions. Although approach minimums are provided for AAC C type aircraft, it is unlikely an aircraft with this higher approach speed will use a 4,000 foot runway. **Table 2-8** outlines the instrument, missed approach and visual approach requirements for Runways 5-23 and 10-28.

TABLE 2-8
EXISTING APPROACH CHARACTERISTICS

RUNWAY END	APPROACH	TYPE	MINIMUMS (AAC A & B AIRCRAFT)	NOTES
5	GPS/RNAV	LNAV MDA	400-1	Lateral Navigation with minimum 1-mile visibility and minimum decision altitude of 400 feet
5	GPS/RNAV	LP MDA	380-1	Lateral approach with minimum 1-mile visibility and minimum descent altitude of 380 feet (newer GPS approach)
5	GPS/RNAV	Circling	520-1	Associated with missed approach procedures– 1 mile visibility and minimum altitude of 520’
23	GPS/RNAV	LNAV MDA	400-1	Lateral Navigation with minimum 1-mile visibility and minimum decision altitude of 400 feet
23	GPS/RNAV	LP MDA	380-1	Lateral approach with minimum 1-mile visibility and minimum descent altitude of 380 feet (newer GPS approach)
23	GPS/RNAV	Circling	520-1	Associated with missed approach procedures – 1 mile visibility and minimum altitude of 520’
5	PAPI	Visual	< 1 mile visibility	At night, pilot controlled* Use PAPI glideslope
23	PAPI	Visual	< 1 mile visibility	At night, pilot controlled* Use PAPI glideslope
10	PAPI	Visual	< 1 mile visibility	The PAPI equipment is off at night; Use PAPI glideslope during daytime hours only
28	PAPI	Visual	< 1 mile visibility	

Sources: AirNav.com, published approach procedures, February 2, 2017-March 2, 2017, and 2016 Airport Master Record

X26 is a non-towered airport, but in 2008, it was one of the first airports to install an ADS-B antenna. An automatic dependent surveillance-broadcast (ADS-B) system is part of the FAA’s NextGen system. It is a type of surveillance technology in which an aircraft equipped with an ADS-B can determine its position

via satellite navigation. The antenna periodically broadcasts this information providing aircraft that can receive this data situational awareness and self-separation with other aircraft. The FAA is requiring some aircraft to be equipped with an ADS-B receiver by 2020, and most new aircraft are equipped with an ADS-B cockpit receiver. Ultimately, the ADS-B transmissions will allow for less separation between aircraft and increased airport capacity.

Other support equipment at X26 include a lighted airport beacon located in the airport midfield area and is 25 feet above ground level, lighted wind cone and segmented circle to designate wind direction, and magnetic compass rose. The airport at the time of this writing has a SuperAWOS (Airport Weather Observation System) on the airport that is supposed to provide current weather conditions, cloud ceiling height, etc., and this information would be broadcast over CTAF Frequency 123.05. However, the SuperAWOS is not operational and has been providing intermittent weather data for some time. As a result, the Airport requested and has received FDOT funding to remove the old equipment and install a new AWOS II which will be equipped with dual frequencies, thus allowing pilots to not have to double click the communications to get different information.

TABLE 2-9 ADDITIONAL AIRPORT SUPPORT EQUIPMENT
Lighted Wind Cone and Segmented Circle
Magnetic Compass Rose
AWOS II, dual frequency – installed 2017
Lighted Airport Beacon
ADS-B Tower – installed 2008

Air Traffic Management

The Sebastian Municipal Airport has instituted voluntary flight procedures for operations on Runways 5-23 and 10-28 (see: www.sebastianairport.com/flightprocedures). The Sponsor has designated that the Airport and surrounding properties are noise sensitive. Air operations are recommended to occur between 0700 to 2100 daily with Touch and Go operations limited to Monday through Saturday 0900-1700.

All takeoff operations are recommended to use the “best rate of climb (Vv)” to 1,000 feet above ground level (AGL) or 1,021 feet above mean sea level (MSL) at a minimum. The airport also supports extensive skydiving operations north of Runway 10-28. It is requested that flight operations not associated with skydiving remain clear of this area. To monitor operations at the airport, pilots should use and monitor the Sebastian Unicom frequency 123.05.

The sponsor and airport recently updated their voluntary noise abatement brochure, so pilots should review the new documentation prior to utilizing the airport. The current takeoff, local area or touch and go (T&G) and landing criteria recommendations for Runway 5, 23, 10 and 28 are provided below.

TABLE 2-10
NOISE ABATEMENT PROCEDURES

Operations	Runway 5	Runway 23	Runway 10	Runway 28
Graphic	***Figure 2-4***	***Figure 2-5***	***Figure 2-6***	***Figure 2-7***
Takeoff	Fly 060 deg. As Soon As Practical, No Further Turns Until 1000' AGL, Or Shoreline Whichever Occurs Last	Fly 240 Deg. As Soon As Practical, No Further Turns Until West Of Sebastian River	Fly 060 Deg. As Soon As Practical, No Further Turns Until 1000' AGL, or Shoreline Whichever Occurs Last	No Turns Until West Of Sebastian River
T&G/Local Area	Adjust "Crosswind" To Arrive At Traffic Pattern Altitude (1021' MSL) over Lagoon And Prior To Turning Downwind.	Adjust "crosswind" To Arrive Over Sebastian River, "eastbound Downwind" At Traffic Pattern Altitude (1021' MSL).	Adjust "crosswind" To Arrive At Traffic Pattern Altitude (1021' MSL) Prior To Shoreline "Westbound Downwind".	Adjust "Crosswind" To Arrive Over The Sebastian River, "Eastbound Downwind", At Traffic Pattern Altitude (1021' MSL).
Landing	"Base Leg Turns" west of Sebastian River	"Base Leg" Over Railroad Tracks.	"Base Leg Turns" West of Sebastian River	"Base Leg" Over Railroad Tracks With Angling "Dog Leg" To Final. Remain Clear of Residential to East

Source: Sebastian Municipal Airport, Voluntary Noise Procedures Brochure, August 2016 (www.sebastianairport.com)
*the noise brochure is currently being updated in conjunction with this study and the environmental permitting plan.

Figure 2-4

Runway 5 Voluntary Noise Procedures Pattern

Source: Sebastian Airport Voluntary Noise Brochure, August 2016



Figure 2-5

Runway 23 Voluntary Noise Procedures Pattern

Source: Sebastian Airport Voluntary Noise Brochure, August 2016



Figure 2-6
Runway 10 Voluntary Noise Procedures Pattern
Source: Sebastian Airport Voluntary Noise Brochure, August 2016



Figure 2-7
Runway 28 Voluntary Noise Procedures Pattern
Source: Sebastian Airport Voluntary Noise Brochure, August 2016



Acquiesce with voluntary noise abatement procedures are appreciated, but not at the cost of safe aircraft operations.

Surrounding Airspace

X26 is not equipped with an Air Traffic Control Tower, but it is located between two airports that are equipped with Air Traffic Control Facilities (Melbourne International and Vero Beach Regional Airports). Therefore, airspace above the airport, designated Class E, is somewhat controlled. Class E airspace begins 700 feet above ground level (AGL) and extends upward to 17,999 feet above mean sea level (AMSL), where it meets controlling Airspace A. X26 is designated as an uncontrolled airport, which does not have any specific operating rules, pilot requirements or equipment requirements. The airport is equipped with a CTAF, Common Traffic Advisory Frequency, on VHF Unicom frequency 123.05 MHz which provides air-to-air communication between aircraft operating at and in the vicinity of X26.

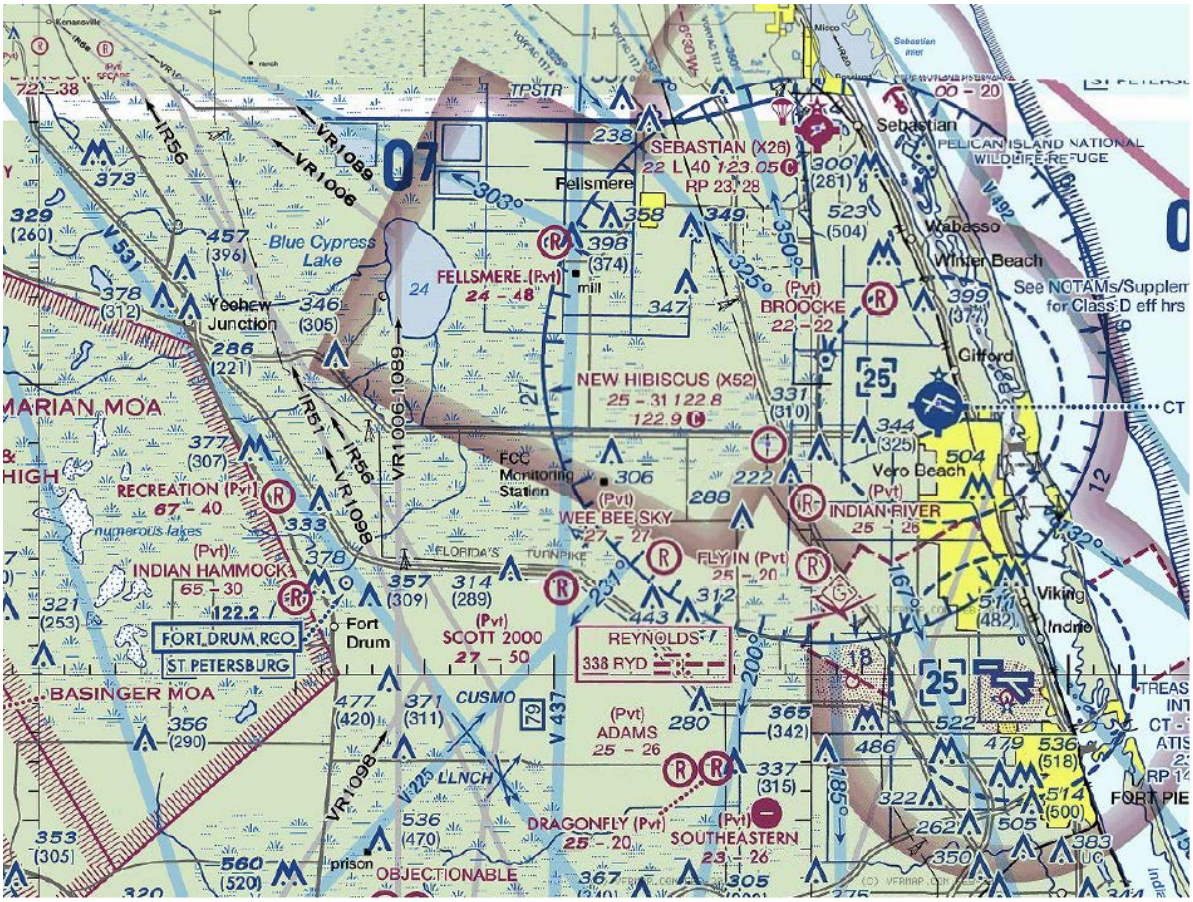
The airspace environment in and adjacent to the airport is influenced by military operating areas (MOAs) associated with Department of Defense or other government facility operations and victor airways, airspace corridors, associated with VOR approaches to Vero Beach Regional Airports. With the implementation of NextGen in the coming years, ground based navigational equipment such as VORs (VHF Omnidirectional Range) antenna are being phased out. **Table 2-11** and **Figure 2-8** illustrate the airspace surrounding the airport.

TABLE 2-11
AIRSPACE CLASSIFICATIONS

CLASS AIRSPACE	ENTRY REQUIREMENTS	EQUIPMENT	MINIMUM PILOT CERTIFICATION	AERONAUTICAL CHART	NEAREST TO X26
A	ATC clearance	IFR equipped	Instrument rating	Jetways – all flight above 18,000 AMSL	Patrick AFB
B	ATC clearance	Two-way radio, transponder with altitude reporting	Private	Surrounds nation's busiest airports	Orlando (MCO)
C	Two-way radio communications prior to entry	Two-way radio, transponder with altitude reporting	No specific requirement	Airports served by radar approach control	West Palm Beach (WPB)
D	Two-way radio communications prior to entry	Two-way radio	No specific requirement	All other towered airports	Vero Beach (VRB)
E	None for VFR	No specific requirement	No specific requirement	Varies	X26
G	None	No specific requirement	No specific requirement	All undesignated airspace	N/A

Sources: Pilot's Handbook of Aeronautical Knowledge and TKDA February 2017

Figure 2-8
Surrounding Airspace
VFR Sectional Chart, 2016



Nearby Airports

Sebastian Municipal Airport is located almost halfway between Vero Beach Regional and Melbourne International Airport, which are both equipped with Air Traffic Control Towers. Other airports located within a 35 nautical mile (NM) radius of X26 that have instrument approach capabilities are Treasure Coast International, Patrick Air Force Base and Merritt Island Airport. Patrick Air Force Base and its immediate surrounding airspace is used to support military operations. Pilots must contact air traffic control for permission to enter Patrick AFB's terminal airspace. **Table 2-12** lists characteristics of nearby airports with instrument capability.

Figure 2-9

Nearby NPIAS Airports

FAA NPIAS, 2017-2021, October 2016

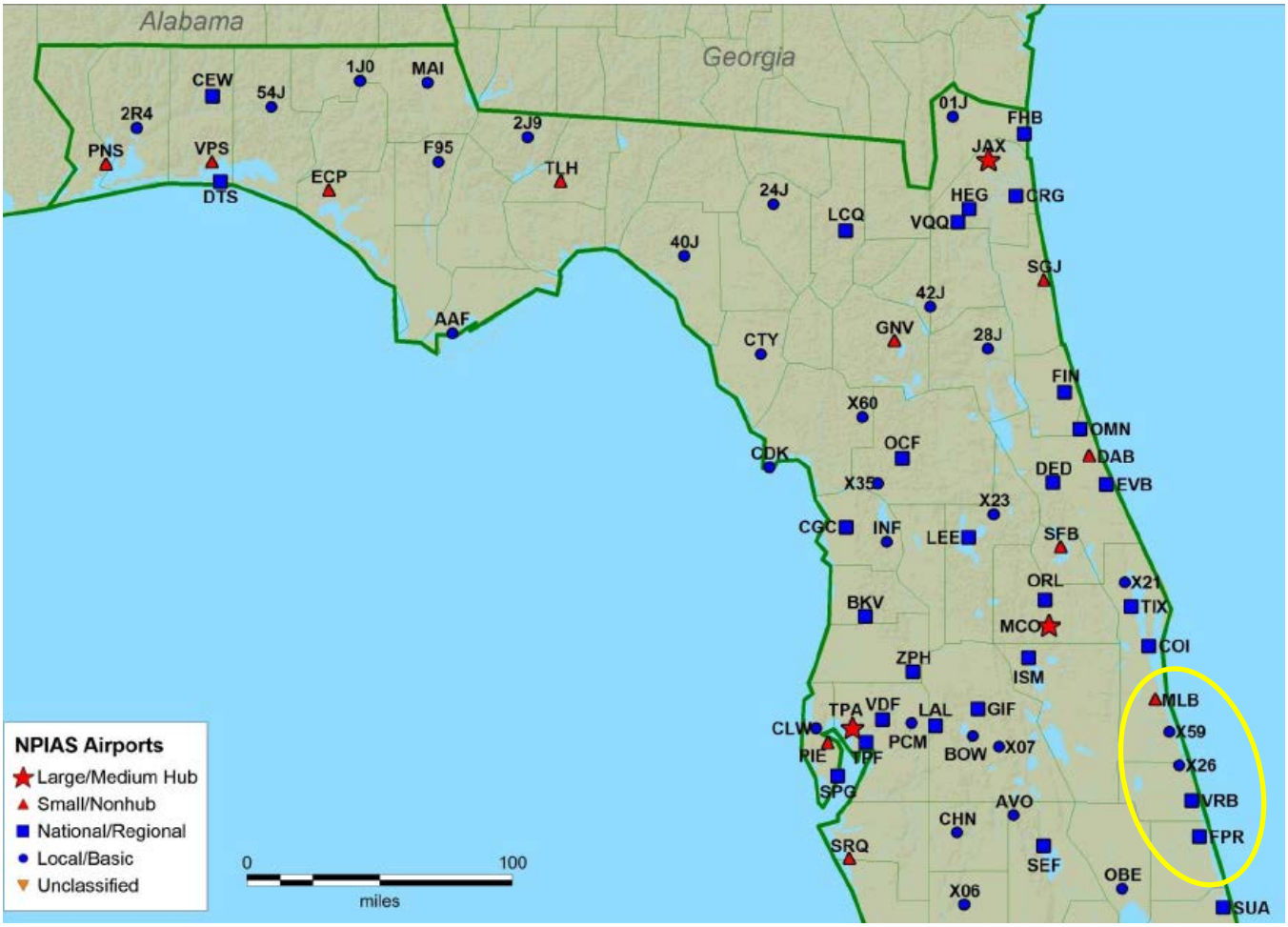


TABLE 2-12 ALTERNATE AIRPORTS WITH INSTRUMENT CAPABILITY						
AIRPORT	**FAA CODE**	**NPIAS DESIGNATION**	**DISTANCE FROM X26 (NM)**	**RUNWAYS**	**PUBLISHED INSTRUMENT APPROACH PROCEDURES**	**ATCT**
Vero Beach Regional Airport*	VRB	Regional - GA	10 NM SE	12R/30L (Asphalt): 7,314' x 106' 4/22 (Asphalt): 4,974 x 100' 12L/30R (Asphalt): 3,504' x 75'	RNAV (GPS) – RWYs 04, 12R, 22 and 30L VOR/DME RWY 30L VOR- RWY 12R	Yes
Melbourne International Airport	MLB	Primary Airport – Non-Hub	19 NM NW	9R/27L (Asphalt): 10,181' x 150' 9L/27R (Asphalt): 6000' x 150' 5-23 (Asphalt): 3001' x 75'	ILS or LOC – RWY 9R RNAV (GPS) – RWYs 09L, 09R, 27L, 27R LOC BC: RWY 27L VOR: RWY 9R	Yes
Treasure Coast International Airport	FPR	National - GA	20 NM South	10R/28L (Asphalt): 6,492' x 150' 14/32 (Asphalt): 4755' x 100' 10L/28R (Asphalt): 4000' x 75'	ILS or LOC – RWY 10R RNAV(GPS) – RWYs 10R, 14, 28L, 32 VOR/DME – RWY 14 NDB – RWY 28L	Yes
Patrick AFB	COF	Military - Private	26 NM North	3/21 (Concrete): 9,003' x 200' 11/29 (Asphalt): 3,992 x 200'	ILS or LOC/DME – RWYs 03 and 21 VOR/DME – RWY 3 TACAN RWYs 3 and 21	Yes
Merritt Island Airport	COI	Regional - GA	33 NM North	11/29 (Asphalt): 3,601' x 75'	RNAV (GPS) – RWY 11	No
*Notes: * Vero Beach Regional Airport although shown as Regional-GA actually provides limited scheduled commercial service.*						
Sources: AirNav.com and FAA NPIAS Report, 2017-2021						

EXISTING LANDSIDE CONDITIONS

The existing landside facilities at Sebastian Municipal Airport are illustrated in **Figures 2-10, 2-11 and 2-12**. The primary on-airport landside functions include: 1) skydiving, 2) general aviation, and 3) aviation businesses. Each function and service is described in this section as it pertains to X26's landside facilities, including existing buildings, aircraft parking aprons, and other relevant components.

Figure 2-10
Airport Administration and Corporate Facilities
Source: Google Aerial Imaging, Europa Technologies, 2016



Figure 2-11

Southwest Quadrant Airport Facilities

Source: Google Aerial Imaging, Europa Technologies, 2016



Figure 2-12

Northwest Quadrant Airport Facilities

Source: Google Aerial Imaging, Europa Technologies, 2016



TABLE 2-13 LANDSIDE FACILITIES			
BUILDING #	**DESCRIPTION**	**ELEVATION (AMSL)**	**BASE DIMENSIONS**
1	Aircraft Storage Hangar (SheltAir)	47'±	TBD
2	Skydive Sebastian Facilities – Multiple Facilities	41'±	TBD
3	Sebastian Aero Services	43'±	TBD
4	Velocity Aircraft	47'±	TBD
5	Airport Terminal	40'±	TBD
6	Velocity Service Center	36'±	TBD
7	2 - T-Hangar Buildings (40-Units)	40'±	TBD
8	Golf Course Maintenance	38'±	TBD
9	Golf Course Club	45'±	TBD
10	Electrical Vault	38'±	TBD
11	Police Evidence Compound	35'±	TBD
12	Airport Maintenance	35'±	TBD
13	Aircraft Storage Hangar – Hangar A (LoPresti Aviation)	50'±	Est. 15,000 SF
14	Aircraft Storage Hangar – Hangar B (Velocity Service Center)	50'±	Est. 12,000 SF
Terminal Apron	Parking (10 aircraft tie-downs) and Maneuvering	NA	TBD
West Apron	Parking (40 aircraft tie-downs) and Maneuvering	NA	TBD
Avgas Aboveground	Pilot's Paradise Owned and Sell	Full service, West Apron	10,000 Gallons
Avgas Aboveground	County-Owned and Sell	Administration Building Apron (full and self service)	10,000 Gallons
Jet A	Skydive Sebastian – Private Use	West Apron	TBD Gallons
Source: Note: Building numbers shown are for reference only and do not represent the airport's actual numbering scheme.			

Access, Circulation and Auto Parking

Direct access to airport facilities on the south and west quadrants of the Airport are provided via Airport Drive East and Airport Drive West, respectively. Airport Drive East extends from Main Street and heads north providing access to the Administrative/Terminal Building as well as Hangars A and B. Approximately 50 parking spaces are available adjacent to the Terminal building.

Airport Drive West is access from Roseland Road and parallels west quadrant development. Parking facilities were established off of Airport Drive West to support aviation businesses as well as the T-Hangar users.

Access to both Roseland Road and Main Street via Fleming Road is provided by Sebastian Blvd (also known as Fellsmere Road and County Road 512). County Road 512 is a four lane highway which provides direct access to I-95 North and South.

Airport and City Public Works Storage

The City Public Works department is responsible for on-airport maintenance with the exception of individual leaseholds. Airport and City public works equipment storage facilities are located in a large metal building on the east side of the East Airport Drive. The building is in poor shape, and plans are to relocate this equipment to another location. The City is currently working on demolishing the building and prepping the site for future development. Utilities are available along Airport Drive East, which may allow the Airport and Sponsor to be able to redevelop or lease this property for non-aeronautical use.

Aircraft Rescue and Firefighting Support

The airport is not a commercial facility, so there are no requirements to have on-airport aircraft rescue and firefighting facilities (ARFF). Fire services are provided by the Indian River County Emergency Services Special District. This district provides fire, rescue, emergency medical, and other services to the persons and property within the district.

Indian River County Special District is equipped with 1,200 and 5,000 gallon water tanker trucks. Fire service provides all fire suppression, airport crash response, fire inspection and prevention operations at X26.

Fuel Storage and Dispersal

100LL/Avgas is available from two suppliers on the airfield. Sebastian Aero/Pilot's Paradise supplies full fuel services on the west side of the airport. The City of Sebastian provides additional full service and self service facilities, which are both located on the administration building/terminal ramp. Both facilities are supported by 10,000 gallon fuel tanks as well as fuel trucks. Fuel prices are fairly similar for full service, and self-service fuel costs are similar to others in the area. The self-service facility is open 24 hours and 7 days per week. Skydive Sebastian services and fuels its own planes. They are the only tenant on the airport who currently uses Jet A, and it is not for sale to any other user or operator.

With continuing concerns about the impacts of leaded fuel on air quality and human health, there is a movement to phase out 100LL fuel and replace it with some type of biofuel substitute. In addition, turbine aircraft, which utilize jet fuel, run cleaner than their piston counterparts. Because of this, FAA noted in its most recent FAA Aerospace Forecast 2016-2036 forecast an increase in turbine engine aircraft and decrease in piston engine aircraft during the next 20-years. This analysis was based upon new aircraft technology as well as climatological and health concerns. An analysis of likely future fleet mix and fuel demand is provided in Chapters 3 and 4 of this report.

Electrical Vault

The electrical vault was built adjacent to the Administrative Building Parking Facilities along Airport Drive East. It supports the terminal and other on-airport facilities including airport lighting, navigational

aids as well as houses the security recording equipment. From inventory of the airport facilities, the electrical vault has capacity to support continued development at the Airport in the near future.

Airport Security

The airport is equipped with a 6 foot perimeter fence and automated gate access is obtained through an ID 'swipe card' system. The airport is also monitored by a number of security cameras which provide coverage and recording of the airport environment. Additional cameras were added to the facility in 2013 to provide coverage for the new corporate facilities. Trespass signage is clearly marked on the perimeter fence, but the main gate near the Airport Administration/Terminal Building remains open during normal airport operating hours of 0800 to 1700.

Following the attacks on September 11, 2001, numerous laws were passed to enhance airport security based upon the threat levels. Security improvements will be provided in conjunction with recommended development throughout the master plan process. Documents used to support our analysis will include, but not be limited to:

- Florida Statute 330 Regulation of Aircraft, Pilots, and Airports
- Recommended Security Guidelines for Airport Planning, Design, and Constructions TSA
- Title 49 Code of Federal Regulations, Part 1542 Airport Security, and
- Title 49 Code of Federal Regulations, Part 1540 Civil Aviation Security: General Rules

Airport Utilities

Article V, Appendix A, Franchises, of the City of Sebastian Municipal Code established the agreements between utility organizations (phone, electrical, natural gas, cable, water and waste management). This municipal code also applies to all utilities in and on the airport property. Airport infrastructure construction and improvements will require expansion or upgrades to existing on-airport utilities to support proposed development. In discussions with Airport Management, existing utilities (i.e. water, electric, sewer, etc.) is available in the west quadrant of the airport and additional infrastructure may be tied into utilities running adjacent to Airport Drive West, Central Airport Drive and Corporate Airport Drive.

However, property north of Corporate Airport Drive and in the northeast quadrant of the airport adjacent to the 100 foot Scrub Jay buffer and former runway 18/36 is not equipped with any utilities. Therefore, any development proposed in this area will need to consider the cost of extending and expanding utility lines to this area as well as other site preparation as part of any proposed development. The project team is and will continue to work with airport utility providers to determine where current utility lines are on the airport as well as the cost of potential expansion.

Electric

In 1951, the City of Sebastian entered an agreement with Florida Power and Light to provide all street lighting services and electrical services to the City of Sebastian and its corporate areas (including the airport). As part of this agreement, the City allows FPL to "construct, operate and maintain in, under, upon, along, over and across the present and future roads, streets, alleys, bridges, easements, right-of-ways and other public places"[4] throughout the existing and future incorporated areas.

Underground electrical lines run along Airport Drive East and East Airport Road providing electricity to the Sebastian Municipal Golf Course and Airport facilities on the Southeast side of the airfield. The FPL lines tie into the airport electrical vault which is located adjacent to the terminal auto parking. A two phase power line also extends across Runway 5-23 to the west side of the Airport. Additional power lines extend along Airport Drive West to provide power to GA tenants.

Waste Management

Waste Management services, according to Ordinance No. O-03-12, adopted June 2003, was granted exclusively to Waste Management Inc. Waste Management Inc. would provide both solid waste collection and recycling services to the residential and commercial incorporated communities within the City of Sebastian. Another ordinance was adopted in June 2013, which continued to grant Waste Management, Inc. of Florida an exclusive contract, which also includes an automatic five year renewal unless either party notifies the other in writing. Solid waste and recycling products are brought the Indian River Solid Waste District for disposal and recycling. Solid waste and recyclables produced by the airport with the exception of green waste is taken by Waste Management Inc. for disposal at the Indian River Solid Waste District.

Water and Wastewater

The Indian River County utilities department provides water and wastewater connections and transfer services to existing and new developments within the area. Water at the airport was initially provided via a series of on-site wells, and some leaseholds were equipped with septic systems. In conjunction with various projects at the airport, water and sewer lines were added along Airport Drive West and East to support the airport facilities. The on-site wells were closed and the septic systems were removed. According to management, water and wastewater utilities have been extended the whole length of the Western Airport Quadrant to allow additional development in this area. No water or wastewater utilities are found north of the closed runway. Water and wastewater lines extend to the Airport Golf Course facilities as well as up Airport Drive East to provide facilities to the Terminal and corporate leaseholds. The terminal building and other larger facilities are equipped with water meters, and some leasehold agreements include costs for water and wastewater management. The Airport has minimum

[4] Sebastian, Florida - Code of Ordinances, Appendix A, Franchises, Article VII, Florida Power and Light – Electric, Section 1, Grant.

standards in place which include the disposal of hazardous materials, so as not to contaminate the water system.

Drainage and Stormwater Management

The City of Sebastian Public Works – Roads and Drainage Division oversees the City's drainage ditches, canals, waterways, as well as manages the storm water park, airport drainage system and provides in-house water quality sampling and testing. Stormwater at the Airport is maintained by a series of underground drains and some shallow ditches. Water from the North and South infield area are also piped west under the north-south taxiway by way of two large pipes. The water continues west to open drainage ditches and canals and ultimately outfalls into the Sebastian River. During heavy downpours, water appears to be draining partially to the conservation easement area and partially to the golf course property where several retention ponds are located. As additional infrastructure including aprons, taxiways, buildings, etc. are added, stormwater impacts will be evaluated and mitigation options will be proposed in conjunction with approximate cost estimates.

Land Use and Zoning

As a federally obligated airport facility, the land use both on-airport and contiguous to the airport property, including approach and departure surfaces, should be compatible with aeronautical activity. Construction of facilities that within five miles of the airport should be evaluated to determine if possible hazard to air navigation. The FAA provides an obstruction evaluation and Airport airspace analysis tool (OE/AAA) at their website, https://oeaaa.faa.gov/oeaaa/external/portal.jsp, to allow sponsors, contractors or their representatives to determine if development could negatively impact airport operations.

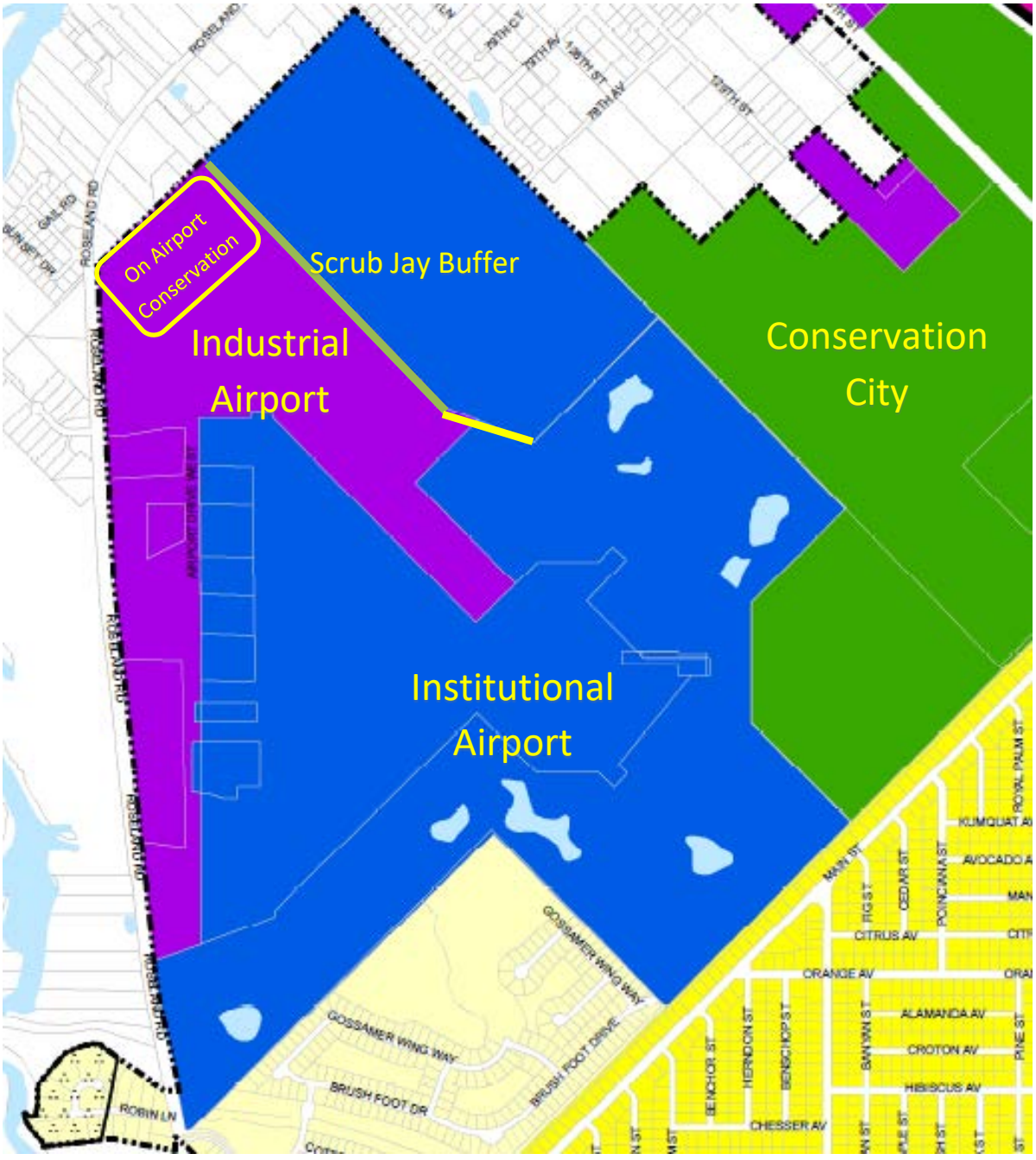
The City of Sebastian has also implemented Ordinance No. O-16-05, enacted August 10, 2016, to provide requirements for land development within the City and incorporated areas. Article IV provides the requirements for land use and Article V relates to existing and future zoning. Both Articles were designed to provide a comprehensive land development code in compliance with local, state and federal needs.

Under **Article IV, Sec. 54-2-4.5**, "No building or structure shall be erected, reconstructed or structurally altered, nor shall any building, land or water be used for any purpose other than a use permitted in the district in which…(it) is located." **Figure 2-13** illustrates current land use both on and adjacent to the airport.

Figure 2-13

Land Use

Source: City of Sebastian Community Planning Website Maps



On-Airport Conservation and Easements

As illustrated in **Figure 2-13**, a 32.3 acre Conservation Easement is located in the Northwest quadrant of the Airport property. A 50 foot vegetative buffer located just inside the airport property boundary surrounds the on-airport conservation area. This conservation area was established based upon protected habitat requirements as well as endangered species finding as well as the additional 100 foot easement on the Northeast side of the airport perimeter to protect Scrub Jay habitat. Conservation areas typically consist of environmentally sensitive natural resources or habitat. However, according to FAA, conservation on an airport should be avoided. Therefore, as part of the environmental studies being conducted in concert with the master plan update, an analysis of the established conservation areas will be evaluated to determine if this property may be utilized for airport development. The project team will work with applicable state and federal agencies to determine if mitigation and/or reuse is possible.

Airport Zoning

Airport zoning is critical to protect airport property including aeronautical surfaces and approach and departure paths from incompatible land use. The City of Sebastian has established land use ordinances to comply with federal and state aviation requirements as well as limit noise and other negative impacts to nearby residents. However, FAA regulations will govern airport land use, specifications and placement of structure within the Airport Operating Area (AOA). Development outlined in this master plan must comply with local land use zoning requirements and recommended actions incorporated into the City's land use and zoning comprehensive plan. Airport zoned property is shown as "AI" in **Figure 2-14**.

The Public Service District (PS) was established to allow for recreational and institutional development. Development within the PS district must comply with the City's comprehensive plans and airspace height limitations. Permitted uses, as outlined in **Sec. 54-5.8** include: Parks and Recreation Areas and public accessory uses. Currently the PS zoned property surrounding adjacent to the airport is used for the 18-hole Sebastian Municipal Golf Course, which is an accepted and compatible land use with the airport environment.

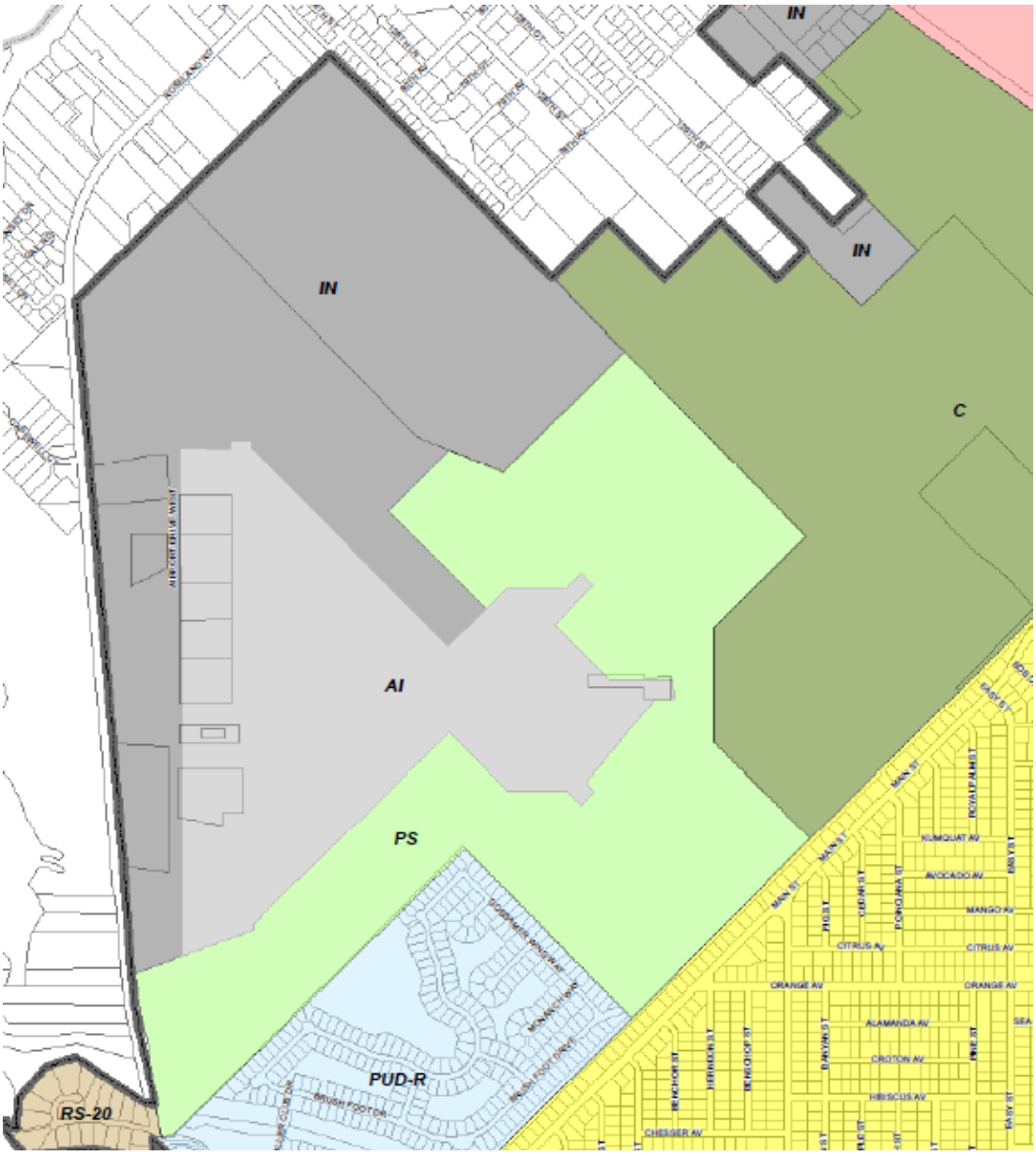
The Industrial District (IN) is a compatible use near an airport unless it causes a hazard to air navigation. Therefore, the City has designated that no salvage yards or junk yard are permitted within the City limits. Permitted uses may include: utilities, business and professional offices, commercial retail, storage facilities, trades and skilled services, including marine-related, wholesale trades and services as well as other light industrial and commercial development.

All development in the IN, PS and AI Districts must comply with the City's Comprehensive Plan and land development regulations.

Figure 2-14

Zoning Map

Source: City of Sebastian Community Planning Website Maps, April 2015



Encumbered Airport Property Inventory*

As noted in Chapter 1, the Airport Sponsor is federally obligated to submit an accurate Exhibit 'A' Airport Property Inventory Map and Inventory as part of the Master Plan Update and Airport Layout Plan

update. The Exhibit A provides a snapshot in time of current airport property as well as identifies parcels for either acquisition, direct fee or easement, or sale to support future airport development.

To accurately provide this information, the project team is working with a local land service company to provide ownership and property encumbrance data for the airport and surrounding properties, which is to be used to populate the Exhibit 'A' Property Map and is used to evaluate airport alternative development options, evaluate compatible land use as well as develop cost estimates and airport 20-year Capital Improvement Program (CIP). The company is currently gathering historical, existing and potential future property title, interest (i.e. easements, right of first refusal, and other rights), and grant history data.

The encumbrance data is summarized in the Airport Layout Plan, Exhibit A Property Map, data sheet. Support information associated with existing property data is provided in Appendix

Environmental Considerations*

An important element of an Airport Master Plan is identifying and documenting environmental issues that can affect existing airport facilities as well as proposed short- and long-term developments. These considerations are important because both state and Federal requirements can play a major role in how these issues are addressed or considered. Environmental considerations must be identified and assessed to help the airport sponsor thoroughly evaluate development alternatives and expedite subsequent environmental processing. Of importance is understanding the differences in environmental processes for projects that are funded by the FAA or FDOT. Both of these processes are further described in this section. Another important consideration is that any environmental considerations identified during the master planning process should set the stage for future state and Federal environmental processes that may be needed. It is not the intent of the Master Plan to include the full NEPA or FDOT PD&E process; rather, the information collected during the Master Plan should identify and set the stage for understanding what future environmental processes may be needed.

Environmental Overview

As a component of the inventory effort, an environmental overview was conducted to identify environmental considerations that could affect future airport development. This overview was based on a review of available resource materials and literature. The environmental information was collected based upon the guidelines set forth in **FAA Order 5050.4B**, entitled *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, which includes 23 categories of potential areas of impact that must be addressed in compliance with NEPA.

For the purpose of this overview, only the environmental categories that were deemed applicable to X26 were addressed, with the goal of identifying features that could affect proposed development projects identified as a product of this Master Plan Update study.

Since an environmental study and habitat conservation plan (HCP) were performed in conjunction with this master plan update, the findings and recommendations are provided in **Chapter 6** of this report. This allowed an evaluation of potential impacts and opportunities related to recommended airfield and landside development proposed for the twenty-year planning period.

Wildlife Hazard Site Visit*

FAA now requests that all airports perform at a minimum a three day wildlife hazard site visit to determine if there are wildlife issues and attractants that have and could negatively impact X26's operations. Further, a portion of the existing airport property is designated conservation for Scrub Jays as well as a conservation buffer which extends around most of the airport property. February 8 – 10, 2017, a FAA Qualified Wildlife Biologist and a Wildlife Biologist performed the three day site visit and their findings are summarized in **Chapter 6**, *Airport Environmental Analysis*, and associated support documentation is provided in **Appendix E** of this report. Data from this information along with the environmental and habitat conservation plan were used to evaluate, modify and determine likely costs associated with airport recommended development graphically depicted on the 2018 Airport Layout Plan. , their findings will be noted later in this report.

Summary

While concise, the overview above does not provide an exhaustive inventory of every specific facet of Sebastian Municipal Airport. The purpose of the inventory chapter is to provide general facility data which will be used as a basis for more detailed evaluation in later chapters of this report.

CHAPTER THREE
Aviation Activity Forecasts

Introduction

Aviation activity demand at airports drives operational and infrastructure improvements. This chapter focuses on identifying existing demand and forecasting likely aviation activity during the next twenty years (2017-2037). This chapter will also identify and forecast critical aircraft demand, which along with the forecasts, will support infrastructure development.

Since the Sebastian Municipal Airport (X26) exclusively supports general aviation operations, the following forecasts were developed:

- Aircraft Annual Operational Demand by Type
- Local and Itinerant Operational Demand
- Based Aircraft Demand
- Based Aircraft Fleet Mix
- On-Demand Air Taxi Enplanement Forecasts
- Total Aircraft Fleet Mix, and
- Critical Aircraft Demand.

Baseline activity utilized to determine all forecast demand was obtained from historical 2016/2017 data. Historical data was obtained from a variety of sources, and then compared to actual on-site survey data acquired in January 2017, April 2017 and July 2017.

Aviation activity may be influenced by economic factors, community goals, national and international trends as well as specific local and regional factors. Therefore, forecasts developed as part of this analysis were based upon more than historical data. Forecasts analyzed aircraft manufacturing, pilot training, new technology, and socio-economic trends (i.e. population, per capita income, and employment) as well as compared activity to other airports within the Treasure Coast Region. Further, on and off-airport

factors including, but not limited to, existing airport facilities, location to other airports, large population segments (e.g. flight schools) and business or tourism center, and community characteristics all impact to varying degrees historical and forecast aviation demand.

Forecasts are not to be construed with predictions of the future but rather an educated guess of future activity based on a variety of predictors, mathematical formulae, assumptions, and subjective judgment. The accuracy of the estimates decline as the planning term is extended potentially as a result of unforeseen local or geo-political events, natural disasters, or longer-term weather or climatological events. These caveats notwithstanding, the forecasts presented in this chapter employ a variety of methodologies which industry-accepted practices.

Historical and Current Air Traffic Activity

The first step in any forecast analysis is to gather existing historical operational and based aircraft data. Published sources of historical data for Sebastian Municipal Airport include the Airport Master Record, 5010 report, the FAA Terminal Area Forecasts (TAF), the Florida Department of Transportation Florida Aviation System Plan (FASP), FDOT Data and Forecasts, and Florida Aviation database (FAD), as well as previous planning documentation. Data from other sources typically used including Flight Aware and FAA Operations and Performance data were not available for X26, and historical data provided in the previous 2002 master plan was dated.

Since the Airport is not equipped with an air traffic control tower, the project team collected data through interviews with tenants and management, physical inventory of based aircraft, and manual counts of aviation activity. Aviation activity was recorded from 0700 to 1700, Monday, January 16 through Sunday, January 22, 2017, as well as Monday, April 10 through Sunday, April 16, 2017. Evening on-site inventory of activity was also performed on one evening during each week. The team was on-site past 2100, and noticed very little evening traffic (approximately 1 operation). Additional data was provided by Airport Management based upon onsite inventory of based aircraft in late June and early July 2017.

Discussions with both tenants and management revealed that April historically represents the peak month for aviation activity at the airport. Data collected included

number of aircraft operations by aircraft type and user, number of touch & go operations, skydiving operations and jumps, on-demand air taxi operations as well as any other pertinent data that would assist in developing realistic forecasts of future activity and facility demand.

A comparison of historical operational data is provided in **Table 3-1**, and based aircraft is shown in **Table 3-2**. An important distinction in the recording of historical data and associated forecasts is that the FAA Terminal Area Forecast does not record operations or based aircraft associated with experimental, light sport aircraft or gliders (Other category), whereas the FDOT databases do. On-site survey of both based aircraft and operations did include experimental, light sport and glider activity.

TABLE 3-1
HISTORICAL OPERATIONAL DATA
Note: Items shown in Blue were each documents respective forecasts for those years
[1]FAA TAF data does not include operations associated with experimental, light sport and glider aircraft.

Fiscal Year	FAA TAF 2017[1]	FASP 2025	FAD 2015	Airport Master Record (submitted update 7/10/2017)	On-Airport Survey (All Operations)
2007	37,240	47,800	47,800	Not Available	
2008	37,240	47,800	47,800	Not Available	
2009	37,240	37,240	37,240	Not Available	
2010	37,240	37,240	37,240	Not Available	
2011	37,240	37,240	37,929	Not Available	
2012	37,240	37,240	38,631	Not Available	
2013	37,240	37,240	39,346	Not Available	
2014	37,240	37,240	40,073	Not Available	
2015	37,240	37,929	40,815	Not Available	
2016	37,240	38,631	41,570	37,240	
2017	**37,240**	**39,345**	**42,339**	**44,403***	**44,403**

**Airport Master Record includes all operations*
Sources: 2017 FAA Terminal Area Forecast, FDOT 2025 Florida Aviation System Plan, 2015 Florida Aviation Database, 2016 Form 5010, Airport Master Record and TKDA 2017

TABLE 3-2
HISTORICAL BASED AIRCRAFT DATA
Note: Items shown in Blue were each documents respective forecasts for those years
*[1]FAA TAF data **does not** include operations associated with experimental, light sport and glider aircraft.*

Fiscal Year	FAA TAF 2017[1]	FASP 2025	FAD 2015	Airport Master Record (submitted update 7/10/2017)	On-Airport Survey (7/10/2017)
2007	52	66	52	Not Available	
2008	52	66	52	Not Available	
2009	41	66	41	Not Available	
2010	39	66	39	Not Available	
2011	40	66	40	Not Available	
2012	42	66	42	Not Available	
2013	42	40	42	Not Available	
2014	40	36	40	Not Available	
2015	40	37	38	Not Available	
2016	40	38	38	38	62
2017	**40**	**38**	Not Available	**59***	**59**

*Note: *Airport Master Record shows 49 fixed wing aircraft (Single Engine, Multi-Engine, Twin, and Jet) and an additional 10 aircraft were represented by a combination of Light Sport, ultralights and powered parachute.*
Sources: 2017 FAA Terminal Area Forecast, FDOT 2025 Florida Aviation System Plan, 2015 Florida Aviation Database, 2016 Form 5010, 2016 Airport Master Record, Airport Management and TKDA 2017

Historical data was used to develop likely based aircraft demand and activity forecasts for the twenty year planning period. As the most accurate data, FY 2017 historical data was used as the primary baseline for all airport forecasts.

Previous Forecasts of Demand

In addition to historical data, previous analyses of likely based aircraft and demand at X26 was reviewed. To see if any past trends would still be applicable. These forecasts in addition to various approved forecast methodologies (i.e. regression, share analysis, trend analysis, comparison to other airports, operations per based aircraft, etc.) were used in combination to determine likely operational and based aircraft demand in addition future fleet mix and critical aircraft demand. A summary of forecasts used as part of this study are illustrated in **Tables 3-3**, *Aviation Operational Forecasts*, and **3-4**, *Based Aircraft Forecasts*.

The 2000 Master Plan Update completed by The LPA Group Incorporated used the year 2000 as their baseline for forecasts through 2022. Since only key years (i.e. 2000, 2007,

2012 and 2022) were provided for both operational and based aircraft demand, data was extrapolated to fill in the gap years. This data is highlighted in blue.

TABLE 3-3
AVIATION OPERATIONAL FORECASTS

Fiscal Year	FAA TAF 2017	FASP 2025	2000 Airport Master Plan
2000			26,237
2007			32,050*
2012			36,974*
2017	**37,240**	**39,345**	**42,655**
2018	37,240	40,073	43,893
2019	37,240	40,815	45,165
2020	37,240	41,570	46,475
2021	37,240	42,339	47,823
2022	37,240	43,122	49,210*
2023	37,240	43,920	50,637
2024	37,240	44,732	52,106
2025	37,240	45,560	53,617
2026	37,240	46,403	55,172
2027	37,240	47,261	56,772
2028	37,240	48,135	58,418
2029	37,240	49,026	60,112
2030	37,240	49,933	61,856
2031	37,240	50,857	63,649
2032	37,240	51,797	65,495
2033	37,240	52,756	67,395
2034	37,240	53,732	69,349
2035	37,240	54,726	71,360
2036	37,240	55,738	73,430
2037	37,240	56,770	75,559
AAGR 2017-2037	0.00%	1.85%	2.90%

Sources: 2017 FAA TAF, 2025 FDOT FASP, 2000 X26 AMPU, LPA Group Inc., and TKDA 2017

TABLE 3-4 BASED AIRCRAFT FORECASTS			
Fiscal Year	**FAA TAF 2017**	**FASP 2025**	**2000 Airport Master Plan**
2000			42
2007			51*
2012			59*
2016	40	38	66
2017	**40**	**38**	**68**
2018	40	39	70
2019	40	40	72
2020	40	41	75
2021	40	42	77
2022	40	43	79
2023	40	44	81
2024	40	45	84
2025	40	46	86
2026	40	47	89
2027	40	48	91
2028	40	49	94
2029	40	50	97
2030	40	51	100
2031	40	53	103
2032	40	54	106
2033	40	55	109
2034	40	56	112
2035	40	57	115
2036	40	59	119
2037	40	60	122
AAGR 2017-2037	0.00%	2.20%	2.96%
Sources: 2017 FAA TAF, 2025 FDOT FASP, 2000 X26 AMPU, LPA Group Inc., and TKDA 2017			

Trends and Factors Affecting Activity

This section examines the effect of relevant trends on X26's historical operations and based aircraft levels in order to establish a general mindset for the forecasting effort. For example, as shown in **Table 3-1**, operational demand from 2007 through 2017 fluctuated between 47,800 operations and 37,500 operations. During this time, several national and international negative and positive events occurred which could to a limited extent explain the fluctuations. In addition, statewide and local trends were also evaluated because they provide airport-specific information that can be used to support the selection of a preferred forecast. The following trends were considered in this analysis:

- U.S. Economic Conditions and National Aviation Trends

- Fluctuations in Oil Prices
- Pilot Demand
- New Technology, and
- Airport Level Service Factors

U.S. Economic Conditions and National Trends

Recent forecasts predict strong growth in both the aerospace and defense industries. Worldwide national spending on defense including the development of new aircraft and unmanned aerial aircraft technology to address internal and external threats is on the rise. This in addition to loosening of governmental regulations related to business development and growth, various national and local incentives and stable global gross domestic product (GDP) growth and lower commodity prices continues to fuel demand for corporate aircraft demand. Further, recent issues associated with the legacy carriers, strong travel demand, lower aircraft prices, as well as pilot demand and regulatory changes continues to drive growth in the small aircraft market segment.

According to the General Aviation Manufacturers Association (GAMA), GA aircraft demand remains favorable in the long-term. They forecast that the decrease in fixed wing piston aircraft will be offset by increases in both fixed wing and rotorcraft turbine, sport and experimental aircraft. Forecasts also continue to show that business turboprop and jet aircraft will remain strong for the next twenty-plus years.

The FAA is also in the process of upgrading the National Airspace System (NAS), national Air Traffic Control technology and procedures as well as airport pavement and other infrastructure. The new Administration has stated that it will support the rebuilding and expansion of America's infrastructure especially aviation infrastructure to support current and long-term demand. Therefore, possible changes in the regulatory environment especially related to Commercial and General Aviation airport funding is expected to drive growth within this market sector.

Fluctuations in Oil Prices

Fluctuations in oil prices not only impacts operations but aircraft fleet mix demands. General aviation operations in the United States alone represents more than 3 times commercial aviation activity. GA aircraft provide access to rural and remote communities, and are also the primary means of delivering other services including, but not limited to: aerial applications, photography, training, law enforcement, medivac,

disaster relief, etc. However, in reviewing data from 1999 through 2010 provided by the FAA and GAMA, GA aircraft declines were partially due to rising fuel and oil prices.[1] Other costs impacting aircraft operations include: maintenance, oil, engine overhaul, airframe, avionics, etc. However, fuel, when compared to other costs, usually represents the greatest percentage of total overall costs which correlates with hours of use. Since fluctuations in fuel costs are less predictable than other operating costs, predictions of likely aircraft demand over any significant period of time must consider elasticity of oil fluctuations and correlate its likely impacts on itinerant and based aircraft demand.

An interesting outcome of higher oil prices in addition to environmental concerns related to lead has led the GA and commercial aircraft manufacturing market to develop more fuel efficient engines and airframes as well as modifications (e.g. winglets) to existing aircraft which allow better fuel efficiency. This is especially true related to turboprop and turbofan aircraft. However, both Jet A, used by turbojet aircraft, and 100LL, used by piston engine aircraft, are impacted by fluctuations in oil prices.

An analysis of fuel fluctuation impacts[2] showed that a 10 percent increase in the fuel cost ratio would decrease aircraft operations related to both piston and turboprop aircraft by 15 percent and 12 percent respectively. However, turbofan operations would increase. This illustrates that piston and turboprop aircraft are more sensitive to fuel costs than turbofan aircraft. Still when comparing turboprop to piston operations, it was found that piston operations were the most sensitive to fuel cost fluctuations. Based upon this data, aircraft manufacturers have and continue to develop more efficient turboprop and turbofan aircraft while demand for piston aircraft has been steadily decreasing.

The fuel analysis also considered fuel fluctuations and operations related to itinerant and local operations. Itinerant operations refer to operations of aircraft flying from one airport to another; whereas local operations usually remain within less than 20 miles of

[1] Federal Aviation Administration, & U.S. Department of Transportation. (2010). National Plan of Integrated Airport Systems (NPIAS).
[2] Hansman, J (PI), McConnachie, D. and Wollersheim, C., Massachusetts Institute of Technology; Elke, M., Hansen, M(PI), Chan, N., and Crépin, M., University of California at Berkley; and Li,T., Peterson, E (PI), and Trani, A. (PI), Virginia Tech. The Impact of Oil Prices on the Air Transportation Industry, National Center of Excellence for Aviation Operations Research, March 28, 2014, pp.1-161, p. 79.

the airport and within the traffic pattern. An analysis of fuel fluctuations to national local demand showed that an approximate "10% increase in (fuel) costs would result in about 4% decrease in local hours flown."[3] Itinerant aircraft operations allowed for greater flexibility. It was found that itinerant demand would not decrease until total operating costs reached a critical point for the aircraft and user. Once that tipping point is met, which is different for different type of aircraft and users, then itinerant operations were forecast to decrease.[4]

Pilot Demand

Boeing, Northrop Grumman, Bombardier and other manufacturing and educational organization continue forecast strong growth in both domestic and worldwide pilot demand for the next 20+ years. The **2016-36 Boeing: Pilot and Technician Outlook** and **Airbus Global Market Forecast: 2016-2035** both predict over 20 percent average annual demand for new pilots to support the North American Aviation Market. New pilot demand worldwide estimates over 40 percent average annual demand to support: new aircraft deliveries, new technology demands, pilot retirements, pilot attrition and pilot loss due to promotions.

Since 2000, there was a steady decrease in the airport transport pilot (ATP) population primarily associated with pilot retirements, fewer students interested in pursuing an aviation career due to cost and limited job prospects, and other attrition issues (i.e. loss of medical, career change, and/or loss of certificate). Consequently, the resulting decline in pilot population indicates that pilots are leaving at a rate higher than the rate at which student pilots are becoming certified. According to **2016-36 Boeing: Pilot and Technician Outlook**, the North American market will need 216,000 new pilots in 2035 to accommodate demand. Worldwide demand will require over 680,000 new pilots to address pilot retirements, attrition, expanded aircraft fleets, new technology and commercial demand.

Further, as a result of several regional jet accidents, the National Transportation Safety Board (NTSB) recommended and FAA issued new pilot hourly and training requirements including: requiring first officers who fly US passenger and cargo aircraft to hold an Airline Transport Pilot (ATP) certificate. Similar requirements were adopted by the

[3] Id at 79
[4] Id.

European Aviation Safety Agency (EASA) and the International Civil Aviation Organization. Historically, regional jets were flown by less experienced, lower time pilots who had yet to acquire their ATP certification. The new rule now requires pilots to obtain: additional 50 hours of multi-engine flight experience and completion of a new FAA-approved training program; ground and flight training stall and upset training, which also includes increased simulator training; as well as additional training in more effective pilot monitoring requirements, enhanced runway safety procedures, and expanded crosswind operations.

The new rule, however, does make some allowances for pilots with less than 1500 hours flight time or who have not reached the age of 23 including: "military pilots with 750 hours total pilot time; graduates holding a Bachelor's degree with an aviation major including 1,000 total flight hours; graduates with an Associate's degree with an aviation major and 1,200 hours of flight time; or pilots who are at least 21 years old with 1,500 flight hours. These "restricted privileges" ATP certificate allows a pilot to serve as a co-pilot until he obtains the required 1,500 hours.[5]

Due to X26's proximity to a number of large flight training academies as well as some on-site pilot training operations, it is heavily used for private and commercial flight training. Historically, more than 80 percent of the Airport's operations may be directly linked to aircraft flight training primarily from Flight Safety based at Vero Beach Regional Airport located approximately 12 miles south of X26. Therefore, flight training operations along with Sebastian Skydiving activities represent the largest components of local general aviation operations at X26. Therefore, based aircraft operations although important was not used as the only factor for determining local operational demand.

New Technology

The FAA defines NextGen as an "umbrella term for the ongoing transformation of the National Airspace System (NAS)… (and it) represents an evolution from a ground based system of air traffic control to a satellite based system of air traffic management." According to the FAA's *June 2013 NextGen Implementation Plan*, the shift to smarter, satellite based and digital technologies combined with new procedures will allow FAA to

[5] 14 CFR Part(s) 61, 121, 135, 141, and 142, Pilot Certification and Qualification Requirements for Air Carrier Operations, FAA (DOT) Final Rule, August 1, 2013

more efficiently guide and track aircraft while enhancing safety, reducing delays, saving fuel, and reducing aircraft exhaust emissions.

With the implementation of NextGen and increased use of global positioning system (GPS) technology, several non-precision instrument approaches, not less than ½ mile visibility, were installed at X26 on both Runway 5 and 23. The RNAV GPS approaches are based upon the Wide Area Augmentation System (WAAS) implemented approximately 10 years ago which uses satellite technology. Both Runways are equipped with non-precision Lateral Performance without Vertical Navigation (LP) and Lateral Navigation with Horizontal Guidance (LNAV). The LP approach uses WAAS satellite technology to provide horizontal guidance whereas LNAV uses FAA surveyed and approved lateral guidance. Both are typically used when terrain or obstructions will not allow installation of vertical guided approach (LPV). Both the LP and LNAV approaches require 1 nautical mile (NM) visibility to the end of the runway, but allow lower minimum decision altitudes (MDA) then a typical visual approach. Thus, allowing for greater use of the Airport during lower cloud cover and lighting conditions.

Therefore, availability of various navigational aids and non-precision and precision approach procedures does have and is likely to continue to have a positive impact on operational use of the Airport. Further, the implementation of NextGen and other satellite based approach systems, according to FAA, are expected to have a positive impact on aircraft operations especially among commercial and corporate activity due to operational cost savings as well as improved airport and terminal airspace capacity.

Other technology advances that may impact operations and infrastructure needs at X26 include increased use of light sport aircraft, federal approval of the Sport Aircraft license, and development and use of unmanned aerial system technology. Both FAA and manufacturers anticipate strong growth of light sport aircraft. These lower cost and easier to fly aircraft are anticipated to replace the older fixed wing piston aircraft. The increase in light sport aircraft as well as FAA approval of the Sport Aircraft license, which requires less training hours than a typical private pilot license, is expected to open the field up to more interested individuals for both recreational and limited business use.

Unmanned Aerial Systems (UAS) aircraft have exploded on the scene. UAS small aircraft have been used for various types of aerial photography, railroad and other infrastructure inspections, managing wildlife, law enforcement, firefighting, etc. in

addition to military uses. According to FAA, UAS aircraft will exceed the number of pilot operated aircraft as soon as 2019. In addition to demand for small UAS aircraft, there is ongoing development and demand for larger UAS, as small as a typical training aircraft (e.g. Cessna 172) and as large as a Boeing 767. Development of these aircraft will depend upon line of sight requirements, ability to fly over people and their safe integration into both the NAS and airport environments. Since demand for UAS technology at X26 is unknown, forecasts included this new technology under the "experimental" aircraft category.

Airport Level Service Factors

Airport level service factors represents facilities, infrastructure and services provided at an airport. These factors directly impact the type and number of operations that an airport serves. "For example, the operations of large aircraft usually require runways greater than 4,000 feet and good runway pavements. According to *Ghobrial, 1997*, the presence of a control tower could increase GA operations by greater than 253% and runway length greater than 4,000 feet would increase GA operations by approximately 52 percent."[6]

Other factors include the total number of runways available, runway length, airport elevation, location to City Center, type (asphalt or concrete) and condition of pavement, availability of ILS or precision approach equipment, Aircraft Maintenance and Powerplant repair station on airfield, on-site fuel facilities (self-service and full service), avionics shop, and other amenities. In addition the number of based aircraft will have a direct impact on the number of total airport operations. Similar other sized general aviation airports as identified by GAATA survey, more than 65 percent of local aircraft flown by local operations are performed by single-engine piston aircraft. Looking at historical data, because of X26's heavy use for flight training, approximately 80 percent of local operations are related to single-engine operations.

Aviation Activity Forecasts

A variety of methodologies were used to develop the forecast of demand at X26. Historical data with the exception of transient military operations were validated using

[6] Ghobrial, A. (1997). A model to forecast aircraft operations at general aviation airports. *Journal of Advanced Transportation, 31*(3), 311-323. doi: 10.1002/atr.5670310306

multiple source data. Historical aircraft operations, based aircraft and enplanement data was utilized to provide the baseline for all forecast methodologies.

Forecasting Methodologies

Regression Analysis

A regression analysis, a statistical model, which uses independent variables, such as population, income, and employment to determine a dependent variable such as passenger enplanements, operations and/or based aircraft. The relationship is estimated using at least 10 years of historical data for the independent and dependent variables. The explanatory power of the equation is measured by the R^2 statistic (called the coefficient of determination). An R^2 of 0 indicates that there is no statistical relationship between changes in the independent and dependent variables. R^2 values near 1.0 mean that there is a very strong statistical relationship. Forecasts of the independent variables are used in the regression equation to calculate forecast values for the dependent variable.

Single and Multi-variable regression analyses were developed to see if there was a strong correlation between various socio-economic variables and based aircraft, on-demand air taxi operations, general aviation operations and total airport operations. Historical observations based upon data available ranged from 5 to 20 years. **Table 3-5** shows the correlation between Sebastian Vero Beach MSA Population and Employment data to historical X26 operations and based aircraft. Correlations between these socio-economic factors and airport data were not strong, and, therefore, regression was not used to determine future operational and based aircraft demand.

Trend Analysis

Trend analysis relies on projecting historical trends into the future using time as the independent variable. The trend forecast uses historical data to forecast future demand. It is one of the fundamental techniques used to analyze and forecast aviation activity. Trend analysis was used to determine long-term demand for both aircraft operations and based aircraft using historical Florida Airport Data and sponsor provided and on-site survey historical data.

Linear trend growth rates were also applied to the 2000 Airport Master Plan Forecast for the published forecast years of 2012 and 2022, and then applied this average annual growth rate from 2022 through 2037.

TABLE 3-5 REGRESSION EVALUATION				
Year	**Population**	**Employment**	**Historical Operations**	**Based Aircraft**
2000	112,947	84,647.50	26,237	52
2001	115,235	85,722.40	26,237	52
2002	117,569	85,821.90	47,800	52
2003	119,951	86,790.70	47,800	52
2004	122,380	89,771.50	47,800	52
2005	124,859	93,373.10	47,800	52
2006	127,388	95,795.20	47,800	52
2007	129,969	95,979.40	47,800	52
2008	132,602	92,579.00	47,800	52
2009	135,288	86,788.00	37,240	41
2010	138,028	86,074.20	37,240	39
2011	139,072	87,022.90	37,240	40
2012	140,123	88,762.60	37,240	42
2013	141,183	90,989.60	37,240	42
2014	142,250	93,898.20	37,240	40
2015	143,326	97,121.30	40,815	38
2016	146,410	100,249.80	41,570	62
2017	148,778	101,553.04	44,403	59
		Pop. Intercept	127689.0354	153187.9308
		Pop. Slope	0.107087554	-436.308047
		Pop. RSQ	0.106987	0.079139891
		Emp. Intercept	78955.88	77966.04
		Emp. Slope	0.287398	275.0305
		Emp. RSQ	0.192222	0.141625

Sources: University of Florida Bureau of Economic Business Research, U.S. Bureau of Labor Statistics Database, historical airport data from various sources, and TKDA, 2017

Share Analysis

Share analysis is used when a larger or more reliable higher level forecast is available. In this case, historical operational and based aircraft data was compared to forecasts developed by FDOT for all NPIAS airports within the Treasure Coast CFASPP Region as well as to Vero Beach Regional Airport's twenty year forecast for pilot training. Using historical data for all airports, it was possible to determine the existing and likely share of the Treasure Coast market that Sebastian Airport would support. As noted earlier, demand for pilots is continued to remain strong for at least the next 10 to 15 years. The state supports extensive flight training as well as small aircraft manufacturing businesses; therefore, it was logical to assume that small aircraft manufacturing and

pilot training would likely remain major (i.e. < 50%) contributors to long-term airport demand.

Exponential Smoothing

Another methodology to determine forecasts of demand involves exponential smoothing. In exponential smoothing, older data is given progressively less importance and newer data is given greater importance in determining long-term demand. Exponential smoothing is also referred to as averaging, and is typically employed for short-term forecasts. Since this methodology requires at least three numbers and is only credible for determining short-term demand, it was not used as part of this forecast analysis.

Extrapolation

The extrapolation model of forecasts uses data that may be representative of the data to be forecast. This data could be from historical operations, analogous situations or field simulations. For X26, extrapolation was used in two ways: First, FASP average annual growth rates for the short (2017-2022), mid (2022-2027), and long-term (2027-2037) were applied to the actual historical data for 2017 to determine likely demand. The second extrapolation analysis applied Active GA and Air Taxi Hours (Table 29) average annual growth rates for the short, mid, and long term from the 2016-36 FAA Aerospace Forecasts to historical X26 data.

Operations per Based Aircraft

Operations per based aircraft (OPBA) uses a time series methodology to determine a correlation between historical based aircraft and operations at non-towered, general aviation airports. X26 supports significant flight training operations related to aircraft not based at Sebastian but at nearby airports, such as Vero Beach Regional, Melbourne International, and Treasure Coast International Airports. Therefore, operations per based aircraft my skew higher due to the impacts of flight training as well as repetitive skydiving activity at the airport. Historical operations per based aircraft are illustrated in **Table 3-6**.

TABLE 3-6 HISTORICAL OPERATIONS PER BASED AIRCRAFT			
Year	**Operations**	**Based Aircraft**	**OPBA**
2007	47,800	52	919
2008	47,800	52	919
2009	37,240	41	908
2010	37,240	39	955
2011	37,240	40	931
2012	37,240	42	887
2013	37,240	42	887
2014	37,240	40	931
2015	37,240	38	980
2016	41,570	62	670
2017	44,403	59	753
		Median OPBA*	**885**

**Note: The median OPBA factor based upon 2007 through 2017.*
Sources: Airport Sponsor data, On-Site Surveys, 2017 Terminal Area Forecast, 2015 Florida Aviation Database, and TKDA

Comparison to other X26 Forecasts

Both the FAA Terminal Area Forecast and Florida Aviation System Plan provide specific forecasts of likely operational demand and based aircraft at Sebastian Airport. These forecasts in addition to the various approved methodologies were used to determine realistic forecasts of likely demand over the next 20 years. Forecasts, however, are not predictions of the future but rather an educated guess based upon current variables. As a result, years shown in the following tables should not be construed to mean that operations will occur on that specific year, rather these time period represent planning activity triggers used to support infrastructure improvements at the airport.

Based Aircraft Demand

Several sources and forecast methodologies were used to determine likely based aircraft demand at X26. Based aircraft demand typically justifies apron and aircraft storage requirements. Based aircraft at X26 includes a combination of single-engine piston (SEP), multi-engine piston (MEP), turboprop (TP) and other (i.e. gliders and ultralights) aircraft. As noted in the inventory section,

- FY 2016 based aircraft include: 53 SEP, 5 MEP, 2 TP, and 2 Other (experimental, light sport, gliders, etc.) totaling 62 based aircraft.

- FY 2017 based aircraft include: 42 SEP, 4 MEP, 3 TP, 0 Jet, 0 Helicopters, 2 ultralights, 5 powered parachute, and 3 Light Sport.

Several infrastructure and aircraft storage facilities are in varying stages of design and construction and will likely be completed sometime in 2017 or early 2018. Therefore, based upon information provided by the Sponsor and current tenants and users, an increase of approximately 14 aircraft is anticipated in 2018. The sponsor and airport management are actively marketing the airport, and exploring adding facilities to attract more tenants. Further, business forecast information provided by current tenants revealed an average increase of between 1 to 3 aircraft bi or triennially. Applying exponential smoothing based upon the average of other forecasts, a growth rate of 1.50 percent was used to forecast mid and long-term demand. Considering short-term growth planned by existing and new tenants, this resulted in an average annual growth rate of approximately 2.72 percent for the planning period of 2017-37. This growth rate is in-line with previous forecasts of demand.

Key forecast years (2017, 2018, 2022, 2027, 2032, and 2037) are provided in Table 3-7. For a full annual breakdown of each based aircraft forecast, see **Appendix F** of this report.

TABLE 3-7
BASED AIRCRAFT FORECAST

Year	Forecast Demand
2017	59
2018	73
2022	80
2027	86
2032	93
2037	101
AAGR 2017-37	2.72%

Based Aircraft Fleet Mix

Aside from determining the number of based aircraft, it is also vital to determine the aircraft fleet mix to develop appropriately sized facilities. Understanding the future fleet mix allows airport management to develop facilities to accommodate various types of aircraft forecast to operate at the airport during the twenty-year planning period.

The future fleet mix was determined by studying the national fleet mix forecast and comparing it with the current based fleet mix at X26.

The FAA Aerospace Forecast (2016-2036) includes a fleet mix forecast for the nation as a whole; however, when compared to historical based aircraft data, inconsistencies were revealed. Since the FAA's forecast is representative of the entire country rather than specific to the types of activity that occur at X26, the FAA forecast could not be used to forecast the future based aircraft fleet mix. Still it is logical to assume that the fleet mix at X26 would remain somewhat consistent with prior years; however, it is also practical to assume that the FAA's forecast is also realistic in some aspects due to their consideration of new aircraft and industry trends.

Thus using historical fleet mix data, data provided by users and applying realistic trends, such as the decrease of multi-engine piston aircraft in favor of light turboprop, as outlined in the FAA Aerospace Forecast, forecasts of likely based aircraft demand are provided in **Table 3-8**. X26 supports experimental aircraft manufacturers and light sport aircraft operators in addition to traditional fixed wing aircraft. Discussions with on-airport tenants, interested parties and the Sponsor demonstrate fairly robust growth in both experimental and light sport aircraft demand along with turboprop and fixed wing single engine aircraft will remain fairly steady throughout the planning period and beyond. Regular use of X26 by large, turbofan aircraft (greater than 60,000 lbs.) was assumed to be unlikely based upon current infrastructure limitations and noise concerns.

TABLE 3-8 BASED AIRCRAFT FLEET MIX FORECAST									
Key Years	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Light Sport	Other	Total	W/o Other*
2017	42	4	3	0	0	3	7	59	49
2018	53	4	3	0	1	5	7	73	61
2022	56	3	3	1	1	8	7	80	64
2027	59	2	4	1	1	12	7	86	67
2032	63	0	4	1	1	17	7	93	70
2037	63	0	4	1	2	24	7	101	70
AAGR 2017-37	2.05%	-99.91%	2.00%	NA	NA	10.96%	0.00%	2.72%	1.80%

**Note: Other includes Experimental, light sport and other designated aircraft (e.g. gliders, hot air balloons, and UAVs)*
Note: Numbers may not add up due to rounding.
Sources: Airport management records, Airport Master Records, 5010, on-site survey, FAA Aerospace Forecast, Table 29, Tenant and Sponsor interviews, and TKDA, 2017

Total Operational Demand

Projected airport operational activity levels are an important factor in identifying existing airfield capacity shortfalls and assessing future needs for airside improvements. Frequency and type of operation also give insight into specific airfield needs that may be sensitive to increased levels of operational activity. Thus, in order to develop an accurate forecast for X26, it was necessary to create several forecasts using existing data and to compile and compare existing forecasts from a variety of sources.

- **2000 Airport Master Plan Update:** Key years from the 2000 Airport Master Plan update were 2007, 2012 and 2022. Using this forecast data and information provided in this previous plan, forecasts were extrapolated between the key years and then forecast forward through the year 2037. This resulted in an average annual growth rate of 2.90% from 2017 through 2037.

- **2017 FAA Terminal Area Forecast:** The FAA TAF projects likely airport operations and based aircraft through the year 2040 based upon the latest historical information. In this case, the last data that the FAA used was from the Airport Master Record, updated in 2014. The forecast demand for X26 remained stagnant from 2014 through 2040. It is also important to note that both the FAA TAF operations and based aircraft forecasts do not include experimental or "other" types of aircraft.

- **2015-34 Florida Aviation System Plan:** The Florida Aviation System Plan update was completed last year. The system plan evaluated overall aviation growth in the state, identified key trends that may impact commercial and GA airports as well as forecast demand for all the airports within the state. The data provided in the FASP for X26 was provided through the year 2035, so the remaining two years of data were extrapolated based upon prior growth rates. The average annual growth rate established within the FASP for X26 was approximately 1.85% which is in-line with other similarly sized airports within the region.

- **2015 Sebastian Municipal Airport Florida Airports Directory:** The Florida Department of Transportation in addition to creating the Florida Aviation System Plan also develops individual three page summaries for each NPIAS airport within the state. This document is referred to as the Florida Airports Directory (FAD) and it includes a brief summary of current airport conditions, anticipated forecast demand, recommended infrastructure improvements as well as the airport's economic impact on the local economy. Key data provided in the document included the base year 2012 operational and based aircraft data and forecast 2040 aircraft operations and based aircraft data. To allow comparison with other forecasts, the average annual growth rate between 2012 and 2040 was determined and then applied existing data. This shows a type of exponential smoothing since yearly growth remains consistent throughout the 38 year period.

- **Historical Trend (FY 2016 and 2017):** Since the airport management had recorded information for only FYs 2016 and 2017, based upon on-site surveys, this information was used to create a historical trend analysis based upon this two years' worth of data. Typically it is better to complete a Trend analysis with at least 10 years' worth of data, but information was limited in this case. Using the trend forecast methodology resulted in an average annual growth rate of 1.52 percent which is slightly lower than both the FASP and FAD forecasts, but still realistic.

- **2015-34 Florida Aviation System Plan Average Annual Growth Rate:** The forecast growth rate established in the FASP for the Airport was 1.85 percent annually. Since the base year shown in the FASP was inconsistent with actual historical data, the FASP growth rate was applied to FY 2017 operations in an attempt to predict demand through the year 2037. Again, this is a type of exponential smoothing since growth remained constant throughout the forecast period.

- **Florida Aviation Data Treasure Coast Airport Market Share:** Using the data provided in the Florida Aviation System Plan database, all airports including Okeechobee County Airport, general aviation operations associated with all airports located within the Treasure Coast CFAPP region were summarized. Using the historical percentage of X26 operations compared to other airports within the CFASPP operations resulted in a historical share of total GA operations. Applying this share forward to total FDOT forecast operations for the region, resulted in anticipated operational demand of 56,666. The resulting average annual growth rate for the twenty-year period ranged from 1.48 percent to 1.49 percent, which again within range of other similarly sized airports.

- **Vero Beach Regional Airport Flight Training Market Share:** Vero Beach is home to Flight Safety International Academy and Paris Air, both which provide extensive aircraft flight training. According to the Airport's recently completed Master Plan, flight training represents approximately 40% of total airport operations. Vero Beach recently reinstated commercial service and is also home to a number of different businesses including Piper Aircraft. As a result, a number of pilot training operations occur at X26. In addition to flight training originating from Vero Beach, the airport supports an on-site business, Pilot's

Paradise, which also provides flight training, as well as supports flight training operations from Melbourne International Airport primarily related to Florida Institute of Technology's aviation program. However, during the team's on-site visit it was obvious that the majority of flight training operations at Sebastian Airport were directly associated with flight training academies based at Vero Beach. As a result, similar to the Treasure Coast analysis, an operational share analysis was determined between the two airports and then used to estimate likely future demand.

- **FAA Aerospace Forecast Trend Analysis:** The 2016-2036 FAA Aerospace Forecasts provide predictions for commercial, air taxi, general aviation and flight training demand for the entire country based upon historical operations and current trends. The forecast growths outlined in the FAA Aerospace Forecasts are often in sync with general aviation growth in states with large general aviation and flight training activity, such as Florida, Texas, Arizona and California. Therefore, using predictive average annual GA flight hours to determine likely operations based upon actual historical airport operational data has and continues to be a relatively realistic predictor of future demand. Based upon **Table 29**, *Active General Aviation and Air Taxi Hours Flown*, average annual growth ranged between 1 and 1.2 percent between 2015 through 2036.

- **Operations per Based Aircraft:** The median historical operations per based aircraft from 2007 through 2017 was 885 operations per based aircraft. To determine likely operations, median historical operations were applied to forecast based aircraft to predict likely demand over the twenty year planning period. The operations per based aircraft methodology is often used to determine demand at GA airports since operational traffic is limited.

- **Average Forecast:** The average forecast merely represents the average of all ten forecasts listed above. This is an attempt to determine a logical prediction of possible aircraft operations based upon various existing forecasts and methodologies.

Selected Forecast

Since all forecasts considered both national trends and specific factors that impacted aviation activity at Sebastian, an average annual growth rate was created based upon taking the average of the other forecast average annual growth rates including the TAF. Although the TAF showed 0 percent growth, it provides possible elasticity in forecast operations that may cause periodic unforeseen slow-down or negative growth. Applying this average to historical data through the forecast period provides a smoothing forecast effect. Again, it is important to note that recommended infrastructure improvements are based upon planning activity levels/trigger points rather than specific years. Therefore, when operations reach 60 percent of forecast need, planning efforts including environmental documentation should be initiated. **Tables 3-9** and **3-10** illustrate the estimated operational forecasts of demand for the next twenty-plus years.

TABLE 3-9
AIRCRAFT OPERATIONS FORECAST

Fiscal Years	2000 AMP	2017 TAF	FASP Forecast	X26 FAD Forecast	Trend 2016/2017 Data	Growth rate based upon FASP	Treasure Coast	Vero Beach	FAA Trend Forecast	OPBA	Average	Proposed Forecast
2017	42,655	37,240	39,345	42,339	46,477	46,477	46,477	46,477	46,477	46,477	44,044	46,477
2018	43,893	37,240	40,073	43,122	44,687	47,337	42,808	42,615	46,922	90,119	47,881	48,491
2022	49,210	37240	43122	46,403	48,497	50,938	45,400	44,786	48,743	108,781	52,312	56,190
2027	56,772	37,240	47,261	50,857	53,260	55,827	48,871	47,657	51,330	132,412	58,149	62,053
2032	65,495	37,240	51,797	55,224	58,022	61,186	52,619	50,710	54,390	156,403	64,309	68,193
2037	75,559	37,240	56,770	59,138	62,785	67,059	56,666	53,960	57,632	180,778	70,759	74,686
AAGR 2017-37	2.90%	0.00%	1.85%	1.68%	1.52%	1.85%	1.00%	0.75%	1.08%	7.03%	2.40%	2.40%

Notes:

Column 1: 2000 Airport Master Plan Trend Analysis
Column 2: 2017 FAA TAF
Column 3: 2015-34 Florida Aviation System Plan
Column 4: 2015 Florida Aviation Directory
Column 5: Historical Trend Data
Column 6: Extrapolation FASP Growth Rate applied to historical airport data
Column 7: Share analysis of Treasure Coast GA Airport, FASP operations
Column 8: Share of VRB Airport Flight Training Operations, VRB MP and FASP
Column 9: FAA Trend Forecast Extrapolation based upon 2016-36 FAA Aviation Activity Forecasts for GA hours)
Column 10: Forecast Operations per Based Aircraft
Column 11: Average of other Forecasts
Column 12: Preferred Forecast (Growth based upon average growth rates of all forecasts except FAA TAF)

Sources: 2017 FAA Terminal Area Forecasts, 2014-24 Florida Aviation System Plan, 2015 Florida Aviation Database, FAA Aerospace Forecasts, 2016-24, 2000 X26 Airport Master Plan Update, Airport historical data and surveys, and TKDA, 2017.

Since the FAA Terminal Area Forecasts do not currently recognize operations associated with light sport, ultralights, gliders and other non-traditional aircraft, **Table 3-10** highlights the preferred aircraft operational forecast based upon traditional activity as well as the identifies the number of operations associated with "Other" types of aircraft activity. The preferred FAA forecast matches the 2015-34 FASP data provided by the Florida Department of Transportation.

TABLE 3-10
PREFERRED OPERATIONAL FORECASTS

Year	Preferred FAA and FDOT Forecast	"Other" Aircraft Operations	Total Forecast Operations
2017	39,345	5,058	44,403
2018	40,073	5,240	45,313
2022	43,122	5,861	48,983
2027	47,261	6,055	53,316
2032	51,797	6,162	57,959
2037	56,770	6,160	62,930

Sources: 2015-34 FDOT Florida Aviation System Plan, Airport Inventory and Management, and TKDA 2017

Itinerant Operations

Itinerant aircraft operations are defined as operations which occur between two different airports, which on average are typically 20 nm apart. However, in Florida, some airports are closer than the 20 nm threshold, so this definition typically refers to aircraft that leave the airport pattern. Itinerant operations include air taxi and commuter, military, commercial carriers, air cargo operators, business/corporate operations as well as recreational and personal use. Some flight training is also included in this category related to cross-country, instrument and air transport pilot training.

Previous analyses including the 2017 TAF predicted a split of 66 percent and 33 percent between itinerant and local operations, respectively. This ratio decreased as actual data was recorded. Thus, based upon on-site inventory and discussions with users including those related to sky diving and flight training, the actual ratio in FY 2017 was determined to be 39 percent and 61 percent itinerant and local, respectively. This flip is primarily due to increased sky diving activity and in-pattern flight training operations, such as touch and go training.

X26 has and continues to support limited on-demand air taxi, business and personal use itinerant operations. The airport does not support any military related operations. Estimated air taxi and itinerant general aviation operations forecasts were both based upon historical percentage of total operations, information provided by airport users and tenants, as well as regional and national trends. **Table 3-11** outlines predicted air taxi demand, and **Table 3-12** summarizes anticipated itinerant GA demand which includes personal, corporate, flight training and other activities.

TABLE 3-11
AIR TAXI OPERATIONS FORECAST

Year	Total Operations Forecast	Air Taxi and Commuter Operations	Percent of Total Operations
2016	41,570	1,000	2.4%
2017	44,403	1,779	4.0%
2018	45,313	1,852	4.1%
2022	48,983	2,171	4.4%
2027	53,316	2,614	4.9%
2032	57,959	3,144	5.4%
2037	62,930	3,776[1]	6.0%[2]

Notes:
[1]Air Taxi operations for 2017 was based upon data provided by tenants and on-site inventory
[2]According to the FASP, on-demand air taxi operations represent approximately 6 percent of total operations at predominantly GA airports.

Sources: 2017 TAF, 2015 FASP, Tenant Data, on-site inventory, and TKDA 2017

TABLE 3-12 ITINERANT GA OPERATIONS ONLY				
Year	Total Operations	Itinerant 5010 GA Operations	Itinerant GA "Other" Operations	Itinerant GA Percent of Total Operations
2016	41,570	24,000	0	57.7%
2017[2]	44,403	14,144	506	33.0%
2018	45,313	14,178	524	32.4%
2022	48,983	14,150	645	30.2%
2027	53,316	13,758	787	27.3%
2032	57,959	13,049	986	24.2%
2037	62,930	11,983	1,232	21.0%
Notes: *[1]2016 itinerant operations were taken from the 2017 TAF data.* *[2]2017 itinerant GA operations were based upon on-site inventory, discussions with tenants, users and management, and comparison to other airports in the region.*				
Sources: 2017 FAA TAF, 2015 FASP, 2016 FAD, tenant and management interviews, and TKDA, 2017				

Local Operations

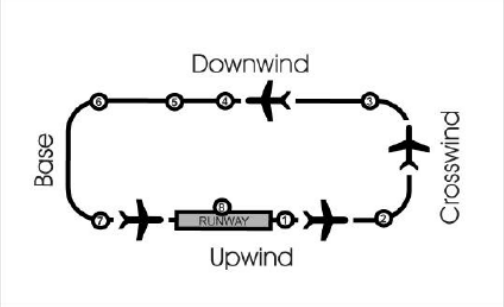
Local operations are defined as aircraft operations that stay within the airport traffic pattern. Local operations include flight training, glider and experimental aircraft, aircraft flight tests, skydiving and other similar operations. Sebastian Municipal Airport is home to several experimental and glider users, a local fixed based operator that performs on-site maintenance as well as Sebastian Skydivers, a national and international skydiving training and event firm.

Local Flight Training

Sebastian also supports extensive flight training operations associated with on-site operators as well as students from Flight Safety International, Paris Air, as well as Florida Institute of Technology (FIT). Based upon historical and current inventory data, flight training represents approximately 78 to 80 percent of total airport operations, and touch and go operations are estimated to represent 77 percent of total flight training operations. Touch and go flight training activity in FYs 2016 and 2017 were estimated to represent 56 percent of total annual operations.

Touch and Go aircraft operations consist of two operations, a landing then immediate takeoff, performed consecutively on a runway. Touch and Go operations are associated with fixed wing aircraft training. Aircraft fly in a circuit flying crosswind, then downwind, then base until final. All of these maneuvers are done with the local airspace and are completed repetitively.

Figure 3-1



Source: Touch and Go Tutorial, http://www.flightadventures.com/misc/fa_pattern_tutorial.pdf

On average, students perform 20 touch and go operations every two hours. Peak training typically occurs on weekdays between 10 am and 12 pm and can account for up to 40 touch and go operations if weather is good. These touch and go operations are designated as local since they occur within the airport traffic pattern and impact both airport and airspace capacity. Estimated Local touch and go flight training activity is shown in **Table 3-13**.

TABLE 3-13
LOCAL AIRCRAFT OPERATIONS
TOUCH AND GO PROCEDURES

Year	Total Annual Operations	Touch and Go Operations	Percent of Total Operations
2016	41,570	23,279	56.0%
2017	46,477	26,137	56.2%
2018	48,491	27,356	56.4%
2022	56,190	32,104	57.1%
2027	62,053	36,021	58.0%
2032	68,193	40,218	59.0%
2037	74,686	44,751	59.9%

Sources: Northrop Grumman, Bombardier and Boeing Pilot demand and training operations forecasts, FAA TAF, FASP and FAD data, User data, on-site inventory TKDA, 2017

Since commercial and corporate pilot demand is expected to remain strong for the foreseeable future based upon domestic and international forecasts, training activity at X26 is expected to grow throughout the planning period. It is important to note that training activities such as touch and go operations can impact an airports overall airspace and airport capacity with very little return on investment since most students do not purchase fuel at these airports. Discussions with heavy training users from other airports is recommended to determine if third party funding or some other revenue mechanism could be implemented to support airport infrastructure maintenance. This is discussed in more detail in later chapters of this report.

Skydiving Activity

Skydiving activity occurs throughout the year. However, in addition to training and usual tandem and certificate jump activities, Skydive Sebastian holds various events throughout the year. These events include: **the Alter Ego Canopy Course** (April 14 and 15); **Team Dirty Sanchez** (April 28-30); **Rookiefest** (May 20); **Splash Bash** (July 28-30); **Head Down Camp** (October 27-29) and **Skydive Invasion** (December 28-January 1). Last year in concert with the Airport and the City of Sebastian, Skydive Sebastian also held an international weekend skydiving event in September which included various local vendors and live music. It is unknown if that event will re-occur this year or if this will be a biennial event.

As a result of these events, peak skydiving activity normally occurs in December, late April, July, September and October. Skydive Sebastian is also looking to expand their facilities as a result of both domestic and international demand. They are an official US Parachute Association certificate provider as well as work with organizations throughout Europe. Therefore, with increased growth in population as well as interest in skydiving, operations are expected to continue to grow. On an average day, skydiving operations can range from 4 to 6 operations per hour from 10 am to 3 pm. Estimated skydiving local operations are provided in **Table 3-14**.

TABLE 3-14 LOCAL AIRCRAFT OPERATIONS SKYDIVING AIRCRAFT OPERATIONS			
Year	**Total Annual Operations**	**Percent of Total Operations**	**Estimated Skydiving Operations**
2016	41,570	5%	2,000
2017	46,477	5%	2,368
2018	48,491	5%	2,580
2022	56,190	6%	3,559
2027	62,053	8%	4,885
2032	68,193	10%	6,674
2037	74,686	12%	8,962
AAGR 2017-37		4%	7.4%
Sources: Skydive Sebastian tenant information, on-site inventory, US Parachute Association forecast activity, Global Market parachute forecast, 2017 published by WiseGuyReports, and TKDA 2017.			

The commercial and military parachute global market forecast compound annual growth from 2017 through 2021 is expected to increase by 5.79 percent. Since Florida supports extensive commercial and recreational skydiving activity, growth of approximately 4 percent was deemed realistic based upon skydiving activity at similarly sized airports and planned tenant development.

Other Aircraft Local Operations

"Other" aircraft local activity that currently exists and is forecast to grow fairly significantly is operations related to "other" aircraft, which currently includes Light Sport, some experimental, gliders, ultralights and powered parachute operations. The City has recently signed a lease with a light sport manufacturer who anticipates, along with recent FAA forecasts, strong growth in this market. In 2017, this operator added 3 aircraft to the Airport's based aircraft fleet and anticipates in the short-term to add at least 2-3 additional aircraft annually.

X26 is ideally suited to support manufacturing and training of light sport aircraft in addition to also supporting other experimental aircraft operations. The airport has ample space for development, and attracting these type of operations is in line with the City and Community's long-term vision for the airport. Thus, it is anticipated that the majority of forecast local "other" operations will be related to light sport training, research, development and testing. **Table 3-15** shows anticipated local "other" aircraft operations for the next 20 years.

TABLE 3-15 LOCAL AIRCRAFT OPERATIONS "OTHER" AIRCRAFT OPERATIONS			
Year	**Total Annual Operations**	**Percent of Total Operations**	**Estimated "Other" Local Operations**
2016	41,570	7%	2,939
2017	44,403	10%	4,552
2018	45,313	10%	4,716
2022	48,983	11%	5,216
2027	53,316	10%	5,268
2032	57,959	9%	5,176
2037	62,930	8%	4,928
AAGR 2017-37			0.40%
Sources: FAA Aerospace Forecasts, 2017-2037, Airport and City of Sebastian Management, Tenant Discussions, and TKDA 2017			

Local and Itinerant Operations Summary

A summary of local and itinerant total operations is provided in **Table 3-16**. Historical data obtained from the 2017 TAF and 2000 Airport Master Plan Update estimated that itinerant operations represent 60 percent of total airport operations. However, with the continued growth in flight training demand, experimental aircraft development and testing as well as skydiving operations at X26, local operations represent the larger percentage of total operations. Although it is anticipated that there will continue to be growth in all operations, data supports continued strong growth in local operations. Based upon current and forecast trends, the percent of local operations is anticipated to increase from 61 to 70 percent by the end of the forecast period. However, if the airport starts to support larger aircraft turboprop and turbofan operations, the percentage between local and itinerant operations may likely equalize in the long-term.

TABLE 3-16 LOCAL AND ITINERANT OPERATIONS					
Fiscal Year	Total Annual Operations	Itinerant Operations	Itinerant Percentage	Local Operations	Local Percentage
2014	40,073	25,000	62%	15,073	38%
2015	40,815	25,000	61%	15,815	39%
2016	41,570	25,000	60%	16,570	40%
2017	44,403	16,429	37%	27,974	63%
2018	45,313	16,555	37%	28,758	63%
2022	48,983	16,966	35%	32,017	65%
2027	53,316	17,159	32%	36,157	68%
2032	57,959	17,179	30%	40,780	70%
2037	62,930	16,991	27%	45,939	73%
Sources: 2017 FAA TAF, 2015 FASP, FAA Aerospace Forecasts 2017-37, airport records, tenant information, global and regional skydiving and flight training forecasts, and TKDA 2017.					

Derivative Forecasts

Once preferred forecasts were selected for total operations and based aircraft, several derivative forecasts may be developed including peak period demand, instrument/visual operations, day and night operations, aircraft operational fleet mix and air taxi enplanement forecasts. Each of these forecasts plays an important role in determining airport facility requirements during the 20-year planning period.

Day and Night Operations

Operations at Sebastian Municipal Airport primarily occur during the daylight hours between 8:00 am and 6:00 pm EST. There have been recorded operations between 7:00 pm and 10:00 pm, but those have been limited to one to three a week at most. With the exception of the self-service fuel facilities located on the Arrival and Departure apron, no other services at the airport are available after 6:00 pm. Further, portions of the airfield are not lit at night. Runway 5-23 is equipped with low-light runway edge lights and 10-28 is not equipped with any edge lights. Further, signage and portions of the taxiways are not equipped with lighting. The lack of lighting, available facilities and volunteer noise ordinances explains the lack of traffic during the night hours. Operations that occur after 6 or 7 pm usually occur during the spring and summer months due to longer daylight hours available. However, an increase in nighttime operations may occur with growth of some on-site businesses which use aircraft for cross country operations.

Based upon on-site observations, historical data and discussions with users and tenants, estimates of day and night operations were determined as shown in **Table 3-17**.

TABLE 3-17
DAY AND NIGHT OPERATIONAL ACTIVITY FORECASTS

Year	Total Operations	Day Operations (7 am to 7 pm)	Percent of Total	Night Operations (7 pm to 10 pm)	Percent of Total
2016	41,570	41,500	99.83%	70	0.17%
2017	44,403	44,325	99.82%	78	0.16%
2018	45,313	45,239	99.84%	74	0.16%
2022	48,983	48,902	99.83%	81	0.17%
2027	53,316	53,226	99.83%	90	0.17%
2032	57,959	57,859	99.83%	100	0.17%
2037	62,930	62,819	99.82%	111	0.18%

Sources: On-site inventory, limited Flight Aware data, user and airport management information primarily from fuel receipts, and TKDA 2017

IFR/VFR Operations

Sebastian Municipal Airport is located within Class E airspace which requires the airport to be equipped with meteorological communications (e.g. AWOS or ASOS) and for aircraft to have the ability to contact an air traffic control tower. Visual Flight Rules (VFR) requirements for Class E airspace under Federal Aviation Regulations (FAR) 91.155, no person may operate an aircraft under VFR when altitude, flight visibility or distance from clouds is less than:

ALTITUDE	FLIGHT VISIBILITY	DISTANCE FROM CLOUDS
Less than 10,000 feet MSL	3 statute miles	500 feet below. 1,000 feet above. 2,000 feet horizontal
At or above 10,000 feet MSL	5 statute miles	1,000 feet below. 1,000 feet above. 1 statute mile horizontal.
Source: FAR Part 91.155 Class E airspace requirements		

Instrument flight rules (IFR) allow pilots to operate under lower minimums during instrument meteorological conditions such as lower cloud cover, poor light and visibility. Under these conditions, pilots will need to rely on on-board instrumentations to get them to a point where they can visually see the runway threshold. Both Runway 5 and 23 are equipped with RNAV/GPS non-precision approaches, which allow down to one statute mile visibility and lower minimum descent altitude than would be allowed for a VFR approach. The RNAV/GPS approaches allow pilots to use WAAS satellite and lateral navigation signals to line up to the centerline of the runway during lower visibility conditions.

According to meteorological data, on-site observations and information provided by users, as well as limited Flight Aware data, recorded instrument operations at X26 is very limited. According to meteorological conditions, when the airport is not closed due to a weather event, meteorological conditions requiring instrument flight operations occurs approximately 1.55 percent of the time. Therefore, using this information and the fact that airport facilities are open between 08:00 am and 4:00 pm, this seemed a logical estimate of likely IFR activity at Sebastian over the 20-year planning period. IFR operations may increase in the future with the advent of additional approach and departure procedures and other new technology. However, we still anticipate that evening and nighttime operations will be kept to a minimal.

Table 3-18 provides likely estimates of VFR and IFR operations.

TABLE 3-18
IFR AND VFR OPERATIONAL ACTIVITY FORECASTS

Year	Total Operations	Visual Flight Rule Activity	Percent of Total	Instrument Flight Rule Activity	Percent of Total
2016	41,570	40,925	98.45%	644	1.55%
2017	44,403	43,715	98.45%	688	1.55%
2018	45,313	44,611	98.45%	702	1.55%
2022	48,983	48,224	98.45%	759	1.55%
2027	53,316	52,490	98.45%	826	1.55%
2032	57,959	57,061	98.45%	898	1.55%
2037	62,930	61,955	98.45%	975	1.55%

Sources: On-site inventory, limited Flight Aware data, user and airport management information primarily from fuel receipts, and TKDA 2017

Aircraft Fleet Mix

The aircraft fleet mix forecast like the based aircraft fleet mix is used to determine critical aircraft demand as well as airport infrastructure sizing requirements including hangars, apron movement areas, taxiways, taxilanes, runways, holding pads, etc. The current majority of aircraft operations are associated with single-engine piston aircraft, typically the PA-28 Cherokee. However, because Skydive Sebastian regularly uses the Cessna 208 Caravan, Beech 200D and DE Havilland DH-6 Twin Otter aircraft, all multi-engine turboprop aircraft, to support their skydiving operations, a large portion of turboprop operations are associated with skydiving activity.

Sebastian Aero. Service, Lois Aviation LLC and Pilots Paradise all fly multi-engine piston aircraft providing both on-demand air taxi and training services. On average these aircraft provide 4 to 6 seats including the pilot. The airport also supports Velocity Aviation which manufacturers both single and multi-engine aircraft. Some of Velocity's aircraft along with other kit planes on the field are designated as experimental, so these aircraft were placed in this category. Other aircraft represent gliders, motorized gliders, and other types of aircraft. Finally, although there are no helicopters currently based at X26, airport management has pointed out that there are regular helicopter operations. And, they have requested as part of this project to evaluate

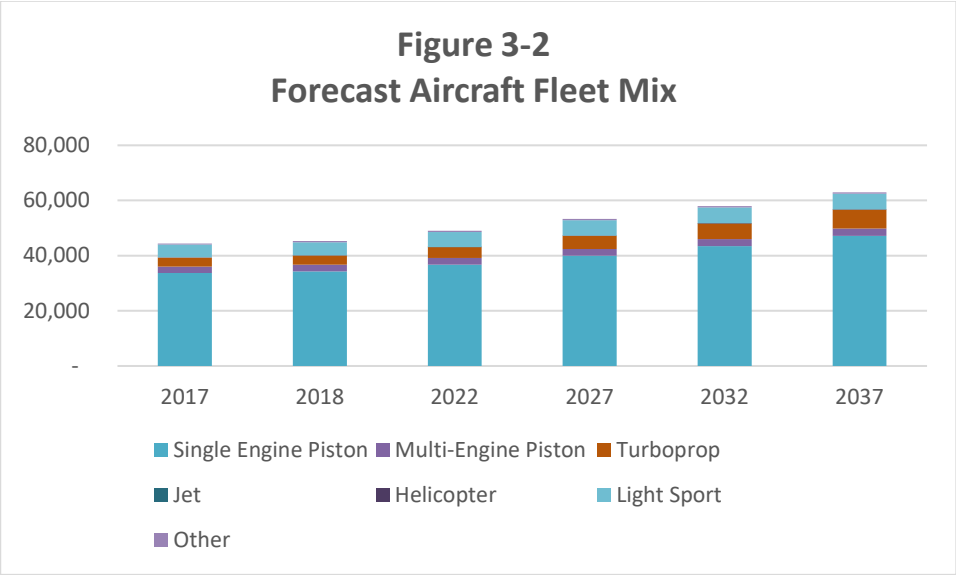
locations for rotorcraft parking near the Arrival and Departure building as well as near Pilot's Paradise.

The FAA Aerospace Forecasts predict that piston aircraft will begin to decrease as new aircraft come on the market and 100LL fuel is phased out. In addition, very light jets are continuing to build a foothold in the general aviation and corporate market because of their fuel efficiency and ability to use short runways. Therefore, based upon anticipated aviation operational and manufacturer trends, it is viable that X26 could continue to support growth of turboprop aircraft as well as attracting turbine rotorcraft and jet aircraft. To allow for flexibility in development, the following aircraft operational fleet mix was created as illustrated in **Table 3-19** and **Figure 3-2**.

TABLE 3-19
AIRCRAFT OPERATIONS FLEET MIX FORECAST

Year	Total Operations	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Light Sport	Other
2017	44,403	33,737	2,348	3,234	-	26	4,638	420
2018	45,313	34,308	2,372	3,366	-	27	4,820	420
2022	48,983	36,673	2,463	3,939	14	33	5,441	420
2027	53,316	39,919	2,550	4,733	17	42	5,635	420
2032	57,959	43,408	2,636	5,680	19	53	5,742	420
2037	62,930	47,149	2,722	6,809	23	67	5,740	420

Sources: Airport historical data, on-site inventory, Florida Aviation System Plan, FAA Aerospace Forecast, user and tenant information, and TKDA, 2017.



Peak Period Demand Forecasts

Peaking forecasts allow airports to be planned for times when the highest volume of traffic is expected, and are therefore used to determine critical requirements such as transient apron area and airfield capacity. Historically, April has represented the peak month for aviation activity at Sebastian for over four years. Although there are limited skydiving activities that occur during this month, this is a high month for aircraft training, air taxi and other general aviation activities. Peak month for skydiving instead tends to be in the fall and early spring with the exception of one long-weekend event scheduled in July.

Peak operations were determined based upon historical and current operations as well as current trends. Peaking estimates were calculated as follows:

- The peak month historically supports 10.5 percent more operations than the average month.
- The average day of the peak month (ADPM) was determined by dividing the number of peak month operations by total number of operations in April (30 days)
- Operational typically occur between 8:00 am and 9 pm EST. Therefore, the peak hour is 18 percent higher than the average hourly operations mostly due to skydiving and flight training activities.

- In reviewing activity, 84 percent of total operational activity was associated with flight training, 70 percent of flight training operations are related to touch and go activity, and on average 40 percent of monthly operations are attributed to skydiving activity.

A breakdown of peak activity is provided in **Table 3-20**.

TABLE 3-20
PEAK PERIOD DEMAND FORECASTS

					Itinerant			Local				
		10.5%	30 days	18%					84%	70%	40%	
Fiscal Year	Total Ops	Peak Month	ADPM	Peak Hour	Total	AT	GA	Total	Training	T&G	Skydiving	Other*
2016	41,570	3,828	128	15	9	-	9	6	5	4	2	-
2017	44,403	4,089	136	16	6	1	5	10	8	6	4	-
2018	45,313	4,173	139	16	6	1	5	10	8	6	4	-
2022	48,983	4,511	150	18	6	1	5	12	10	7	5	-
2027	53,316	4,910	164	19	6	1	5	13	11	8	5	-
2032	57,959	5,337	178	21	6	1	5	15	13	9	6	-
2037	62,930	5,795	193	23	6	1	5	17	14	10	7	-

*Note: *Not enough information to accurately forecast*
Sources: Airport historical data, on-site inventory, Florida Aviation System Plan, FAA Aerospace Forecast, user and tenant information, and TKDA, 2017.

Air Taxi Enplanements*

Several tenants including the local FBO provide on-demand air taxi services primarily using the Beech King Air 200D or the Cessna 320. The majority of air taxi aircraft were configured to support 2 to 6 passenger seats. Based upon this data and enplanement information, a forecast of anticipated on-demand aircraft operations is provided in **Table 3-21**. Air Taxi operations have increased because of new ownership of Pilot's Paradise, the Fixed Based Operator, as well as interest in sightseeing activities.

TABLE 3-21
AIR TAXI ENPLANEMENT FORECAST

Year	Air Taxi Operations	Enplanements	Enplanements Per Operation	Estimated Average Seats[1]
2017	1,779	3,598	2	3
2018	1,852	3,822	2	3
2022	2,171	4,846	2	3
2027	2,614	6,439	2	3
2032	3,144	8,546	3	5
2037	3,776	11,327	3	6

Note: [1]Estimated average seats was based upon the type and model of air taxi aircraft not including pilot.

Source: Aircraft Manufacturer data, tenant and airport data, FAA Aerospace Forecast, FASP and FAD Forecasts, and TKDA, 2017

Summary of Forecast Aircraft Activity

In summary, the data and methods used to forecast aviation demand for the Sebastian Municipal Airport are consistent with those used by the FAA, FDOT and other airports in Florida. The forecasts presented in this chapter are considered to accurately reflect X26's anticipated activity growth through 2037, provided that facilities necessary to accommodate the demand are made available. For FAA review purposes, **Table 3-22** presents a comparison between the FAA's 2017 TAF values and the preferred activity forecasts for X26, and **Table 3-25** includes a consolidated summary of the forecasts.

Table 3-22 provides a comparison of FAA TAF forecast operations and based aircraft in relation to forecast operations and based aircraft minus experimental, light sport and other* types of aircraft. Since the 2017 TAF Base Year was different from actual operations and based aircraft, **Table 3-22** also provides a comparison between the forecasts and the TAF if the base year data was the same.

TABLE 3-22 FORECAST OPERATIONS AND BASED AIRCRAFT COMPARISON TO 2017 FAA TAF					
Aircraft Operations Forecast					
Fiscal Year	**Aircraft Operations***	**2017 Published TAF**	**Percent Difference**	**Adjusted TAF Forecast**	**Percent Difference**
2017	39,345	37,240	5.7%	39,345	0.0%
2018	40,073	37,240	7.6%	39,345	1.9%
2022	43,122	37,240	15.8%	39,345	9.6%
2027	47,261	37,240	26.9%	39,345	20.1%
2032	51,797	37,240	39.1%	39,345	31.6%
2037	56,770	37,240	52.4%	39,345	44.3%
Based Aircraft Forecasts					
Fiscal Year	**Airport Based Aircraft***	**2017 TAF Based Aircraft Forecast**	**Percent Difference**	**Adjusted 2017 TAF Forecast**	**Percent Difference**
2017	49	40	23%	49	0%
2018	61	40	52%	49	24%
2022	64	40	61%	49	31%
2027	67	40	67%	49	36%
2032	70	40	74%	49	42%
2037	70	40	75%	49	43%

**Both Airport Operational forecasts and Based Aircraft forecasts do not include experimental, light sport or other aircraft in the forecast of demand.*
Sources: Airport historical data, 2017 FAA TAF, 2015-34 FASP, and TKDA 2017

A number of documents and aviation experts expect dynamic growth in experimental, light sport and other non-traditional aircraft. X26 is currently home to one experimental and light sport aircraft manufacturer and is in discussions with another. Based upon the existing tenant's business plan and FAA forecasts of demand, **Tables 3-23, 24 and 25**, summarize likely non-traditional aircraft demand.

TABLE 3-23 FORECAST OTHER* AIRCRAFT OPERATIONS DEMAND					
Fiscal Year	Total Operations	Light Sport	"Other "Aircraft	Total	% of Total Ops
2017	44,403	1,517	3,541	5,058	11%
2018	45,313	2,217	3,023	5,240	12%
2022	48,983	3,182	2,679	5,861	12%
2027	53,316	3,877	2,178	6,055	11%
2032	57,959	4,344	1,818	6,162	11%
2037	62,930	4,769	1,391	6,160	10%

Note: "Other" aircraft include: experimental, ultralights, gliders, powered parachute, UAVs, etc.
Sources: Airport historical data, Tenant Business Plans, Airport Sponsor and TKDA 2017

TABLE 3-24 FORECAST OTHER* BASED AIRCRAFT DEMAND					
Fiscal Year	Total Based Aircraft	Light Sport	"Other" Aircraft	Total	% of Total Based Aircraft
2017	59	3	7	10	17%
2018	73	5	7	12	17%
2022	80	8	7	15	19%
2027	86	12	7	19	23%
2032	93	17	7	24	25%
2037	101	24	7	31	31%

Note: "Other" aircraft include: experimental, ultralights, gliders, powered parachute, UAVs, etc.
Sources: Airport historical data, Tenant Business Plans, Airport Sponsor and TKDA 2017

TABLE 3-25 AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
Base Year	2017										
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
PASSENGER ENPLANEMENTS											
On-Demand Air Taxi	3,598	3,822	4,846	6,439	8,546	11,327	6.20%	6.13%	5.99%	7.94%	5.90%
Total Passenger Enplanements	**3,598**	**3,822**	**4,846**	**6,439**	**8,546**	**11,327**	**6.20%**	**6.13%**	**5.99%**	**5.94%**	**5.90%**
OPERATIONS											
Itinerant Operations:											
Air Carrier	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Commuter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Charter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Taxi	1,779	1,852	2,171	2,614	3,144	3,776	4.13%	17.19%	20.41%	20.26%	20.11%
Total Commercial Operations	**1,779**	**1,852**	**2,171**	**2,614**	**3,144**	**3,776**	4.13%	17.19%	20.41%	20.26%	20.11%
5010 General Aviation Operations	14,144	14,178	14,150	13,758	13,049	11,983	0.24%	-0.20%	-2.77%	-5.15%	-8.17%
Other General Aviation Operations (LS and Exp)	506	524	645	787	986	1,232	3.60%	23.04%	22.09%	25.25%	24.97%
Military	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%

TABLE 3-25 AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
Base Year	2017										
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
Total Itinerant Operations	**16,429**	**16,555**	**16,966**	**17,159**	**17,179**	**16,991**	0.76%	2.48%	1.14%	0.11%	-1.09%
Local Operations:											
Recorded (5010) Civil Operations	23,422	24,042	26,801	30,889	35,604	41,011	2.65%	11.47%	15.25%	15.26%	15.19%
Other General Aviation Operations (LS and Exp)	4,552	4,716	5,216	5,268	5,176	4,928	3.60%	10.61%	0.99%	-1.74%	-4.79%
Military	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Total Local Operations	**27,974**	**28,758**	**32,017**	**36,157**	**40,780**	**45,939**	2.80%	11.33%	12.93%	12.79%	12.65%
TOTAL OPERATIONS	**44,403**	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**	2.05%	8.10%	8.85%	8.71%	8.58%
Day Operations	44,325	45,239	48,902	53,226	57,859	62,819	2.06%	8.10%	8.84%	8.70%	8.57%
Night Operations (19:00 - 23:00)	78	74	81	90	100	111	-5.62%	9.87%	11.08%	10.94%	10.81%
Instrument Operations (NPI)	688	702	759	826	898	975	2.05%	8.10%	8.85%	8.71%	8.58%
Cargo/Mail (enplaned + deplaned tons)	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
PEAK OPERATIONS FORECAST (April 2017)											

TABLE 3-25 AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
Base Year	2017										
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
Peak Month	4,089	4,173	4,511	4,910	5,337	5,795	2.05%	8.10%	8.85%	8.70%	8.58%
Average Day Peak Month	136	139	150	164	178	193	2.21%	7.91%	9.33%	8.54%	8.43%
Peak Hour	16	16	18	19	21	23	0.00%	12.50%	5.56%	10.53%	9.52%
OPERATIONAL FLEET MIX											
Single-Engine Piston	33,737	34,308	36,673	39,919	43,408	47,149	1.69%	6.89%	8.85%	8.74%	8.62%
Multi-Engine Piston	2,348	2,372	2,463	2,550	2,636	2,722	1.02%	3.84%	3.53%	3.37%	3.26%
Turboprop	3,234	3,366	3,939	4,733	5,680	6,809	4.09%	17.00%	20.17%	20.02%	19.87%
Jet	0	0	14	16	19	23	0.00%	0.00%	0.00%	0.00%	16.00%
Civil Helicopter (CH)	26	27	33	42	53	67	3.85%	22.22%	27.27%	26.19%	26.42%
Total	*39,345*	*40,073*	*43,122*	*47,261*	*51,797*	*56,770*	1.85%	7.61%	9.60%	9.60%	9.60%
Excluded from FAA TAF Forecasts											
Light Sport Aircraft	1,517	2,217	3,182	3,877	4,344	4,769	46.14%	43.53%	21.84%	12.05%	9.79%
Other (Experimental Gliders, UAVs, Ultralights, etc.)	3,541	3,023	2,679	2,178	1,818	1,391	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL OPERATIONAL FLEET MIX	**44,403**	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**	**2.05%**	**8.10%**	**8.85%**	**8.71%**	**8.58%**
BASED AIRCRAFT FLEET MIX FORECAST											

TABLE 3-25 AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
Base Year	2017										
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
Single-Engine Piston	42	53	56	59	63	63	25.72%	5.99%	5.23%	6.96%	0.00%
Multi-Engine Piston	4	4	3	2	0	0	0.00%	-25.00%	-33.33%	0.00%	0.00%
Turboprop	3	3	3	4	4	4	2.00%	8.24%	10.40%	10.40%	10.40%
Jet	0	0	1	1	1	1	0.00%	0.00%	0.00%	0.00%	0.00%
Civil Helicopter	0	1	1	1	1	2	0.00%	9.20%	11.63%	11.63%	11.63%
Total	*49*	*61*	*64*	*67*	*69*	*70*	24.21%	5.77%	3.73%	3.93%	0.83%
Excluded from FAA TAF Forecasts											
Light Sport Aircraft	3	5	8	12	17	24	71.19%	61.89%	49.89%	34.19%	43.51%
Other (Experimental, Gliders, UAVs, Ultralights, etc.)	7	7	7	7	7	7	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL BASED AIRCRAFT	**59**	**73**	**80**	**86**	**93**	**101**	23.73%	9.16%	8.22%	7.98%	8.43%
OPERATIONAL FACTORS											
Average aircraft size (seats)											
Air Carrier	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Commuter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Charter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Taxi	3	3	3	5	5	6	0.00%	0.00%	66.67%	0.00%	20.00%

TABLE 3-25 AIRPORT PLANNING FORECAST SUMMARY SEBASTIAN MUNICIPAL AIRPORT											
Base Year	2017										
							Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15	Base yr. to +20
	2017	2018	2022	2027	2032	2037	2018	2022	2027	2032	2037
Average enplaning load factor											
Air Carrier	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
Commuter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Charter	0	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%	0.00%
On-Demand Air Taxi	2	2	2	2	3	3	1.99%	8.20%	10.36%	10.36%	10.36%
GA Operations per based aircraft	637	515	514	518	521	525	-19.11%	-0.23%	0.75%	0.70%	0.65%
Note: Due to Rounding may not add up											
Sources: Airport historical data, 2017 FAA TAF, 2015-34 FDOT FASP, and TKDA 2017											

Critical Aircraft Demand

Critical aircraft operations represent the most demanding aircraft in terms of approach speed, wingspan and tail height that regularly, approximately 500 annual operations, use an airport. The critical aircraft may be a single aircraft or a combination/family of aircraft. These aircraft operational requirements direct airfield and facility needs at an airport. As discussed in more detail in Chapters 3 and 4, a design aircraft may differ for different on-airport facilities. For example, the most demanding aircraft for a t-hangar storage area, associated apron and taxi lanes may be designed to accommodate an A-I and B-I aircraft, such as the Cessna 182 or Cessna Mustang, respectively; whereas the primary runway, taxiways and terminal apron may be designed to accommodate B-II aircraft, such as the King Air 350i.

The 2010 Airport Layout Plan shows that the current critical aircraft for Runway 5-23 is an A-II (DH-6-300 "Twin Otter"), and should be upgraded to support a B-II aircraft such as the Cessna 560 XL. The secondary runway, 10-28, currently lists the King Air B-100 (B-I Small Aircraft Only) as the current critical aircraft, and upgrading it to support a King Air C-90B (B-I) aircraft.

Skydive Sebastian uses the DH-6-300 as their main jump plane. At one point, Skydive Sebastian had two DH-6-300 aircraft on the field, but one was irreparably damaged during an accident. During peak skydiving season, the company also uses a Cessna 208 Caravan which temporarily is based at the airport.

In addition to turboprop aircraft used by Skydive Sebastian, Pilot's Paradise and other tenants utilize a Beech King Air 200D on a fairly regular basis. This was confirmed through discussions with airport users and on-site inventory of activity. **Table 3-26** illustrates current aircraft demand for FY 2017.

As noted, the previous Airport Layout Plan suggested that the Cessna Citation jet XL would regularly operate at Sebastian Airport. Although based upon manufacturer operating criteria the aircraft can safely operate on Runway 5-23, there has been no user interest in operating such an aircraft at X26. Further, since the Airport is noise sensitive and has implemented noise abatement procedures, the introduction of a jet aircraft may not "sit well" with the local community.

Aircraft regularly using the airport include the following.

TABLE 3-26
CURRENT AIRCRAFT DEMAND

Aircraft Type	ARC Code	Engine Type	Operations
Beech B-23	A-I	SEP	120
Beech P-35	A-I	SEP	104
Beech V35	A-I	SEP	250
Cessna 152	A-I	SEP	108
Cessna 172	A-I	SEP	303
Cessna 182	A-I	SEP	110
Cessna Skyhawk	A-I	SEP	62
Piper 28 Cherokee	A-I	SEP	24,689
Piper Arrow	A-I	SEP	5,578
Piper 32 Cherokee	A-I	SEP	216
Piper Cub	A-I	SEP	100
Cirrus SR22	A-I	SEP	100
Maule M-7-235	A-I	SEP	1,897
Piper Warrior	A-I	SEP	100
	Subtotal	SEP	33,737
Piper 31 Navajo	B-I	MEP	1,514
Piper 30 Twin Comanche	A-I	MEP	792
Piper 34 Seneca	A-I	MEP	132
			2,438
Cessna 320D	A-I	TP	964
Cessna 208 Caravan	B-I	TP	495
DH6-300-600	A-II	TP	867
Beech 200D	B-II	TP	908
			3,234
Glider		NA	420
Helicopter - Small		Unknown	26
Light Sport*			4,638
		TOTAL	**44,403**

Items in blue are Turboprop aircraft used by current airport tenants and users
**Light sport includes Velocity Aircraft operations*

Sources: Airport surveys, airport data, on-site survey – TKDA 2017

Currently, the critical design aircraft is the **Beech 200D**. The aircraft fleet mix forecast, supported by aircraft manufacturer and FAA data, forecast that multi-engine piston aircraft are being replaced by quieter and efficient turboprop aircraft and light jet aircraft. Turboprop operations at X26 based upon historical and current data consist of a mix of ARC A-II and B-II aircraft. Assuming that turboprop demand will remain strong throughout the forecast period, it is anticipated that B-II turboprop aircraft will remain the airport design group for the foreseeable future.

In addition, the sponsor is developing larger hangar facilities adjacent to the terminal apron. Since the King Air family is still heavily used at GA airports for business or on-demand air taxi operations, it is likely that the **King Air 350i, ARC B-II**, as well as similarly sized aircraft can be accommodated in the southeast quadrant of the airport. Although some jet aircraft are forecast to operate at X26 in the future, the light jet category of aircraft also tend to be included in the ARC B-I and B-II categories. Again, this supports that B-II-II operations will remain the critical aircraft for airfield design for the foreseeable planning period.

A breakdown of future critical aircraft operational demand is provided **Table 3-27.**

TABLE 3-27 2037 FORECAST AIRCRAFT DEMAND			
Aircraft Type	**ARC Code**	**Engine Type**	**Operations**
Beech B-23	A-I	SEP	168
Beech P-35	A-I	SEP	145
Beech V35	A-I	SEP	349
Cessna 152	A-I	SEP	151
Cessna 172	A-I	SEP	423
Cessna 182	A-I	SEP	154
Cessna Skyhawk	A-I	SEP	87
Piper 28 Cherokee	A-I	SEP	34,504
Piper Arrow	A-I	SEP	7,795
Piper 32 Cherokee	A-I	SEP	302
Piper Cub	A-I	SEP	140
Cirrus SR22	A-I	SEP	140
Maule M-7-235	A-I	SEP	2,651
Piper Warrior	A-I	SEP	140
		Subtotal SEP	**47,149**
Piper 31 Navajo	B-I	MEP	1,651
Piper 30 Twin Comanche	A-I	MEP	918
Piper 34 Seneca	A-I	MEP	153
		Subtotal MEP	**2,722**
Cessna 320D	A-I	TP	230
Cessna 208 Caravan	B-I	TP	1,042
DH6-300-600	A-II	TP	1,825
Beech 200D	B-II	TP	1,912
Beech KingAir 350I	B-II	TP	1,800
		Subtotal TP	**6,809**
Embraer Phenom 100	B-I	Turbofan	15
Embraer Phenom 300	B-II	Turbofan	10
		Subtotal Jet	**23**
Light Sport Aircraft *	A-I	SEP/Other	5,740
Glider/Other		NA	420
Helicopter		Unknown	67
		TOTAL	**62,930**

Note: May not add up due to use of percentages and rounding
**Includes Velocity and new tenant estimates*
Sources: TKDA, 2017

Next Steps

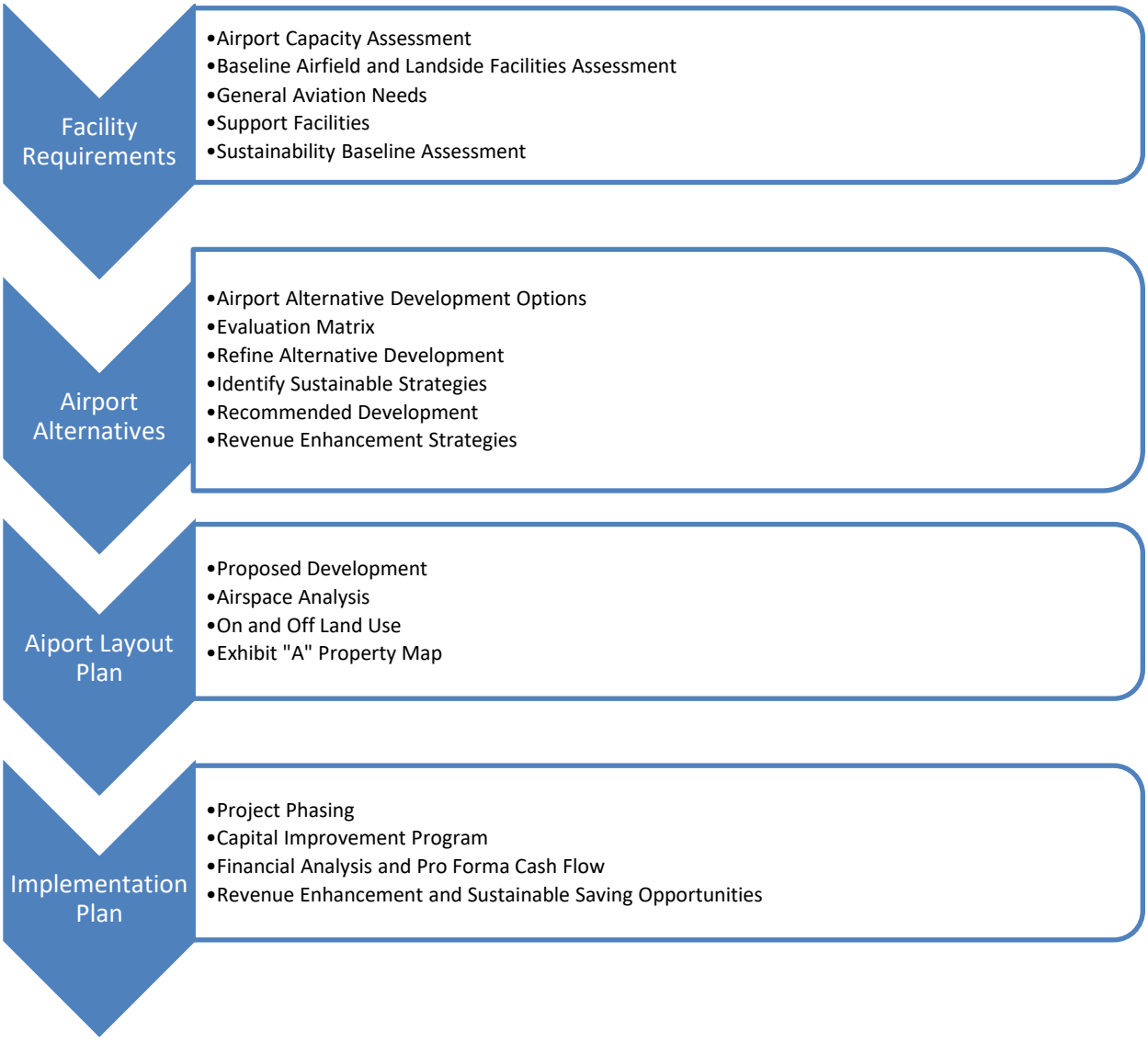
As illustrated in **Figure 3-3**, forecast demand is used to identify needed airport infrastructure as well as provides planning activity level triggers for project justification. Typically, airport development triggers include:

- Aircraft Operations
  - Airport planning, environmental documentation and preliminary permitting should start when at 60 percent of forecast planning activity triggers.
  - Design and construction should begin at 80 percent of forecast planning activity levels to allow for infrastructure to be in place to meet demand.
- General Aviation Hangar Development
  - Hangar site preparation and construction should begin when demand is at 90 percent capacity or based upon tenant/user requests
- Transient Aircraft Storage Demand
  - Transient aircraft storage, including apron parking, shade hangars and box hangar storage should begin around 80 percent of demand to allow adequate time for site preparation, funding and construction.
- Tenant Demand, and
  - Trigger demand for tenant infrastructure needs are specifically related to their need. If demand warrants and funding available, design, permitting and any environmental work should begin immediately.
- Airport Capacity
  - Airport capacity is tied to operational demand. Therefore, planning, environmental and other documentation should begin when airport and airspace demand equals 60 percent of total capacity.
  - At 80 percent capacity, engineering design and construction should begin. This typically will include additional taxiways, runways, and navigational aids.

Forecast data and facility needs are used to create airport alternative options, on and off land use, to identify revenue diversification opportunities as well as establish phasing for project development. Proposed airport development for the next twenty-years is graphically presented in the Airport Layout Plan set and a pro-forma cash flow analysis and updated capital improvement program will provide the sponsor data related to likely federal and state funding

as well as identify third party funding and revenue and costs associated with proposed development.

FIGURE 3-3
NEXT STEPS



This Page was Intentionally Left Blank

CHAPTER FOUR
Airport Capacity and Facility Needs

Chapter Overview

This chapter evaluates airspace, airfield and landside capacity and facility needs for the Airport based upon the critical aircraft, forecast demand, emerging trends in aviation as well as recommended and required facility design criteria. Sebastian Municipal Airport currently supports a variety of general aviation activities including flight training, recreation, skydiving, and air taxi operations. The Airport is also home to several light sport aircraft manufacturers. According to the most recent FAA Aerospace Forecast, demand for light sport aircraft is expected to remain strong for the next 20+ years. FAA forecasts strong growth not only for light sport aircraft but turbine engine aircraft as well. In reviewing historical, existing and anticipated operations based upon the business plans of on-site tenants at the Airport, these type of aircraft are and will continue to drive facility demand.

Using the FAA approved forecasts, airspace and airfield capacity was evaluated using guidance provided from FAA AC 150/5060-5, Airport Capacity and Delay, to determine annual service volume and capacity. Using the FAA's current methodology, the average Annual Service Volume for Sebastian Municipal Airport (X26) was approximately 252,000 operations. Applying the Annual Service Volume to annual forecast demand, showed that X26 has excess airspace and airfield capacity and can support greater demand than illustrated by the activity forecasts.

Since the FAA Demand Capacity advisory circular (AC) is in the process of being updated, the consulting team also applied some analysis recommendations contained in ACRP Report 79, Evaluating Airfield Capacity as well as ACRP Report 104, Defining and Measuring Aircraft Delay and Airport Capacity Thresholds, to evaluate airfield capacity. Using the methodologies outlined in the ACRP reports still show that the Airport can support additional capacity beyond forecast demand. Therefore, the City should

continue to market the airport and look for opportunities for additional compatible development.

Facility requirements were identified based upon forecast demand including based aircraft, operations, critical aircraft, etc. The facility requirements also considered the impacts and opportunities associated with emerging technology (i.e. NextGen, light sport aircraft, sport pilot's license, unmanned aerial vehicles, etc.) as well as design requirements provided by both FAA and FDOT. Facility recommendations are briefly outlined in Table 4-1.

TABLE 4-1
2037 FACILITY REQUIREMENTS SUMMARY

Airport Facility	2037 Demand
Hangar Demand:	
Shade Hangar	40
T-Hangar	36
Corporate/Box Hangar	8
Conventional Hangar	4* (development is driven by business demand)
Apron Tie-Down	
Based aircraft tie-downs	7
Transient aircraft tie-downs	2* (Based upon peak hour demand)
Fuel Demand (14 day peak fuel demand)	
100 LL	2,656 gallons
Jet A	17,935 gallons
Terminal Building Area	4,050 SF
Auto Parking Spaces (Peak Hour Demand)	113
Support Facilities:	
Airfield Fencing/Security	Relocate and possible expansion depending upon recommended development
Roadway Access	Expansion
Utilities	Extend and expand lines to support planned development (water, sewer, electricity, phone/cable, etc.)

TABLE 4-1 2037 FACILITY REQUIREMENTS SUMMARY	
Airport Facility	2037 Demand
Land Acquisition	To support runway approach and departure protection zones.
Obstruction Mitigation	Remove trees and add obstruction lighting as needed to immovable objects
Source: TKDA 2017	

A runway length analysis was also performed for Runway 10-28 and 5-23. However, neither require an extension to support forecast demand during the twenty year planning period. Further, since aircraft engines are becoming more efficient and quieter, more advanced aircraft are able to operate on shorter runways. These improved efficiencies have opened up airports to new traffic and provides greater operational efficiencies.

The detailed discussion of the airport demand capacity evaluation and facility needs are provided in the following paragraphs. This information provides the baseline for recommended development options provided in **Chapter 5**, Airport Alternatives and Recommended Development.

Airport Demand Capacity Analysis

Demand/capacity analysis is important to determine if the existing airfield configuration can accommodate future demand. By comparing the theoretical operational capacity with projected operations levels, the type and timing of airfield capacity improvements can be estimated.

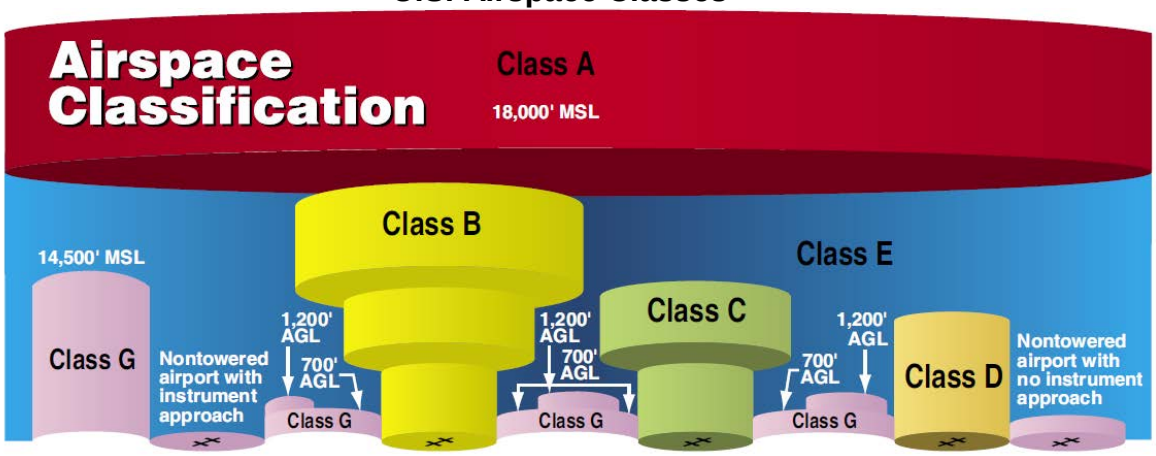
Airport capacity is defined by the Federal Aviation Administration (FAA) as an estimate of the number of aircraft that can be processed through the airfield system during a specific period, with acceptable levels of delay. Estimates of existing airfield capacity at COI were developed in accordance with the methods presented in **FAA Advisory Circular (AC) 150/5060-5**, *Airport Capacity and Delay*. This methodology does not account for every possible situation at an airport, but rather the most common situations observed at U.S. airports when this AC was adopted.

The capacity AC provides a methodology for determining the hourly runway capacity, the annual service volume (ASV) and average expected delays. Each of these factors was calculated for existing conditions and for key years over the 20-year planning period. An airport's hourly runway capacity expresses the maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period. It should be noted that the hourly capacity cannot be sustained for long periods or an airport will experience substantial increases in delay. The ASV estimates the annual number of operations that the airfield configuration should be capable of handling with minimal delays. The ASV considers that over a 12-month period a variety of conditions are experienced, including periods of high volume and low volume activity. The average anticipated delay was based on a ratio of the forecast demand to the calculated ASV. These calculations were based upon the airfield configuration as well as operational and meteorological characteristics, which are described in detail within the following sections.

Airspace Capacity

Airspace capacity is an essential element of any airport, especially with respect to maintaining existing and proposed operational characteristics. As noted in **Chapter 2**, *Existing Conditions*, the airspace surrounding X26 is Class G. Class G airspace extends from the airport surface to 700 feet above ground level (AGL). Class E airspace covers an area outside of the Class D with a floor elevation of 700 feet above ground level (AGL) and continues upward until it meets Class A airspace as shown in **Figure 4-1**.

Figure 4-1
U.S. Airspace Classes

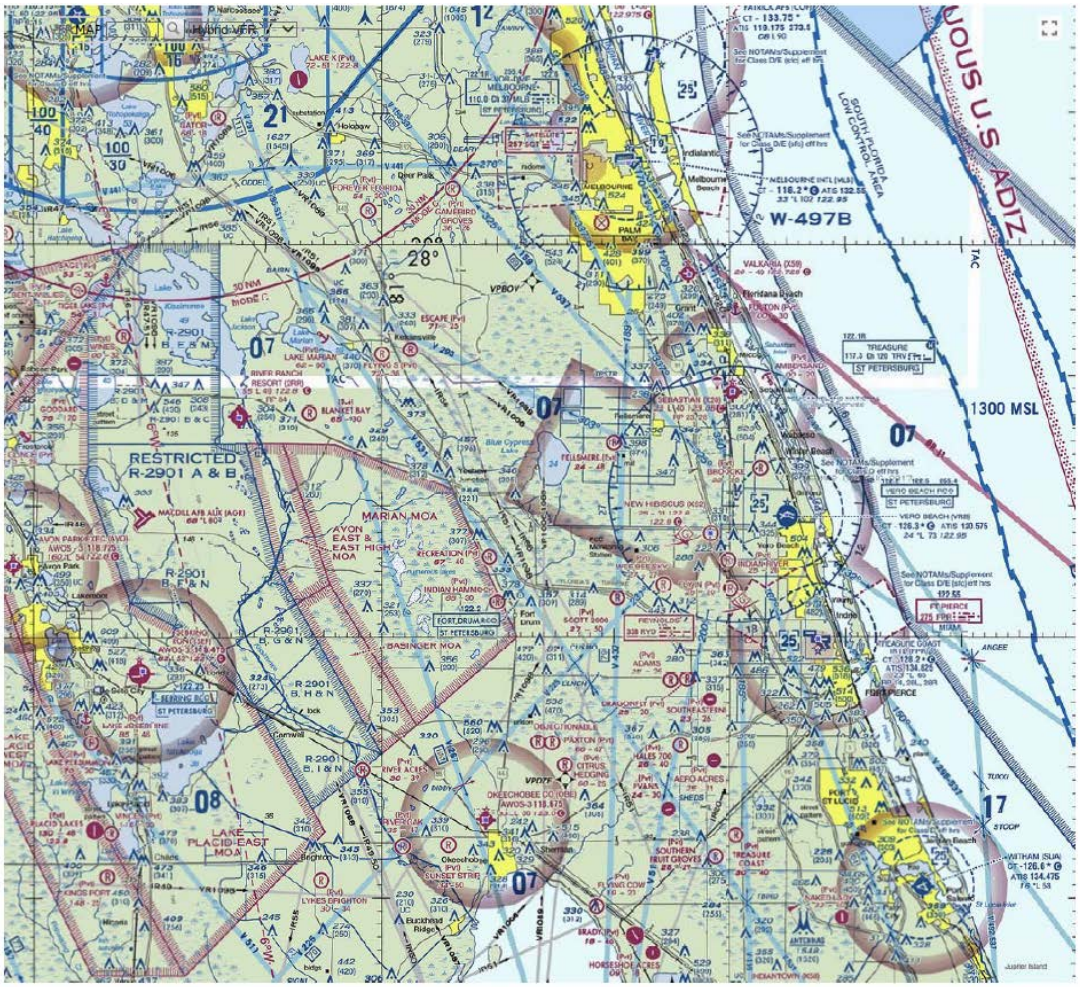


Source: FAA Pilot's Handbook of Aeronautical Knowledge, 2008.

As illustrated in **Figure 4-2**, Airspace Sectional, X26 is located north of Vero Beach Regional Airport's Class D airspace and under the Glass G umbrella. Several miles east of the airport is a military restricted area, designated W-497B, and to the west is the Marianna Military Operating Area (MOA) used by Avon Park. Flying directly north, aircraft will enter Melbourne International Airport Class D airspace.

There is no Terminal Radar Approach Control (TRACON) at Sebastian Municipal Airport. The main function of a TRACON is to control the airspace around airports with high traffic density. The TRACON area of coverage is approximately 35-mile radius from the airport. In the case of X26, the closest TRACON is the Central Florida TRACON, designated F11, located in Orlando Florida. The Miami Air Route Traffic Control Center (MIA ARTCC) controls all air traffic enroute to or from the Sebastian Airport area. Since the last Master Plan Update, the capacity of the airspace surrounding X26 has remained unchanged. Unless the level and type of operations changes, it is anticipated that current airspace capacity will continue to accommodate operations at X26 throughout the 20-year planning period.

FIGURE 4-2
SECTIONAL MAP



Source: FAA Miami VFR Sectional Map, 2017

Airfield Capacity Methodology

The primary determinant of airport capacity is the airfield configuration. Runways are used for aircraft to arrive and depart from the airport, while taxiways enable aircraft to maneuver to and from runways and landside facilities, such as hangars and apron areas. The number of operations that an airport can accommodate is dependent upon how quickly aircraft can move to or from active runways. The runway and taxiway configuration at X26 is further discussed within the following sections.

Airfield Characteristics

In addition to the aviation activity forecasts, identification of existing and future airfield characteristics and operational conditions are required to accurately determine airport annual service volume for the twenty-year planning period. Elements that affect an airfield's capacity include:

- Runway configuration;
- Taxiway configuration;
- Aircraft mix index;
- Operational characteristics; and
- Meteorological conditions.

Runway Configuration and Utilization

As noted in **Chapter 2**, the Airport is equipped with two runways: Runway 5-23 and 10-28. Runway 5-23 has dimensions of 4,023 x 75 feet and has a published pavement strength of 22,000 lbs. single wheel. The runway is equipped with Precision Approach Path Indicator, 2-box lighting system (PAPI-2) on each end as well as low intensity runway lighting (LIRLs). The runway is marked to support non-precision instrument approaches (NPI), and both Runway 5 and 23 support Global Positioning System (GPS) Area Navigation (RNAV) approaches with no less than 1-mile visibility.

Runway 10-28, which previously was a taxiway, provides crosswind coverage and has dimensions of 3,199 x 75 feet. The runway pavement strength is unpublished, so it was assumed to support aircraft with gross weights of 12,500 lbs. or less. Runway 10-28 is also equipped with 2-box PAPIs on either end, but is not equipped with any edge lighting. The runway is marked as "basic," and it supports visual approaches only, which

requires a cloud ceiling at or above 1,000 feet AGL and visibility of three miles or greater at the airport. **Figure 4-3** provides a graphical depiction of the current airfield layout.

FIGURE 4-3
AIRFIELD LAYOUT



Source: FDOT Airport Directory, 2017

Two runways were closed and converted to taxiways or apron during or soon after completion of the prior master plan update. Former Runway 18-36 located on the west side of the airfield was converted into Taxiway A and associated aprons. Since the 2002 Master Plan update, Runway 13-31 was closed since it did not provide 95 percent wind coverage at 10.5 knots in conjunction with Runway 5-23. The pavement is currently in poor condition, and a discussion of reuse for proposed development is provided in Chapters 5-8 of this report.

A crossing runway configuration as shown in Figure 9 of **FAA AC 150/5060-5,** *Airport Capacity and Delay,* was used to calculate the appropriate capacity levels based upon existing and forecast operations. According to the AC, the standard airport service volume (ASV) for this type of runway configuration is 230,000 operations. However, according to the 2004 Florida Aviation System Plan, the capacity for X26 was calculated as 172,500 operations. For this reason as well as changes in aircraft type, the ASV was recalculated.

Taxiway Exits

The distance between taxiway locations and runway ends contributes to airfield and aircraft delays. The longer an aircraft occupies the runway, the more delay will be created for aircraft waiting to land or depart. Additional taxiway connectors allow landing aircraft to clear the runway quicker. Conventional taxiways have a 90° angle to the runway and require slower aircraft speeds to access, while high-speed connectors form an acute angle with the runway thus decreasing runway occupancy by allowing aircraft to continue roll out onto the taxiway without having to slow to less than 20 knots.

The current airfield configuration as of August 25, 2017 includes a full parallel taxiway to Runway 10-28 (Taxiway B) as well as a full apron edge taxiway located on the west side of the airfield designated Taxiway A. Taxiway A connects development to the northeast to threshold of Runway 10 and Runway 5. The Airport also has taxiway pavement connecting the threshold of Runway 23 to the former Runway

However, during this master plan process, Taxiways C, D and E were designed and construction is set to begin in Fiscal Year 2018. Taxiway C is being constructed on the north side of Runway 5-23 and will provide full parallel coverage. Taxiway D runs perpendicular to the south side of Runway 5-23 to provide access to corporate and conventional hangar development. Taxiway E provides a connection between Runway thresholds 28 and 23. Existing and proposed taxiway exit locations are provided in **Table 4-2.**

TABLE 4-2 TAXIWAY EXITS				
Taxiway Connector	**Distance From**			
	Runway 5 Threshold	**Runway 23 Threshold**	**Runway 10 Threshold**	**Runway 28 Threshold**
Existing Taxiways*				
Taxiway A	~241 ft.	~3782 ft	0 ft	3,199 ft
Taxiway C-1	~0 feet	~4,199 ft	NA	NA
Taxiway C	NA	NA	~1564 ft	~1635 ft
Closed Runway/Taxiway B1	~2797 Ft.	~1226 Ft	~1836 ft	~1363 FT
Taxiway B-2	NA	NA	3199 feet	0 ft
Former Taxiway E	~3793 ft	~230 ft	NA	NA
Runway Intersection	~2739 ft	~1284 ft	~1890 ft	~1309 ft
New Taxiways (Design/Construction 2018)				
Taxiway C-2	~1284 ft	~2739 ft	NA	NA
Taxiway C-3	~2135 ft	~1888 ft	NA	NA
Taxiway C-4	~4199 ft	~0 ft	NA	NA
Taxiway D	~2342 ft	~1681 ft	NA	NA
Taxiway E	NA	NA	3,199 ft	0 ft
Sources: Infrastructure Consulting and Engineering (ICE) Design and TKDA 2017				

The taxiway exit factor is maximized when a runway has approximately 4 exit taxiways within a specific range based upon the runway critical aircraft. For crossing runways (Figure 9, FAA AC 150/5060-5) serving a mix index between 0% and 20%, taxiway exit factors ranged from 2,000 to 4,000 feet.

Aircraft Mix Index

The mix index is calculated with the following formula: %(C+3D), where Class C represents aircraft with certified Maximum Takeoff Weight (MTOW) ranging from 12,500 to 300,000 pounds and Class D represents aircraft with MTOW greater than 300,000 pounds. Aircraft operating at X26 consist of a combination of Class A, B and C aircraft as illustrated in **Figure 4-3.**

TABLE 4-3 AIRCRAFT DEMAND/CAPACITY CLASSIFICATIONS		
Aircraft Classification	**Description**	**Sample Aircraft**
Class A	Small Single Engine Aircraft with Maximum Gross Weights of 12,500 lbs. or less	**Piper P-28** 
Class B	Small Multi-Engine Aircraft with Maximum Gross Weights of 12,500 lbs. or less	**DHC-6 Twin Otter** 
Class C	Large Aircraft with Maximum Gross Weight of more than 12,500 lbs. but less than 300,000 lbs.	**Beech King Air 350i** 
Sources: Airport Manufacturer Data, Sebastian Airport Records, and TKDA 2017		

Based upon the fleet mix forecasts identified in **Chapter 3**, the mix index used to determine the airport service volume was: 4% in 2017 based upon current operations by DH6-300-600 and B200D and 9% in 2037 based upon anticipated operations by DH6, B200D, B350i and Phenom 300.

Operational Characteristics

The operational characteristics that can affect an airfield capacity include percentage of aircraft arrivals, sequencing of aircraft departures, and percentage of touch–and-go operations.

Percentage of Aircraft Arrivals

The percentage of aircraft arrivals is the ratio of landing operations to the total operations of the airport. Arriving aircraft require greater runway occupancy time than departing aircraft. For general planning purposes, 50 percent of arrivals were utilized as an estimate to determine the capacity at X26.

Percentage of Touch-and-Go Operations

Touch-and-go operations are aircraft that land and, without stopping on the runway, take off again on the remaining runway. Touch-and-go operations are counted as one landing and one takeoff (i.e., two operations) and are normally associated with flight training activities. FAA guidelines for calculating ASV require an estimate of the percentage of touch-and-go operations occurring at the airport.

Based upon discussions and observations of flight training operations associated with Flight Safety, Paris Air, and Florida Institute of Technology, all of whom use X26 for training operations, touch-and-go operations represent approximately 40 percent of total operations resulting in a VFR Touch and Go factor of 1.40. IFR Touch and Go operations do not currently nor are expected to occur at X26 through the planning period; therefore, the Touch and Go factor for IFR operations was 1. These percentages were utilized in the calculation of the ASV and was anticipated to remain consistent throughout the planning period.

Runway Utilization Percentage

The current airfield configuration consists of two runways: 5-23 and 10-28. Runway utilization from observations was determined as: 26 percent Runway 5; 21 percent Runway 23; 34 percent Runway 10; and 19 percent Runway 28. The airport experiences IFR conditions only 2 percent of the time, during which 60 percent of operations occur on Runway 5, and 39 percent of operations utilize the circling approach to Runway 23. The remaining 0.5 percent of the time, the airport experiences weather minimums below IFR capabilities when aircraft traffic is unable to operate at the airport.

Meteorological Conditions

According to weather data obtained from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Centers[1] and operational data obtained from airport operations, historical runway utilization was approximately:

- 26 percent VFR operations on Runway 5;
- 21 percent VFR operations on Runway 23;
- 34 percent VFR operations on Runway 10
- 19 percent VFR operations on Runway 28
- 60.5 percent of IFR operations on Runway 5
- 39 percent of IFR operations on Runway 23; and
- Meteorological conditions are below operating minima approximately 0.5 percent annually at which point the airport is officially closed.

Meteorological conditions influence the capacity for the airfield. Runway utilization at airports typically is determined by wind conditions, as aircraft must land and take off into the wind for optimal aircraft performance, while cloud ceiling and forward visibility dictates approach spacing requirements. The following operational conditions are an element of calculating airport capacity:

- Visual Flight Rules (VFR) – Cloud ceiling is greater than 1,000 feet above ground level (AGL) and the visibility is at least three statute miles;
- Instrument Flight Rules (IFR) – Cloud ceiling is at least 600 feet AGL but less than 1,000 feet AGL and/or the visibility is at least half a statute mile but less than three statute miles; and
- Poor Visibility and Ceiling (PVC) – Cloud ceiling is less than 500 feet AGL and/or the visibility is less than half a statute mile.

VFR, IFR and All Weather wind roses are provided in **Figures 4-4** through **4-6**, respectively. Runway 5-23 and 10-28 are required at X26 to provide 95 percent wind coverage to support smaller aircraft operations. As noted in Figures 4-4 through 4-6, this was calculated using a 10.5 knots crosswind component to address smaller and

[1] Station: Sebastian Station **GHCND: US1FLIR0019**, NOAA National Climatic Center, October 2008 through August 2017.

lighter (less than 12,500 lbs.) aircraft needs as well as for a 13 knot crosswind component. The 13 knot crosswind component was used to identify potential impacts to larger and heavier aircraft.

FIGURE 4-4

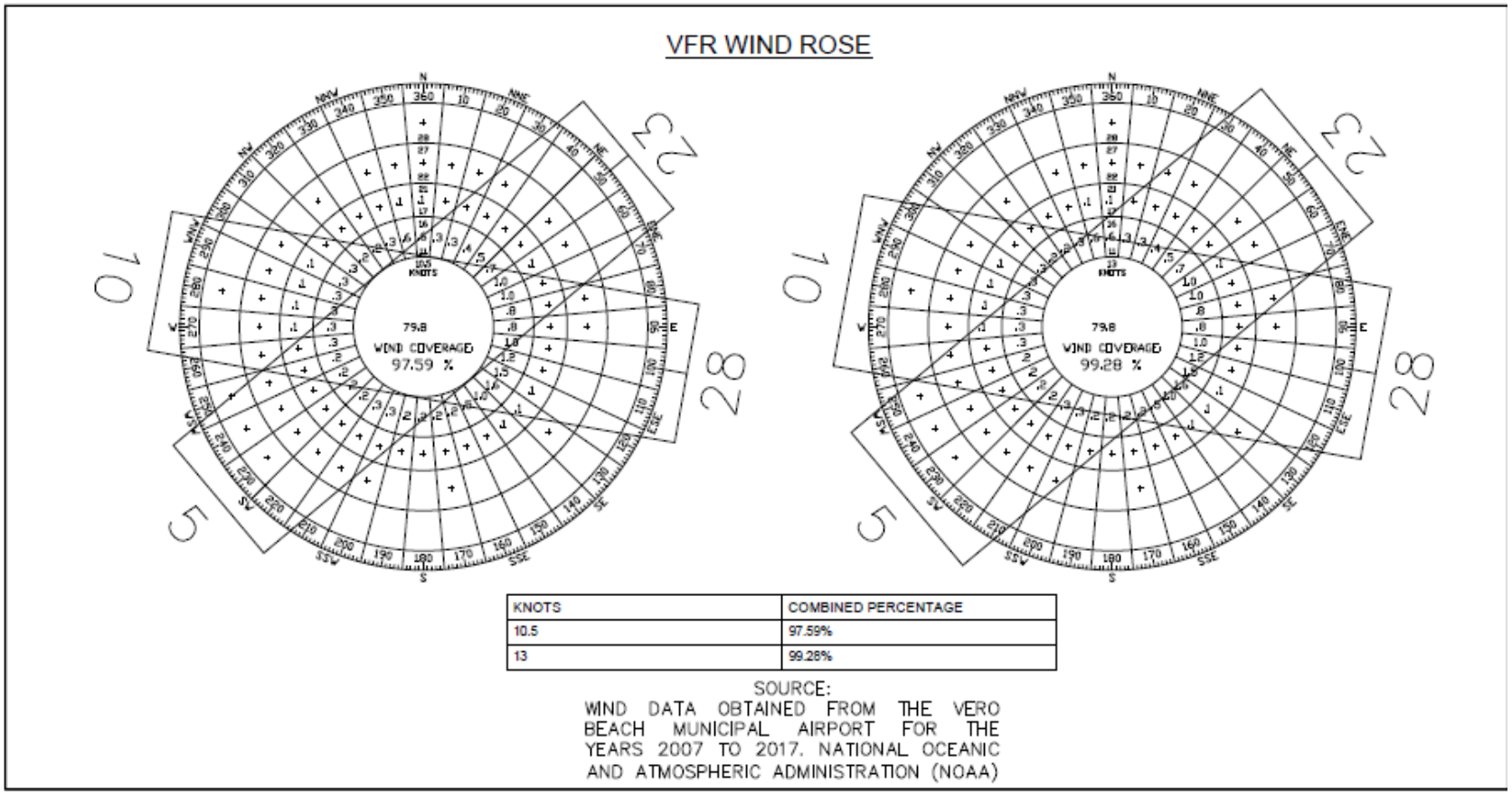

VFR WIND ROSE
10
23
5
28
79.8
WIND COVERAGE
97.59 %
79.8
WIND COVERAGE
99.28 %
KNOTS
KNOTS
COMBINED PERCENTAGE
10.5
97.59%
13
99.28%
SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

FIGURE 4-5

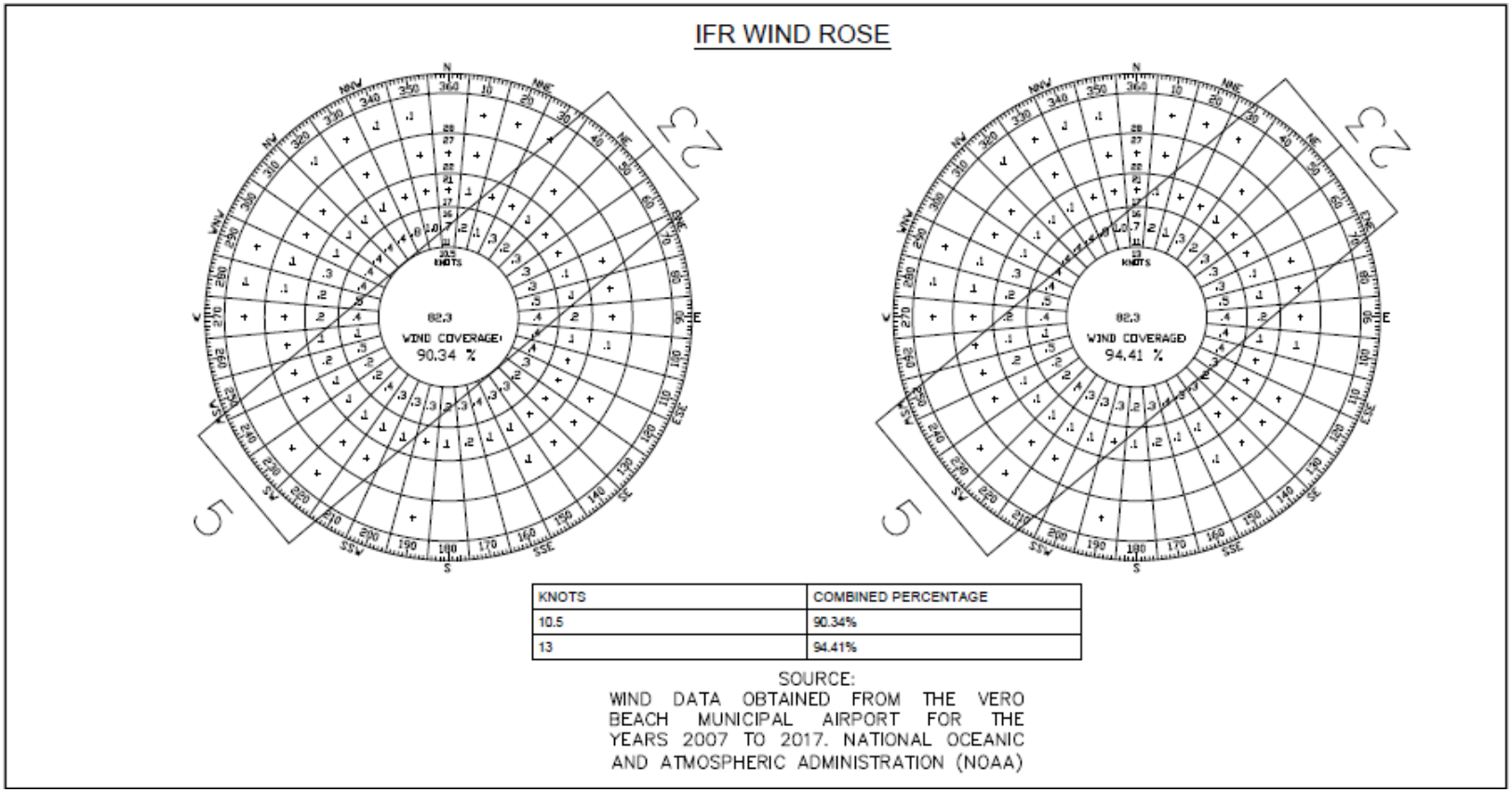
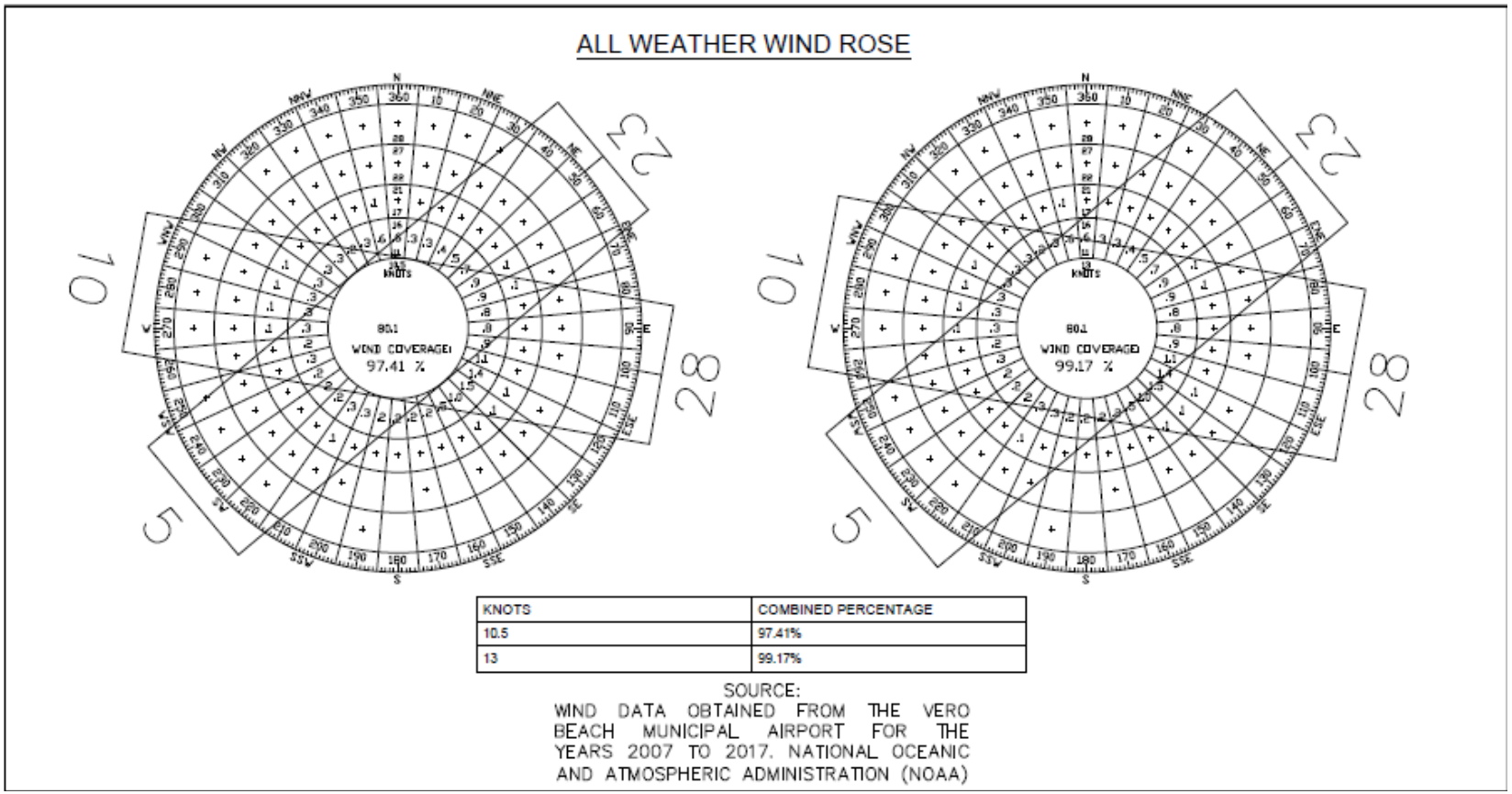

IFR WIND ROSE
10.5
KNOTS
WIND COVERAGE
90.34 %
13
WIND COVERAGE
94.41 %
KNOTS
COMBINED PERCENTAGE
10.5
90.34%
13
94.41%
SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

FIGURE 4-6



KNOTS	COMBINED PERCENTAGE
10.5	97.41%
13	99.17%

SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

X26 has an RNAV/GPS published instrument approach to both Runway 5 and 23. Runway 5's GPS/RNAV approach allows for Localizer Performance (LP) Minimum Descent Altitude (MDA) minima of 380 feet above ground level (AGL) and Lateral Navigation (LNAV) MDA of 400 feet AGL, both with forward visibility of one mile. Runway 23 is also equipped with both LP and LNAV approaches. However, the LP MDA on Runway 23 is 380 AGL and the LNAV MDA is 480 AGL primarily related to some obstructions within the approach. Both approaches have a 1 statute mile visibility requirement or greater depending upon aircraft design category (A, B, C or D).

According to NOAA Weather Data obtained for the area, X26 experiences VFR conditions approximately 97.5 percent of the time, IFR 2.0 percent and below IFR minimums 0.5 percent of the time. When the meteorological conditions are below these minimums, aircraft are unable to depart or land.

Airfield Capacity

The preceding airfield characteristics were used in conjunction with the methodology outlined in **FAA AC 150/5060-5** to determine airfield capacity. As mentioned previously, this FAA methodology generates the hourly capacity of runways and the annual service volume for measuring airfield capacity.

Using the guidance outlined, **Figure 9** in Chapter 4 of AC 150/5060-5 represents the current and future airfield runway design at the Airport. Generally, the airport capacity of this orientation is approximately 230,000 operations. However, as noted earlier, the airport capacity analysis provided within the 2004 Florida Aviation System Plan published an ASV of 172,500 operations. Considering the differentiation and the anticipated change in the fleet mix, a new VFR and IFR hourly capacity and ASV was determined using the data provided in Chapter 3 of **FAA AC 150/5060-5**.

Hourly Runway Capacity

Hourly runway capacity measures the maximum number of aircraft operations that can be accommodated by the runway configuration in one hour. Based on the FAA methodology, hourly capacity for runways is calculated by analyzing the appropriate VFR and IFR figures for the airport's runway configuration. From these figures, the aircraft mix index and percent of aircraft arrivals are utilized to calculate the hourly capacity base. A touch and go factor is also determined based on the percentage of

touch and go operations combined with the aircraft mix index. These figures also consider the taxiway exit factor.

For both VFR and IFR conditions, the hourly capacity for runways is calculated by multiplying the hourly capacity base, touch-and-go factor, and taxiway exit factor. This equation is:

Hourly Capacity = C* x T x E

where: C* = hourly capacity base
T = touch and go factor
E = exit factor

Sebastian Airport's current and future airfield configuration consists of two crossing runways (5-23 and 10-28). Using this configuration, illustrated in Figure 4-9 in the Advisory Circular, along with the existing and future aircraft fleet mix, the hourly base capacity for VFR operations is 98 and 59 for IFR operations. Since no physical changes are expected to be made to the runway configuration over the planning period, this configuration is used for the hourly capacity calculations throughout the entire planning period. Anticipated hourly capacity for IFR and VFR operations based upon existing and long-term forecast demand is illustrated in **Tables 4-4 and 4-5,** respectively.

This data was then used to determine the weighted hourly capacity for 2017 and 2037. Weighted hourly capacity (Cw) is calculated as follows:

Cw ={(C1 x W1 x P1)+(C2 x W2 x P2)…+…(Cn x Wn x Pn)} ÷{(W1 x P1) + (W2 x P2)…+…(Wn x Pn)}

Where: C = hourly capacity
W=weighted factor
P = percent of runway use

Weighted hourly capacity was calculated for the base year (2017) and final forecast year (2037) illustrated in **Tables 4-4 and 4-5**, respectively.

TABLE 4-4
2017 HOURLY CAPACITY MATRIX CALCULATIONS

Runway Use Condition	Hourly Capacity Base (C*)	Touch and Go Factor (T)	Exit Rating (E)	Hourly Capacity	Weight Factor (W)	Percentage Use (VFR)	Percentage Use (IFR)
5 VFR	98	1.40	0.84	115.248	1	26%	0
5 IFR	59	1.00	1	59	1		60.50%
23 VFR	98	1.40	0.84	115.248	1	21%	0
23 IFR	59	1.00	1	59	1		39.00%
10 VFR	98	1.40	0.92	126.224	1	34%	0
28 VFR	98	1.40	0.92	126.224	1	19%	0.00%
Closed	0	0.00	0	0	4		0.50%

Sources: AC 150/5060-5, Aircraft historical data, aircraft observation (January and April 2017) and TKDA

TABLE 4-5
2037 HOURLY CAPACITY MATRIX CALCULATIONS

Runway Use Condition	Hourly Capacity Base (C*)	Touch and Go Factor (T)	Exit Rating (E)	Hourly Capacity	Weight Factor (W)	Percentage Use (VFR)	Percentage Use (IFR)
5 VFR	98	1.40	0.92	126.224	1	26%	0
5 IFR	59	1.00	1	59	1		60.50%
23 VFR	98	1.40	0.92	126.224	1	21%	0
23 IFR	59	1.00	1	59	1		39.00%
10 VFR	98	1.40	0.92	126.224	1	34%	0
28 VFR	98	1.40	0.92	126.224	1	19%	0.00%
Closed	0	0.00	0	0	4		0.50%

Sources: AC 150/5060-5, Aircraft historical data, aircraft observation (January and April 2017) and TKDA

Thus, based upon existing and anticipated demand and runway utilization, weighted hourly capacity for 2017 was calculated at 89.2 and for 2037 at 91.78. This data was then used to determine airport service volume at Sebastian Airport through the twenty year planning period.

Annual Service Volume

The most important value to be computed in order to evaluate the throughput at an airport is the ASV. ASV represents an estimate of the number of annual operations that the airport can support without undue delay. ASV is not an absolute capacity limit for the airport, but an average based on one year's worth of meteorological conditions and operational conditions. ASV is calculated by multiplying the weighted hourly capacity for each runway configuration, $C_{W,}$ with average daily demand during the peak month, *D*, and average peak hour demand during the peak month, *H*., as follows*:*

Annual Service Volume = C_w x D x H

where: C_w = weighted hourly capacity
D = ratio of annual operations to average daily operations during the peak month
H = ratio of average daily operations to average peak hour operations during the peak month

TABLE 4-6
ANNUAL SERVICE VOLUME AND DEMAND

Year	Cw	D	H	ASV	Annual Ops	% Capacity
2017	89.21601985	326.4926471	8.5	247,591	44,403	18%
2018	89.21601985	325.9928058	8.6875	252,665	45,313	18%
2022	91.77617866	326.5533333	8.333333333	249,748	48,983	20%
2027	91.77617866	325.097561	8.631578947	257,534	53,316	21%
2032	91.77617866	325.6123596	8.476190476	253,298	57,959	23%
2037	91.77617866	326.0621762	8.391304348	251,108	62,930	25%

Sources: Historical Airport Records and TKDA 2017

Using the FAA methodology, demand that approaches the calculated ASV likely will result in airfield delays. Several projects that would increase the capacity at an airport

are eligible for funding from the FAA. According to FAA **Order 5090.3C**, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, this eligibility is achieved once the airfield has reached 60 percent of its current capacity. This allows improvements to be planned and made before demand levels exceed the capacity of the facility thereby avoiding lengthy delays. Typical trigger points for planning and environmental projects is 60 percent of capacity and 80 percent capacity for design and construction.

Future capacity levels for the airport were calculated based on the forecast annual operations and the calculated ASV. These levels are depicted in **Table 4-7** and are shown graphically in **Figure 4-7**.

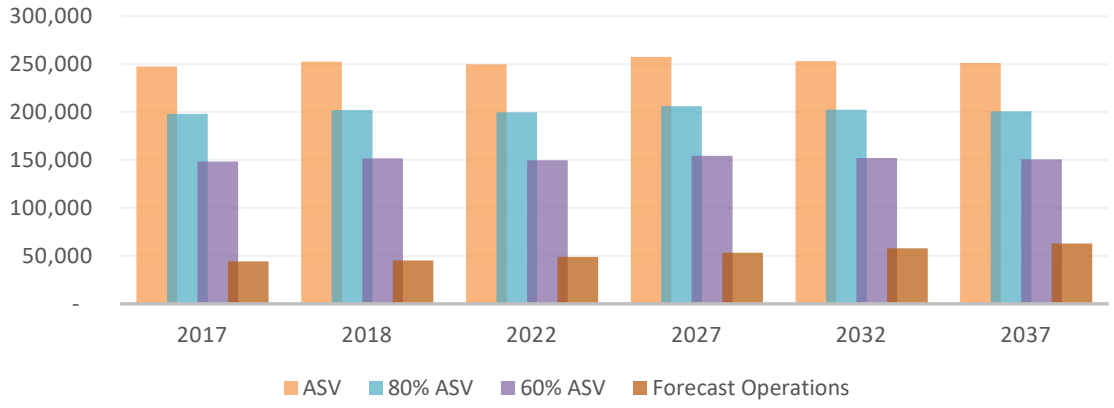
TABLE 4-7
ANNUAL SERVICE VOLUME

Year	Annual Operations	Annual Service Volume	60% Capacity Level	80% Capacity Level	Current Airport Capacity Level
Base Year					
2017	44,403	247,591	148,555	198,073	18%
Forecast Years					
2018	45,313	252,665	151,599	202,132	18%
2022	48,983	249,748	149,849	199,799	20%
2027	53,316	257,534	154,520	206,027	21%
2032	57,959	253,298	151,979	202,638	23%
2037	62,930	251,108	150,665	200,886	25%

Sources: Historical Airport Data and TKDA 2017

Based on capacity levels as presented in **Table 4-7**, the airfield capacity at X26 is not expected to exceed the ASV throughout the twenty-year planning period. Since X26's property boundary is constrained and is sensitive to community goodwill, any additional capacity projects will relate closely to preserving and enhancing existing airfield infrastructure elements. **Chapter 5**, *Alternatives Analysis*, will outline in more detail projects that are associated with enhancing airside and landside improvements at X26.

Figure 4-7
Airport Annual Service Volume



Annual Aircraft Delay Estimates

The average anticipated delay is based upon a ratio of the forecasted demand to the calculated ASV. This ratio is used as a guide for planning future airfield improvements. The FAA acknowledges in **FAA AC 150/5060-5** that the level of delay that is acceptable to a particular airport may differ from the level deemed acceptable at a similar airport. It is important to note that it is not only the delay time that determines acceptability, but also the frequency of these delays.

Several methods exist for estimating anticipated delay levels. One method involves using a variety of charts in **FAA AC 150/5060-5** to estimate the average delay per aircraft based upon the ratio of annual demand to ASV. This delay per aircraft would then be used to calculate the annual delay for all operations. Another method utilizes software developed by the FAA (*Airport Design Software, Version 4.2d*) to determine the projected delay values. For this study, the anticipated delay, presented in **Table 4-8,** was determined using the FAA software. The increase in anticipated delay is related to the increasing number of operations throughout the planning period.

TABLE 4-8 ANNUAL AIRCRAFT DELAY		
Year	**Average Delay per Aircraft (Minutes)**	**Total Annual Delay (Hours)**
Base Year		
2017	1.2577	0.0017
Forecast Years		
2018	1.2837	0.0017
2022	1.5312	0.0019
2027	2.3436	0.0026
2032	2.9439	0.0030
2037	3.6880	0.0035
Sources: Historical Airport Data and TKDA 2017		

As indicated in **Table 4-8**, the average delays per aircraft remain low throughout the planning period. However, the delay projection at X26 considers an average delay based on hours the airport is operationally capable to accommodate aircraft, but may not reflect delay imposed to arriving and departing aircraft during peak periods. Therefore, delay calculations were developed to determine likely peak hour delays for arriving and departing aircraft during VFR and IFR conditions. Peak delay per aircraft operating during these times may be significantly higher. The impact that increasing delay imposes upon the airport is such that constraints, both on the ground and in the air, are compounded with increasing operational activity. Arrival and departure delays can be mitigated by decreasing aircraft runway occupancy time, by constructing additional taxiway exits at critical points along the runway. When aircraft are required to continue taxiing down the runway for the next available taxiway exit, runway occupancy time is increased and thus, hourly throughput capability of the runway is decreased.

Table 4-9 highlights the anticipated delay which is still marginal. Therefore, capacity improvements related to airspace and airfield capacity demand only is not needed during the planning period based upon anticipated operations.

TABLE 4-9 PEAK HOUR DELAY				
Year	**Visual or Instrument Flight Conditions**	**Arrival Delay in Minutes**	**Departure Delay in Minutes**	**Hourly Delay in Minutes**
2017	VFR	0.2	0.09	1.257748
2017	IFR	0	0	0
Forecast Demand				
2018	VFR	0.2	0.09	1.283695
2018	IFR	0	0	0
2022	VFR	0.22	0.1	1.531175
2022	IFR	0	0	0
2027	VFR	0.3	0.15	2.343606
2027	IFR	0	0	0
2032	VFR	0.35	0.17	2.943904
2032	IFR	0	0	0
2037	VFR	0.4	0.2	3.688018
2037	IFR	0	0	0
Sources: Airport historical data and TKDA 2017				

Summary

In estimating the capacity of the existing X26 operational areas, the primary elements of airfield capacity were examined to determine the airport's ability to accommodate anticipated levels of aviation activity. The results indicate that:

- Projected operations as a percent of total airfield capacity will grow from 18 percent to 25 percent over the planning period, indicating that the airfield has capacity to handle future operations;
- Airspace in the vicinity of the airport does have limitations for additional instrument approach procedures, but likely will accommodate future aviation activity through coordination among local military facility authorities, the FAA, and the surrounding community;
- Based upon wind data obtained from NCDC, the current airfield configuration of 5-23 and 10-28 provides the FAA-required 95 percent wind coverage during 13 knot crosswind conditions; and
- With planned and ongoing improvements to the existing taxiway system constraints and areas of congestion will be mitigated. Additional connectors will

likely be added in the future to support continued airport growth. This is discussed in more detail in the remaining chapters of this master plan update.

Facility Requirements

This section of the Master Plan Update identifies the airside and landside facility requirements for Merritt Island Airport. Airside facilities include runways, taxiways, navigational aids, airfield lighting, markings, signage, and are related to the arrival, departure, and ground movement of aircraft. Landside facilities provide an interface between the air and ground transportation methods and include general aviation terminal facilities, aircraft hangars, aircraft parking aprons, automobile parking and access as well as various airport support facilities.

The facility requirements herein were developed in accordance with FAA and FDOT planning guidelines and are a result of on-site inspections and discussions with personnel from the Titusville-Cocoa Airport Authority (TICO Authority) and airport tenants. Whenever possible, the requirements were based upon forecasts of operational and based aircraft activity presented in **Chapter 3**, *Forecasts of Aviation Activity*, of this report. Facility surpluses and deficits were identified for the base year 2007, and subsequently for every five years thereafter throughout the 20-year planning period (i.e., 2012, 2017, 2022, and 2027).

Approximately 15 requirements, as established in the Airport Improvement Program (AIP) Handbook, must be met for the Airport District Office (ADO) to even consider a project eligible for AIP funding. In general, a project must pass three basic tests as outlined in Table 3-4 in FAA Order 5100.38D:

- The project advances an AIP Policy contained in 49 CFR §47101;
- There is an actual need for the project within next 5 years including subcomponents as outlined in AC 150/5070-6, Airport Master Plans; and
- The project scope is appropriate as detailed in FAA Order 5100.39

Identification of likely projects including supporting environmental and planning requirements, as well as a full analysis of likely project costs and phasing, FAA and State

project priority funding criteria, and likely AIP eligibility and funding percentage if eligible is discussed in detail in Chapters 5, *Alternative Evaluation and Preliminary Implementation Plan*, and 8, *Recommended Implementation Plan and Financial Feasibility Analysis.* Projects that do not currently meet the test for FAA AIP eligibility, however, will still be provided along with alternative recommended timing and funding options to provide the sponsor and agencies a map to address future community and

Airport Development Triggers

Airport development triggers, also known as planning activity levels (PALS), are driven by aircraft demand. When airport demand hits a certain level, typically 60 percent, 80 percent and 90 percent, it will trigger airport planning, infrastructure design and construction efforts, respectively. This allows the Sponsor and the Agencies to determine project funding eligibility, identify and address facilities needed to enhance airport safety, increase capacity, and support local and long-range planning. This Master Plan utilizes two types of development triggers: Activity-Based development triggers and Regulatory-Based development triggers. A detailed analyses of both activity and regulatory based needs are evaluated throughout this chapter.

Activity-Based Development Triggers

Triggers based on airport activity are needed to ensure an airport remains capable of serving the types of aircraft and visitors who currently and will likely operate at the airport through the end of the planning period. Activity based triggers are difficult to gauge since demand fluctuates as a result of outside forces (e.g. fuel prices, available infrastructure, airspace and airport capacity), and there are still no cost effective methods of tracking operations at small, general aviation airports. Therefore, consistent updates to the Master Plan data are essential to justify future airport infrastructure.

Regulatory-Based Development Triggers

The second type of development triggers are those based on airport standards and recommended guidance established by various regulatory agencies, including FAA and FDOT. Regulatory-Based development triggers identify infrastructure that do not meet current design standards as well as infrastructure needs to comply with impending regulations. These triggers will also identify how and when these criteria need to be met for an airport to remain in compliance with operational and grant assurance requirements. For example, X26 current width of Taxiway A exceeds the taxiway width

requirements as outlined in FAA AC 150/5300-13A. Therefore, as part of this master plan, reduction of the width of Taxiway A is recommended to allow more area for aircraft apron parking and movement.

Emerging Trends

As part of the planning process, it is necessary to consider emerging trends in aviation and technology in an effort to capture opportunities for potential development at the airport. This may include changes to existing infrastructure as well as new infrastructure to support these trends as well as economic and operational opportunities.

Trends evaluated throughout this master plan process included: airport sustainability, NextGen technology, technological improvements and demand related to light sport aircraft and unmanned aerial vehicle technology, new federal rules and guidance as well as emergency and community support.

Airport Sustainability

As noted in Chapters 1 and 2, airport sustainability focuses equally on four areas: community, environmental, financial and operations. Potential development alternatives based upon forecast demand are evaluated as part of Chapters 5 and 6 to determine likely environmental, social, and economic impacts to the airport and surrounding community. A preferred alternative scenario was determined utilizing the essential elements of the "triple bottom line" approach – economic growth, social responsibility, and environmental stewardship.

Because sustainability, airport planning, and design practices are continuously evolving, the planning process must allow airports to capture new trends and initiatives based upon their current and ultimate goals. Each airport must identify its own sustainability priorities in order to establish the groundwork for future planning and implementation. As part of the initial kick-off meeting with Airport Staff and City Administration, sustainability initiatives and goals were identified and are being incorporated throughout the master plan process. Since an environmental study was being conducted in parallel with this master plan update, suggestions and recommendations related to future d

Airports worldwide are at the epicenter of a growing debate regarding airport growth and the environmental consequences of aviation Due to rising concerns regarding resource

conservation, environmental protection, and fiscal responsibility. A number of sustainability practices within the aviation industry, supported by government initiatives have already been recommended for incorporation into the master plan process including Solid Waste Management and Recycling, land use, market value and expansion of compatible land use opportunities, environmental mitigation, expanded coordination with local economic development and community organizations, etc.

Sustainable development was first formally defined in 1987 by the Brundtland Commission as: "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[2] An airport industry-specific definition was since adopted by Airport Council International-North America, defining sustainability as "…a holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource conservation and Social responsibility (EONS) of the airport."[3]

Airport sustainability according to the Federal Aviation Administration (FAA) "encompasses a wide variety of practices applicable to planning, design, building and operating airport facilities (based upon) three core principles:

- Protecting the environment;
- Maintaining high and stable levels of economic growth; and
- Social progress that recognizes all stakeholders' needs."[4]

As the FAA and FDOT are striving to incorporate sustainability into all projects, a sponsor should determine an appropriate overall sustainability goal(s) and review individual efforts to achieve them. Airports that implement sustainable practices may benefit from reduced resource usage, improved user and tenant satisfaction, a more strategic use of

2 "Report of the World Commission on Environment and Development: Our Common Future" aka "The Brundtland Report", World Commission on Environment and Development, 1987

3 Airport Sustainability: A Holistic Approach to Effective Airport Management. Airport Council International-North America http://www.sustainableaviation.org/pdfs/Sustainability%20White%20Paper.pdf

4 Federal Aviation Administration, *Interim Guidance for FAA's Sustainable Master Plan Pilot Program*, http://www.faa.gov/airports/environmental/sustainability/media/interim_guidance_sustainable_master_plan_pilot.pdf

airport property, and reduced waste generation and increased recycling. As such, these facility requirements and future planning incorporate several sustainability initiatives.

NextGen

Over the past several decades, the FAA has been working on modernizing the national airspace system to more effectively support the continued growth of aircraft operations. The Next Generation Air Transportation System (NextGen) is a comprehensive suite of state-of-the-art technologies and procedures that enable aircraft to move more directly from Point A to Point B. This allows more efficient route structures allowing for reduced fuel burn, less time in the air per route while also lessening the impact on the overall environment. NextGen relies on satellite rather than ground based navigational systems to provide aircraft navigation. As of 2020, all aircraft must be incorporate the Automatic Dependent Surveillance Broadcast (ADS-B) equipment, which will replace radars as the primary means by which air traffic controllers track and manage aircraft. This satellite-based technology enables more efficient separation of aircraft and provides coverage where radar doesn't exist. Aircraft nationwide are now flying more precise, satellite-based procedures than traditional ground-based procedures, which has allowed airports to provide lower approach minimums to their runways as well as the potential implementation of smaller runway safety areas due to increased navigational precision.

In addition, new separation standards to avoid the hazards of wake turbulence are improving the efficiency of aircraft arrivals and departures, reducing taxi times, and saving fuel. Wake Recategorization (Wake Recat) enables FAA to safely reduce the distance between various aircraft based on wingspan, weight, and stability instead of just mainly on weight.

Other NextGen initiatives include weather, voice systems, information management and data communications. All focused on improving airport efficiency and safety. Thus, all of these changes will have a major impact on airport infrastructure potentially allowing for more areas for revenue development as well as allowing smaller general aviation airports, such as Sebastian, to support diverse general aviation and corporate operations.

New Technology

In addition to NextGen, changes in technology is having a massive impact throughout the transportation industry. New and updated aircraft designs and engines are allowing operators to use smaller airports with shorter runways often closer to their destinations saving time and money. Sebastian Airport is also home to several light sport aircraft manufacturers who are expanding aircraft ownership to a whole new group of users. Previously, the cost of owning and operating an aircraft was prohibitive to most of the population. However, continued growth in this sector along with other changes including the sport pilot's license has opened up flying to more individuals.

Other technological improvements include the development of unmanned aerial vehicles. Unmanned Aerial Vehicles currently operate under the FAA's small unmanned aircraft rule, Part 107, which has been in place for approximately one year at the time of this writing. It is important to note that unmanned aerial vehicles are not the same as drones, although sometimes used interchangeably. UAS still operate under line of sight requirements and must be under 55 pounds whereas Drones are primarily associated with military unmanned aircraft that are operated outside line of sight and may exceed the 55 pound criteria.

Under the new regulations, UAVs uses have expanded to include:

- Emergency response and recovery efforts
- Scientific research, survey and mapping
- Movie filming
- Real estate marketing
- Infrastructure and utility survey, inspections and monitoring
- Agricultural mapping
- Wildlife tracking, etc.

Growth in this field has expanded exponentially. Since 107 became effective since August 2016, "more than 80,000 individual drones have been registered for commercial and government purposes. And more than 60,000 people have obtained a Remote Pilot Certificate required to operate a drone under Part 107. By 2021 – just four years from

now—the agency estimates there could be as many as 1.6 million small drones (under 55 lbs.) in commercial operation."[5]

What does this mean for Sebastian Airport? The airport already supports other new technology operations which may be ripe for use as UAS. Further, the airport has areas portions of the airport which may be suitable for UAS manufacturing, testing and training. The impacts and opportunities related to this new technology as well as others was considered in identifying future airport development.

New Federal Rules and Guidance

On August 30, 2017, the final rule overhauling airworthiness standards for general aviation airplanes was implemented. This was in response to Congressional mandates directing the FAA to streamline approval of safety advancements for small GA airplanes. The new rule also addresses recommendations from the FAA's 2013 Part 23 Reorganization Aviation Rulemaking Committee, which suggested a more streamlined approval process for safety equipment on those airplanes. Part 23 revolutionizes standards for airplanes weighing 19,000 pounds or less and with 19 or fewer passenger seats by replacing prescriptive requirements with performance-based standards in addition to consensus-based compliance methods for specific designs and technologies.

The FAA expects this rule will enable faster installation of innovative, safety-enhancing technologies into small airplanes, while reducing costs for the aviation industry. The new part 23 also promotes regulatory harmonization among the FAA's foreign partners, including the European Aviation Safety Agency, Transport Canada Civil Aviation, and Brazil's National Civil Aviation Authority. It is hoped that this "harmonization" will minimize certification costs for airplane and engine manufacturers worldwide.

This change has already benefitted X26 by attracting a small light sport manufacturer and distributor to set up operations at the airport. It is anticipated because of its location between several airports along with available infrastructure and lower costs will allow management to continue to attract and capitalize on these type of

[5] FAA Small Drone Rule Lets Unmanned Aircraft Soar, FAA News, September 6, 2017, https://www.faa.gov/news/updates/?newsId=88748

opportunities. Further, since the airport supports skydivers from around the world, the airport is known worldwide which has also increased its visibility on the world stage.

These are just some of the emerging aviation trends that will likely impact operations at Sebastian Municipal Airport during the 20-year planning period. This master plan considered the various issues and opportunities as part of the short and long-term airport development. However, the master plan was created in a way to allow the City and Airport management the flexibility to address unforeseen changes and opportunities in the market.

Airport Role and Service Level

X26 is included in the National Plan of Integrated Airport System (NPIAS), which is published by the U.S. Department of Transportation. In the NPIAS, the FAA establishes the role of those public airports defined as essential to meet the needs of civil aviation and to support the Department of Defense and Postal Service. In the NPIAS, the role for each airport is identified as one of four basic service levels (Primary, Commercial Service, Reliever and General Aviation). These levels describe the type of service that the airport is expected to provide the community during the NPIAS five-year planning period. It also represents the funding categories set up by Congress to assist in airport development.

In 2012, the FAA released General Aviation Airports, A National Assets study which re-categorized general aviation airports throughout the US based upon operations and based aircraft activity. These categories included: National Airports, Regional Airports, Local Airports and Basic Airports. According to the criteria listed in this report, Sebastian Airport is designated as a Local General Aviation Airport. Local airports are defined as:

- 'Closer to metropolitan areas and provide access for the community to the national aviation system
- Support some flying by sophisticated aircraft
- Primarily support piston aircraft operations
- Support business and personal aircraft operations as well as significant flight training, emergency services and small charter operations
- Most operations are within the state or region, and

- May be important access for aeromedical and emergency services'[6]

Based upon forecast demand and the long-term goals of the City and Airport management, the airport will remain a local airport throughout the anticipated planning period.

The Florida Department of Transportation also categorizes airports within their Aviation System Plan as commercial, reliever or general aviation. According to the Florida Aviation System Plan (FASP), X26 is designated as a general aviation airport.

Sebastian Airport, as noted in previous chapters, primarily supports general aviation operations by private and corporate/business users. The Airport is also used regularly for flight training as well as supports significant skydiving activity associated with Skydive Sebastian. Also due to the airport's close proximity to the Indian River Lagoon and the Sebastian Inlet, the airport attracts a number of transient/visiting general aviation aircraft.

Airport management has stated that their focus is on continuing to support general aviation operations, and is continuing to see strong growth in light sport aircraft, skydiving and other recreational activity. The current airfield can and does support some limited air taxi operations as well as very light jets, such as the Phenom 100 or 300. Forecast activity suggests and is supported by the FASP forecasts that the airport will continue to experience significant growth.

Critical Aircraft

A key element in defining facility needs is establishing development guidelines that are directly associated with the size and type of aircraft activity that the airport currently and will be expected to serve during the planning period. A critical aircraft for facility planning and design purposes.

The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. The critical aircraft (or composite aircraft) performs more than 500 itinerant operations on a particular runway. An itinerant operation is a flight that originates at the facility and arrives at another facility more than 20 nautical

[6] General Aviation Airports, A National Asset, 2012, Federal Aviation Administration, Appendix A-2, page A28.

miles way, or those arriving at the facility from an origination point more than 20 nautical miles away.

Often, more than one aircraft will determine different facility features such as an aircraft which has a wide wingspan, but is not very heavy compared to another aircraft which is heavier but does not have as wide of a wingspan. Both use the same runway, however the heavier aircraft will determine runway pavement strength while the aircraft with the wider wingspan will determine lateral separations within the airfield layout.

The existing critical aircraft is the Beech King Air 200D, which is used by both Skydive Sebastian, private users as well as the FBO for charter operations. It is anticipated based upon discussions with users and growth in the market that the future critical aircraft will be the King Air 350i, which provides more passenger and cargo room, has greater fuel range, and is more efficient then the older King Air 200. Critical aircraft design criteria is outlined in **Table 4-10**.

TABLE 4-10
RUNWAY CRITICAL AIRCRAFT

	Existing	Future
Critical Aircraft	Beech King Air 200D	Beech King Air 350i
Approach Speed	98 knots	120 knots
Approach Category	B	B
Wingspan	54 ft. 6 inches	57 ft. 11 inches
Design Group	II	II
Tail Height	15 ft	14 ft 4 inches
Maximum Takeoff Weight	12,500 lbs	15,000 lbs

Sources: TKDA Analysis, Airport historical data, FAA AC 150/5300-13A, Beechcraft (Textron)

Airport Reference Code

One method for identifying the standard capabilities of an airport is to review its Airport Reference Code (ARC). The ARC is the Runway Design Code (RDC) of the most capable or most demanding runway at an airport. These codes are developed and established based on the Critical Aircraft that will regularly use the runway.

Runway Design Code

The Runway Design Code (RDC) is a code signifying the design standards to which a runway is to be built. Each runway has its own RDC, which is composed of three elements based on the critical design aircraft and the visibility minimums for the runway:

- The first element of the RDC is the aircraft approach category, which is a grouping of aircraft based on a reference landing speed (V_{REF}). The categories of the aircraft approach category can be seen in **Table 4-11**.
- The second element is the airplane design group, which is a classification of aircraft based on wingspan and tail height. The specification of each airplane design group can be seen in **Table 4-12**.
- The third component is the visibility minimums at the airport expressed in RVR values in feet. The RVR values can be seen in **Table 4-13**. The current runway visibility range is 5,000 feet.

TABLE 4-11
AIRCRAFT APPROACH CATEGORY (AAC)

AAC	Vref/Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more, but less than 121 knots
C	Approach speed 121 knots or more, but less than 141 knots
D	Approach speed 141 knots or more, but less than 166 knots
E	Approach speed 166 knots or more

Source: FAA AC 150/5300-13A, Change 1, Airport Design

TABLE 4-12
AIRPLANE DESIGN GROUP (ADG)

Group Number	Tail Height (ft.[M])	Wingspan (ft.[M])
I	< 20' (<6 m)	< 49' (< 15 m)
II	20' – < 30' (6 m – < 9 m)	49' – < 79' (15 m – < 24 m)
III	30' – < 45' (9 m – < 13.5 m)	79' – < 118' (24 m – < 36 m)
IV	45' – < 60' (13.5 m – < 18.5 m)	118' – < 171' (36 m – < 52 m)
V	60' – < 66' (18.5 m – < 20 m)	171' – < 214' (52m – < 65 m)
VI	66' – < 80' (20 m – < 24.5 m)	214' – < 262' (65 m – < 80 m)

Source: FAA Advisory Circular 150/5300-13A Change 1, Airport Design

TABLE 4-13 VISIBILITY MINIMUMS	
RVR (ft.*)	**Instrument Flight Visibility Category (Statute Miles)**
5000	Not lower than 1 mile
4000	Lower than 1 mile but not lower than 3/4 mile
2400	Lower than 3/4 mile but now lower than 1/2 mile
1600	Lower than 1/2 mile but not lower than 1/4 mile
1200	Lower than 1/4 mile
Source: FAA AC 150/5300-13A, Change 1, Airport Design	

Approach Reference Code and Departure Reference Code

The Approach Reference Code (APRC) for a runway indicates the current operational capabilities of a runway and associated parallel taxiway for landing operations. The APRC is composed of the same three elements as the RDC; however the RDC indicates the planned development of the runway and has no operational application.

X26 was initially designed as naval flight training facility as a result some of its airfield pavement exceeds current standards. Runway 5-23 was narrowed to a width of 75 feet, and Runway 10-28 also has a width of 75 feet. The taxiway to runway centerline separation between Runway 10-28 and Taxiway B is 240 feet, and the new Taxiway C which will run parallel to Runway 5-23 is designed with a 240 foot centerline to centerline separation.

Since the previously approved Airport Layout Plan (2010), GPS approaches were added to Runway 5-23, and the runway was remarked as a non-precision instrument runway. Based upon the critical aircraft, the Beech 200, the existing APRC for Runway 5-23 is B-II-5000. Recommendations for Runway 10-28 included adding non-precision approaches as well as upgrading the runway from B-I (small)-visual to a B-II with greater than 1 mile visibility. However, at the time of this writing, Runway 10-28 is still marked as a basic runway and supports visual only approaches. However, the runway regularly supports operations by the King Air 100 (B-I), DHC-6-300 Twin Otter (A-II) as well as the Beech King Air 200 (B-II). As a result, the runway should be classified as a B-II small runway based upon the combination of operations regularly using Runway 10-28.

The Departure Reference Code (DPRC) is similar to the APRC, but indicates the current operational capabilities of a runway and associated parallel taxiway for takeoff operations. The DPRC is also composed of the same three elements as the RDC. Therefore DPRC for Runway 5-23 is B-II-5000 and for 10-28 is B-II (small)-visual.

Both the APRC and DPRC are adequate to support forecast operations. However, the runway pavement strength of Runway 10-28 is unpublished. Thus, it is assumed that the runway pavement supports aircraft weighing 12,500 lbs. or less (small aircraft). Whereas Runway 5-23 has a published single wheel strength of 22,000 lbs. Thus, based upon discussions with City and Airport Management as well as users, the viability of changing Runway 10-28 to a utility runway with no less than 1 mile visibility was considered.

Runway System Requirements

The most important piece of infrastructure at an airport is the runway. Runways must be designed to the proper length, width, and strength to safely accommodate the critical aircraft. The RDC of each runway establishes the required separation and safety standards of the runway according to AC 150/5300-13A, *Airport Design*.

According to the 2017 Airport Master Record, Runway 5-23 is 4,023 x 75 feet and has a single-wheel pavement strength of 22,000 lbs. Runway 10-28 is 3,199 x 75 feet, and its pavement strength is unpublished.

Runway Length Analyses

In determining the recommended runway lengths for X26, the procedure and rationale as outlined in **FAA AC 150/5325-4B and draft 4C**, *Runway Length Requirements for Airport Design*, were used. Several characteristics of the design aircraft were needed to conduct the runway length analysis including MTOW, approach speed, and number of passenger seats along with mean maximum temperature of the hottest month, airport elevation and effective runway gradient (difference between the highest and lowest elevations of the runway centerline divided by the runway length).

Runway 5-23

Runway 5-23 is the primary runway at X26, and therefore should be designed to accommodate the most demanding aircraft likely to use the airport. The critical aircraft used for the runway length analysis was the Beech King Air 350i. Since the maximum takeoff weight (MTOW) of this aircraft is 15,000 lbs, runway length guidelines outlined in Chapter 3 of FAA AC 150/5325-4B was applied.

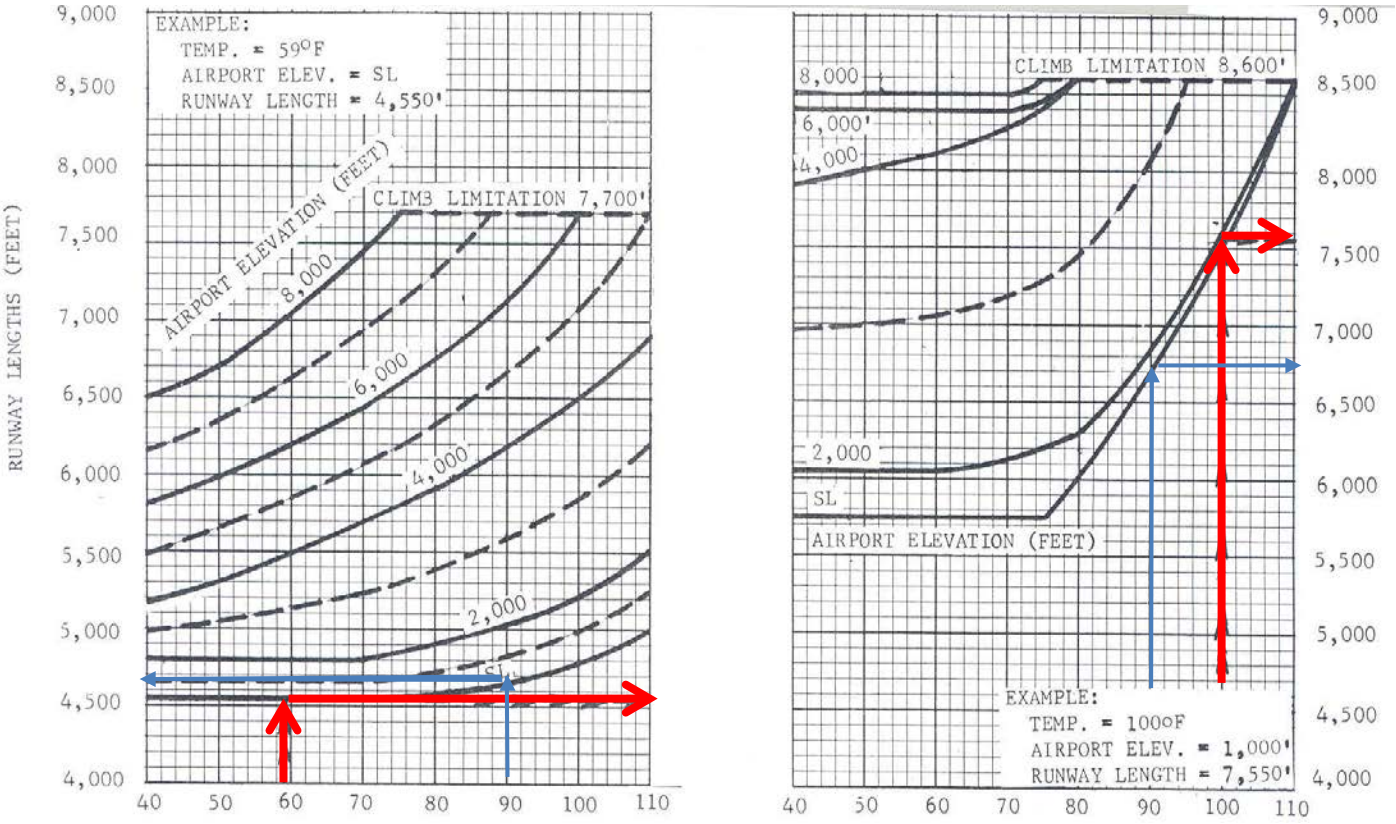
The Beech King Air 350i falls within Table 3-1, Airplanes that make up 75 percent of the fleet. The next step was to apply the mean maximum temperature at Sebastian, which historically is 90.1 degrees Fahrenheit, and airport elevation, 21.5 feet surveyed, to Table Figure 3-1 in AC 150/5325-4B. This resulted in the following runway length:

- At 60 percent load factor, a runway length of 4,550 feet is required (see Figure 4-8). Adjusting this distance for gradient change between the highest and lowest

- points on Runway 5-23 results in a recommended runway length of 4,581 feet (3.1 feet x 10 + 4,550 feet).
- At 90 percent load factor, a runway length 6,750 feet was determined (see Figure 4-x). Adjusted for the change in runway grade results in a recommended runway length of 6,781 feet.

The blue lines represent the estimated runway length requirements based upon airport elevation and mean maximum temperature.

FIGURE 4-8
75 PERCENT OF FLEET AT 60 OR 90 PERCENT USEFUL LOAD
Sources: FAA AC 150/5325-4B, Figure 3-1 and TKDA, 2017



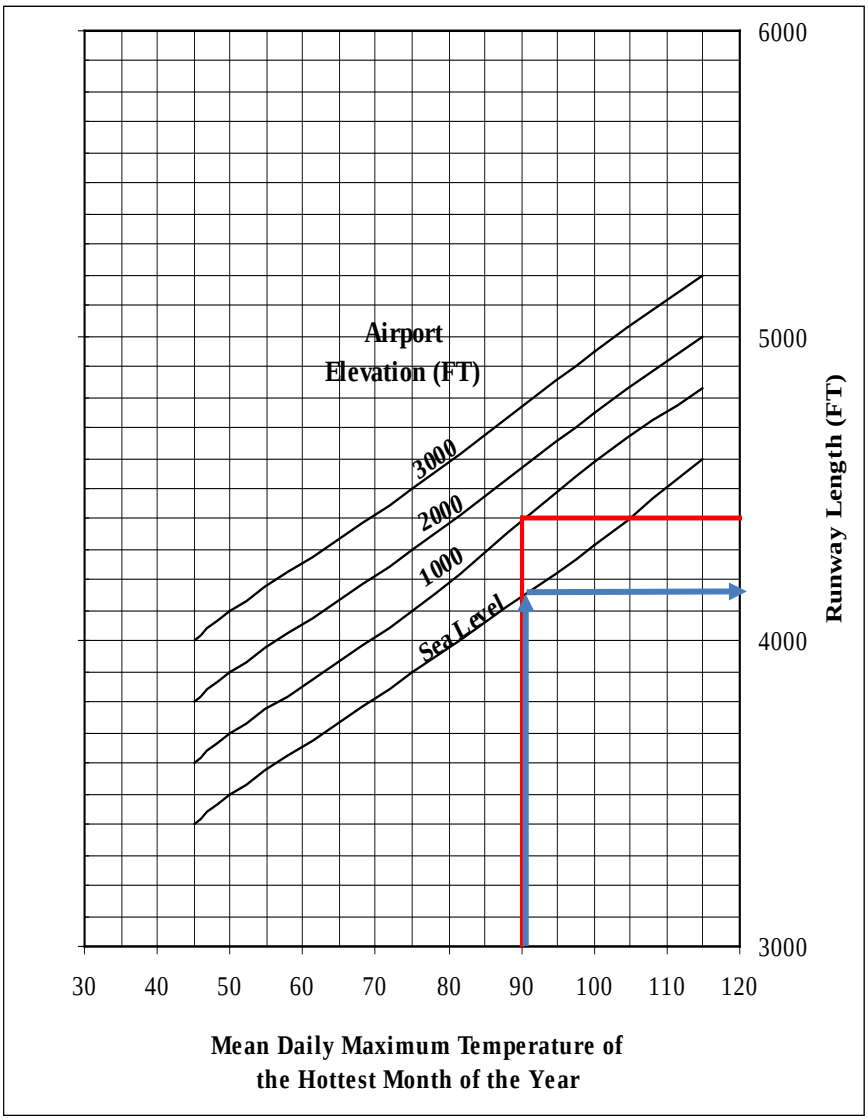
However, it is important to note that this methodology captures the runway length requirements to support turboprop and turbine powered (jet) aircraft with maximum takeoff weights between 12,600 lbs and 60,000 lbs. As a result, the methodology recommended in the Draft AC 150/5325-4C which recommends using the recommended FAR takeoff lengths published by manufacturers of that specific aircraft and adjusting for temperature, airport elevation and runway grade changes was anticipated to provide a more realistic demand for runway length requirements.

According to Beechcraft Textron Aviation, the manufacturer of the Beech King Air 350i, the takeoff length at 59 degrees Fahrenheit, at sea level and over a 50 foot obstacle is 3,300 feet. Adjusting this length for airport elevation, temperature and grade change results in a recommended total length of 3,851 feet. Based upon the existing and forecast fleet mix, a runway length of 3,851 feet is a realistic representation of runway length demand.

Runway 10-28

Runway 10-28 appears to be designed to support aircraft with maximum takeoff weights of 12,500 lbs or less. Using the Cessna 208 and DHC6-300 as the critical aircraft for the runway length analysis, guidance outlined in Chapter 2 of AC 150/5325-4B was applied. Since both aircraft are designed to accommodate 10 passengers or more, Figure 2-2, Small Airplanes Having 10 or More Passenger Seats, was used. Applying the airport elevation of 21.5 feet MSL and mean maximum temperature of 90.1 degrees Fahrenheit results in a runway length of 4,175 feet (see **Figure 4-9**). Adjusting this length for change in elevation (2.5 feet) results in a recommended runway length of 4,200 feet. Note the blue line represents the estimated runway length for Runway 10-28 at X26.

FIGURE 4-9
SMALL AIRPLANES HAVING 10 OR MORE PASSENGER SEATS
Source: FAA AC 150/5325-4B, Figure 2-1



However, similar to Runway 5-23, DHC-6-300 and B100 aircraft regularly use Runway 10-28 even though it has a length of 3,199 feet. Therefore, applying the recommended

methodology outlined in Draft AC 150/5325-4C which recommends adjusting the manufacturer's FAR takeoff length resulted in the following lengths:

- The Twin Otter DHC-6-300 manufacturer FAR balanced field length is 2,700 feet. Adjusting this for airport elevation, temperature and change in runway grade results in a recommended length of 3,151 feet.
- The Cessna 208 manufacturer FAR balanced field length is 2,055 feet. Adjusting this length by airport elevation, temperature, and change in runway grade results in a recommended length of 2,404 feet.

Thus, based upon manufacturer data which is provides a more realistic estimate of runway demand, no runway extension is required to support existing and forecast aircraft demand at Sebastian Municipal Airport over the twenty-year planning period.

Width Requirements

Since Runways 5-23 and 10-28 support B-II operations, a runway width of 75 feet is required based upon FAA AC 150/5300-13A. Both runways meet this design criteria.

Pavement Strength and Conditions

The runway pavement must be designed and maintained to support regular use of the critical aircraft as well as limited use by larger and heavier aircraft. The published runway pavement strength of Runway 5-23 and Runway 10-28 weights varying from 3,000 to 12,500 lbs. single wheel, information based on the February 2017 - PCN Evaluation Report completed by FDOT.

The Florida Department of Transportation (FDOT) published February 2017 Statewide Airfield Pavement Management Program Update, which provides the pavement condition index (PCI) for each Florida airport inspected. The weighted PCI rating and condition for the runways, taxiways, apron and overall airfield as published in the report are provided in **Table 4-14.**

TABLE 4-14 2017 PAVEMENT CONDITIONS REPORT SEBASTIAN MUNICIPAL AIRPORT		
	PCI Index	**PCI Condition**
Runway 5-23	75	SATISFACTORY
Runway 10-28	80	SATISFACTORY
Taxiways	79	SATISFACTORY
Apron	74	SATISFACTORY
Overall Airfield	81	SATISFACTORY
Source: Summary Report, Statewide Airfield Pavement Management Program Update, Florida Department of Transportation, 2017		

As part of airport development, pavement rehabilitation associated with the existing aprons and taxiways is being considered in the short term. A runway overlay is recommended for the midterm with a potential full rehabilitation set for the long-term.

Part 77 Airport Imaginary Surfaces

The Code of Federal Regulations Title 14, Chapter I, Subchapter E, Part 77 – *Safe, Efficient Use, and Preservation of Navigable Airspace* establishes the imaginary surfaces used to identify airspace around an airport necessary for the safe passage of aircraft. These surfaces are used to identify existing obstacles, and to establish a process to determine whether any new or proposed construction would be a hazard to air navigation.

These surfaces are to be used by the airport sponsor to prevent any possible hazard to the airspace surrounding the airport. Development both on and adjacent to the Airport should be evaluated to determine if negative impacts to airport operations would likely occur and to identify potential mitigation options. Failure to do so can result in the loss of funds from the FAA. There are five imaginary surfaces for any airport:

Primary Surface: This surface is centered on the runway centerline with its width determined by the visibility minima of the approaches at an airport. For specially prepared hard surfaces, the primary surface extends 200 feet beyond the runway end, and for turf or other surfaces it ends at the end of the runway. The elevation of the primary surface is the same as the elevation of the nearest point of the runway.

Approach Surface: This surface is centered on the runway centerline and extends outward and upward from the end of the primary surface. The length and widths of the approach surface are determined by the type of approach for that runway end. The slope, or the amount of horizontal distance for every one foot of vertical rise, is also determined by the type of approach to the runway end.

Transitional Surface: The transitional surface extend outward and upward at right angles to the runway centerline, and the extended runway centerline at a fixed slope of seven feet horizontal to every one foot vertical from the sides of the primary surface, and approach surfaces.

Horizontal Surface: This surface is a horizontal plane that is 150 feet above the established airport elevation. This surface is developed by creating swinging arcs of specific radii from the end of the primary surface, and then connecting those arcs by lines tangent to those arcs.

Conical Surface: The conical surface extends outward and upward from the periphery of the horizontal surface for a distance of 4,000 feet at a slope of 20 feet horizontal for every one foot vertical.

Several tree obstructions were identified that impact the approach surface to Runway 23, and a three-story home is located within the approach to Runway 5. Other obstructions to the Part 77 surfaces are identified in Table 4-15.

TABLE 4-15
OBSTRUCTIONS TO AIR NAVIGATION

ID	Description	Elev.	Surface	Latitude	Longitude
A	Lighted Tower	198’	Horizontal	27.837811	-80.487560

Approach and Departure Surfaces

Approach and Departure Surfaces (APDS) were designed and implemented to protect the use of the runway in both visual and instrument flight conditions near the airport. Their specifications are listed in Table 3-2 of AC 150/5300/13A Change 2, *Airport Design,* provided in **Table 4-16**. Unlike 14 CFR Part 77 airport imaginary surfaces, these surfaces are clearance surfaces and move with the threshold, not the runway end.

Both runways serve Airplane Approach Category A and B aircraft. Runway 5-23 also supports both day and night instrument operations (Table 4-X, Row 4). Since both Runway 5 and 23 are equipped with non-precision GPS instrument approaches which provide vertical guidance (LP and LNAV), Row 8 of **Table 4-16** also applies. However, Runways 10-28 supports visual and daytime only operations by aircraft with approach speeds greater than 50 knots, thus, Row 2 applies.

The Airport is equipped with NAVAIDs which support non-precision instrument approaches to Runway 5 and 23 so a 40:1 departure surface slope applies as illustrated in **Table 4-16**.

Interviews with the existing tenants and airport users indicated the existing approaches are adequate for their operations at X26; however approaches less than one mile but greater than 3/4 statute mile will be considered. Forecast demand does not anticipate use by aircraft larger than approach category B. The airport is expected to retain the same approach and departure surface requirements for each runway of Row 4 and Row 8, as well as a departure surface for each runway end. Lower approaches would require the protection of Row 6.

TABLE 4-16
APPROACH AND DEPARTURE SURFACE STANDARDS TABLE

Row	Runway Type	Dimensional Standards Feet (Meters)					Slope/OCS
		A	B	C	D	E	
1	Approach end of runways expected to serve small airplanes with approach speeds less than 50 knots. (Visual runways only, day/night)	0 (0)	120 (37)	300 (91)	500 (152)	2,500 (762)	15:1
2	Approach end of runways expected to serve small airplanes with approach	0 (0)	250 (76)	700 (213)	2,250 (686)	2,750 (838)	20:1

TABLE 4-16
APPROACH AND DEPARTURE SURFACE STANDARDS TABLE

Row	Runway Type	Dimensional Standards Feet (Meters)					Slope/OCS
		A	B	C	D	E	
	speeds of 50 knots or more. (Visual runways only, day/night)						
3	Approach end of runways expected to serve large airplanes (Visual day/night); or instrument minimums ≥ 1 statute mile (1.6 km) (day only).	0 (0)	400 (122)	1000 (305)	1,500 (457)	8,500 (2591)	20:1
4	Approach end of runways expected to support instrument night operations, serving approach Category A and B aircraft only.[1]	200 (61)	400 (122)	3,800 (1158)	10,000[2] (3048)	0 (0)	20:1
5	Approach end of runways expected to support instrument night operations serving greater than approach Category B aircraft.[1]	200 (61)	800 (244)	3,800 (1158)	10,000[2] (3048)	0 (0)	20:1
6	Approach end of runways expected to accommodate instrument approaches having visibility minimums ≥ 3/4 but <1 statute mile (≥ 1.2 km but < 1.6 km), day or night.	200 (61)	800 (244)	3,800 (1158)	10,000[2] (3048)	0 (0)	20:1
7	Approach end of runways expected to accommodate instrument approaches having visibility minimums < 3/4 statute mile (1.2 km).	200 (61)	800 (244)	3,800 (1158)	10,000[2] (3048)	0 (0)	34:1
8	Approach end of runways expected to accommodate approaches with vertical guidance (Glide Path Qualification Surface [GQS]).	0 (0)	Runway width + 200 (61)	1520 (463)	10,000[2] (3048)	0 (0)	30:1
9	Departure runway ends for all instrument operations.	0[4] (0)	See Figure 2-8.	40:1			
Notes:	*1 "Marking and lighting of obstacle penetrations to this surface or the use of a Visual Guidance Slope Indicator (VGSI) …may avoid displacing the threshold"*						
	2 "10,000 feet (3048 m) is a nominal value for planning purposes. The actual length of these areas is dependent upon the visual descent point position for 20:1 and 34:1, and Decision Altitude (DA) point for the 30:1"						
	4 "Dimension A is measure relative to Takeoff Distance Available (TODA) (to include clearway)"						

TABLE 4-16 APPROACH AND DEPARTURE SURFACE STANDARDS TABLE						
Row	**Runway Type**	**Dimensional Standards Feet (Meters)**				**Slope/OCS**
		A	B	C	D	E
	Source: Federal Aviation Administration Advisory Circular 150/5300-13A Change 1, Table 3-2, FAA Approach/Departures Standards Table, 2/26/2014					

Declared Distances

If the surfaces are not clear of obstructions and those obstructions cannot be removed, landing and takeoff thresholds may be displaced by implementing declared distance criteria to avoid the obstruction(s). Declared distances typically include different landing and takeoff thresholds due to an obstruction to air navigation (i.e. tower, building, or highway) within the approach or departure surface. Currently, there are no displaced thresholds at X26.

The airport does not completely own the RPZ property prior to the Runway 5, 23 and 28 ends, which is recommended. Following the publication of the 2012 Interim Guidance on Land Uses Within a Runway Protection Zone, if the visibility minima were to decrease, a change in classification to other-than-utility, a change to the runway threshold, or any other adjustments to the existing layout would occur that would move or alter the size of the RPZ or introduce additional incompatible land uses, then one option may include implementation of declared distance criteria.

Table 4-17 lists the current available distances allowed on Runway 15-33 and 10-28.

TABLE 4-17 EXISTING AND FUTURE DECLARED DISTANCE LENGTHS				
	Runway 5		**Runway 23**	
	Existing	**Future**	**Existing**	**Future**
Takeoff Runway Available	4,023 ft.	TBD	4,023 ft.	TBD
Takeoff Distance Available	4,023 ft.	TBD	4,023 ft.	TBD
Accelerate Stop Distance Available	4,023 ft.	TBD	4,023 ft.	TBD
Landing Distance Available	4,023 ft.	TBD	4,023 ft.	TBD
	Runway 10		**Runway 28**	
	Existing	**Future**	**Existing**	**Future**
Takeoff Runway Available	3,199 ft.	TBD	3,199 ft.	TBD

Takeoff Distance Available	3,199 ft.	TBD	3,199 ft.	TBD
Accelerate Stop Distance Available	3,199 ft.	TBD	3,199 ft.	TBD
Landing Distance Available	3,199 ft.	TBD	3,199 ft.	TBD
Sources: TKDA, 2017				

Runway Safety Dimensional Requirements

Runway safety dimensions are areas on each runway's ends and sides designed to protect aircraft landing, departing, and operating on the runway. These areas consist of the Runway Safety Area (RSA), Runway Object Free Area (ROFA), and the Runway Protection Zone (RPZ).

Runway Safety Area (RSA)

The RSA is intended to enhance the safety of aircraft that overshoot, underrun, or veer off the runway while also providing greater accessibility to firefighting and rescue equipment during these incidents. The distance necessary beyond the runway end is determined to contain 90 percent of overrun incidents.

The RSA is centered on the runway centerline and according to the FAA must be: (1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations; (2) drained by grading or storm sewers; (3) capable, under dry conditions, of supporting snow removal and aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing damage to the aircraft; and (4) free of objects, except for objects that need to be within the RSA because of their function. Unlike other airport standards, RSA standards cannot be modified. **Table 4-18** illustrates the RSA information for X26.

TABLE 4-18 RUNWAY SAFETY AREA DIMENSIONS			
	Runway 5-23		
	Existing Condition	**FAA B-II Standard**	**Future Condition**
Width	150'	150'	Same
Length Beyond Departure End	300'	300'	Same
Length Prior to Threshold	300'	300'	Same
	Runway 10-28		
	Existing Condition	**FAA B-II Small Standard**	**Future Condition**
Width	150'	150'	Same
Length Beyond Departure End	300'	300'	Same
Length Prior to Threshold	300'	300'	Same
Source: AC 150/5300-13A, Airport Design and TKDA, 2017			

B-II RSA requirements will remain protected so the operational capability, the APRC and DPRC, can remain B-II-5000. This can be maintained at little to no additional cost. The RSAs at X26 are clear of all objects other than those necessary for their purpose.

Runway Object Free Area (ROFA)

The Runway Object Free Area is another clearing surface which considers all objects protruding above the nearest point of the RSA to be obstructions. This includes terrain within a distance from the edge of the RSA equal to one-half the most demanding wingspan of the RDC of the runway. Objects necessary for the air navigation or ground maneuvering of aircraft, except where precluded by other clearing standards, are

allowed within the ROFA, as well as taxiing aircraft and holding aircraft. Objects not necessary for the air navigation or aircraft ground maneuvering purposes should not be placed in the ROFA. ROFA existing conditions, standards, and ultimate configurations are shown in **Table 4-19**.

TABLE 4-19
RUNWAY OBJECT FREE AREA DIMENSIONS

	Runway 5-23		
	Existing Condition	**FAA B-II Standard**	**Future Condition**
Width	500'	500'	Same
Length (Beyond Runway End)	300'	300'	Same
Length Prior to Threshold	300'	300'	Same
	Runway 10-28		
	Existing Condition	**FAA B-II Small Standard**	**Future Condition**
Width	500'	500'	Same
Length (Beyond Runway End)	300'	300'	Same
Length Prior to Threshold	300'	300'	Same

Source: AC 150/5300-13A, Airport Design and TKDA, 2017

B-II ROFA standards will remain protected so the operational capability, the APRC and DPRC, can remain B-II-5000. The ROFAs at X26 are clear of protruding objects above the edge of the RSA.

Obstacle Free Zone (OFZ)

The Obstacle Free Zone is a safety area that is not only a design surface, but an operational surface as well. It is a defined volume of airspace centered above the runway centerline, above a surface whose elevation at any point is that of the nearest point on the runway centerline.

Typical design standards require objects, except for frangible NAVAIDs, be cleared from this surface, and while operations are being conducted, aircraft also may not be within this surface. The OFZ is made up of the Runway OFZ, and when applicable the Precision Obstacle Free Zone (POFZ), the inner-approach OFZ, and the inner-transitional OFZ. The

OFZ is unique in its shape being dependent on the approach minimums for the runway end and the aircraft on approach. For each operation, the OFZ may be different. Best practice is to use the most demanding OFZ when designing safety areas. OFZ criteria are shown in **Table 4-20.**

TABLE 4-20
OBSTACLE FREE ZONE DIMENSIONS

Operator	Width	Length beyond Runway End
Small aircraft and visibility < 3/4 mile	300	200
Small aircraft with approach speeds > 50 knots	250	200
Small aircraft with approach speeds < 50 knots	120	200
Operations by Large aircraft	400	200

Source: Advisory Circular 150/5300-13A, Change 1, Airport Design

X26 supports regular operations (500 annual operations) of both large aircraft with MTOW greater than 12,500 lbs. as well as small aircraft with approach speeds greater than 50 knots. Therefore, Runway 5-23 has an object free zone criteria of 200 x 400 feet, and Runway 10-28 has an OFZ of 200 x 250 feet.

Runway Protection Zone (RPZ)

The RPZ is a safety area designed to protect people and property on the ground. According to AC 150/5300-13A, *Airport Design*, the RPZ is trapezoidal in shape, is centered on the extended runway centerline, and it begins 200 feet from the runway threshold. There are two RPZs for each runway, a departure RPZ and an approach RPZ; however the more stringent of the two is used unless they begin at different locations such as a relocated departure RPZ if the Takeoff Run Available (TORA) and the runway end are not the same. The dimensions of the RPZ are determined by the critical aircraft and the approach minimums for the approach RPZ and the critical aircraft and departure procedures for the departure RPZ.

On September 27, 2012, the FAA released **Interim Guidance on Land Uses Within a Runway Protection Zone**. This document, to be included in the yet to be released **Land Use Compatibility AC**, provides more clarity on what land uses are specifically prohibited within an RPZ and specifies what changes at the airport will require further review of an RPZ. The following changes will require FAA Regional and ADO staff to consult with the National Airport Planning and Environmental Division, APP-400 (who will then coordinate with the Airport Engineering Division, AAS-100):

- An airfield project (e.g., runway extension, runway shift)
- A change in the critical aircraft that increases the RPZ dimensions
- A new or revised approach procedure that increases RPZ dimensions
- A local development proposal within the RPZ (either new or reconfigured)

Before the consultation with APP-400, an alternatives analysis must be performed in coordination with FAA Regional and ADO staff to document the full range of alternatives that could avoid introducing a land issue within the RPZ, minimize the impact of the land use in the RPZ, or mitigate risk to people and property on the ground.

Existing land uses within an RPZ are to be mitigated as practical. For now, the FAA has taken the stance of mitigate when possible. Otherwise if no change occurs to the dimensions or location of the RPZ, then an RPZ analysis does not need to be performed.

Land uses within an RPZ that are either prohibited or require coordination with the FAA include:

- Buildings and structures (examples include but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (examples include but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities (examples include but are not limited to: rail facilities – light or heavy, passenger or freight; public roads/highways; vehicular parking facilities)
- Fuel storage facilities (above or below ground)
- Hazardous material storage (above or below ground)

- Wastewater treatment facilities
- Above-ground utility infrastructure (i.e. electrical substations) including any type of solar panel installations.

There are two possible RPZ incompatible uses at X26 listed in **Table 4-21**.

TABLE 4-21
RPZ INCOMPATIBILITIES

Runway	**Incompatible Uses**
10	Airport Road West
10	Roseland Road

Source: TKDA 2017

Standards for RPZ dimensions have changed since the previous ALP to include a difference between small and large aircraft users of the airport. Small aircraft, those 12,500 pounds or less, now have slightly reduced standards for safety dimensions. The RPZ dimensions can be seen in **Table 4-22**.

TABLE 4-22 RUNWAY PROTECTION ZONE DIMENSIONS						
	Runway 5			**Runway 23**		
	Existing	**Standard**	**Future**	**Existing**	**Standard**	**Future**
Approach Visibility Minima	1-mile	1-mile	TBD	1-mile	1-mile	TBD
Length (ft.)	1000 ft.	1000 ft.	TBD	1000 ft.	1000 ft.	TBD
Inner Width (ft.)	500 ft.	500 ft.	TBD	500 ft.	500 ft.	TBD
Outer Width (ft.)	700 ft.	700 ft.	TBD	700 ft.	700 ft.	TBD
Acreage	13.770	13.770	TBD	13.770	13.770	TBD
	Runway 10			**Runway 28**		
	Existing	**Standard**	**Future**	**Existing**	**Standard**	**Future**
Approach Visibility Minima	Visual	Visual	Visual	Visual	Visual	Visual
Length (ft.)	1000 ft.	1000 ft.	1000 ft.	1000 ft.	1000 ft.	1000 ft.
Inner Width (ft.)	250 ft.	250 ft.	250 ft.	250 ft.	250 ft.	250 ft.
Outer Width (ft.)	450 ft.	450 ft.	450 ft.	450 ft.	450 ft.	450 ft.
Acreage	8.035	8.035	8.035	8.035	8.035	8.035
Source: AC 150/5300-13A, Airport Design and TKDA, 2017						

If the status of any of the RPZs changes as previously mentioned, then incompatibilities will need to be rectified or an alternatives analysis performed documenting why the incompatibilities cannot be fixed. Despite some of the incompatibilities being "grandfathered-in," the airport should still actively attempt to clear the RPZ from the incompatibilities for the safety of the people and persons on the ground.

Runway System Requirements Summary

The following tables summarize the runway requirements for X26.

TABLE 4-23 RUNWAY 5-23 DATA TABLE						
	Existing		Standard		Future	
	5	23	5	23	5	23
Aircraft Service	Utility		N/A		Utility	
Runway Design Code	B-II		N/A		Same	
Approach Reference Code	B-II-5000		N/A		TBD	
Departure Reference Code	B-II-5000		N/A		TBD	

Pavement Strength (lbs.)	22,000		N/A		Same	
Pavement Material	Asphalt		N/A		Same	
Surface Treatment	None		N/A		Same	
Effective Gradient	0.07%		±2.00		Same	
Wind Coverage at 13 knots	95%		95%		Same	
Runway Length	4,023’		N/A		TBD	
Runway Width	75'		75'		Same	
Displaced Threshold Elevation	N/A		N/A		TBD	
Runway Lighting Type	LIRL		LIRL		Same	
Runway Marking Type	NPI		NPI		Same	
Part 77 Approach Category	B(NP)	B(NP)	N/A	N/A	TBD	TBD
Approach Type	Non-Precision	Non-Precision	N/A	N/A	Same	Same
Visibility Minimums	1-Mile	1-Mile	N/A	N/A	TBD	TBD
Type of Aeronautical Survey Required	Non-Vertically Guided		Non-Vertically Guided		Vertically Guided	
Runway Departure Surface	Yes	Yes	Yes	Yes	TBD	TBD
Threshold Siting Surface	Row 4, 8	Row 4, 8	N/A	N/A	TBD	TBD
Visual and Instrument NAVAIDs	PAPI-2, Beacon, AWOS-3, ADS-B Antenna		N/A		PAPI-2, REILs, Beacon, AWOS-3, ADS-B Antenna	
Touchdown Zone Elevation	18.4’	21.5’	N/A	N/A	18.4’	21.5’
Vertical Datum	NAD88		NAD88		Same	
Horizontal Datum	NAD83		NAD83		Same	
Source: Federal Aviation Administration Advisory Circular 150/5300-13A Change 1						

TABLE 4-24 RUNWAY 10-28 DATA TABLE					
	Runway 10-28				
	Existing		**Standard**	**Future**	
Aircraft Service	Utility		N/A	Utility	
Runway Design Code	B-II Small		B-II Small	B-II Small	
Approach Reference Code	B-II-Visual		NA	B-II-Visual	
Departure Reference Code	B-II-Visual		NA	B-II-Visual	
Pavement Strength (1,000lbs)	Unpublished		12.5	12.5	
Pavement Material	Asphalt		NA	Asphalt	
Surface Treatment	None		NA	None	
Effective Gradient	0.00%		NA	0.00%	
Wind Coverage at 10.5 knots/13 knots	90%/91%		95%	90%/91%	
Runway Length	3,199’		NA	3,199’	
Runway Width	75’		75’	75’	
Displaced Threshold Elevation	NA		NA	NA	
Runway Lighting Type	None (Reflectors)		NA	Same	
Runway Marking Type	Basic		NA	Same	
Part 77 Approach Category	A(Vis)	A(Vis)	NA	A(Vis)	A(Vis)
Approach Type	Visual	Visual	NA	Same	Same
Visibility Minimums	>1 mile	>1 mile	NA	Same	Same
Type of Aeronautical Survey Required	Non-Vertically Guided		NA	Non-Vertically Guided	
Runway Departure Surface	None		NA	None	
Threshold Siting Surface	Row 2		NA	Row 2	
Visual and Instrument NAVAIDs	PAPI-2, Beacon, AWOS-3, ADS-B Antenna		NA	PAPI-2, Beacon, AWOS-3, ADS-B Antenna	
Touchdown Zone Elevation	18.3’	20.8’	NA	18.3’	20.8’
Vertical Datum	NAD88		NAD88	NAD88	
Horizontal Datum	NAD83		NAD83	NAD83	
Source: Federal Aviation Administration Advisory Circular 150/5300-13A Change 1					

Taxiway System Requirement

A safe and efficient taxiway system is designed to provide safe and efficient aircraft movement to and from the runways to landside facilities. The previous ALP was developed when taxiway design was based on Airport Design Group (ADG) only, which itself is based on the wingspan and tail height of an aircraft. However, within an ADG, there can be vastly different types of undercarriage in the aircraft. The FAA, according to AC 150/5300-13A, has introduced Taxiway Design Groups (TDG). These TDGs are based on the Main Gear Width (MGW) and the Cockpit to Main Gear Distance (CMG) of the taxiway critical aircraft (which may be different than the runway critical aircraft. There are seven TDGs, and the representative critical aircraft for taxiways at X26, the Beechcraft King Air 200D and 350i, both fall within the TDG 2 category.

TDG 2 taxiways and taxilanes have a maximum width of 35 feet. Since Sebastian Municipal Airport was originally designed as a Naval aircraft training facility, much of the airfield was designed to support military operations. Also, some of the existing taxiways, including Taxiway A, was designed and initially used as a runway. Currently Taxiway A runs from North to South on the edge of the general aviation apron, and it connects the northwest development to Runway 10 as well as Runway 5. Taxiway B is 35 feet wide and runs parallel on the north side of Runway 10-28.

New taxiways are being designed at constructed during the time of this writing. Taxiways C, D, and E are all designed to accommodate taxiway group 2 aircraft. However, taxilanes supporting the T-hangars on the west side of the airfield are only 15 feet wide. This may be due to the size of the aircraft. However, even TDG group 1A aircraft require a taxilane width of no less than 25 feet. Thus, as part of proposed development, improvements to the existing taxiway system as well as new taxiways and taxilanes will be identified.

FAA has begun to enforce the right aircraft right size approach in designing and constructing infrastructure at airports. All future taxiways and taxilanes will be funded only to the maximum width of the critical aircraft's TDG at the time of development.

Taxiway and taxilane clearance requirements are still associated with the ADG of the critical aircraft as it is determined by wingspan. Due to the desire to maintain the operational capability of the runway as B-II, the taxiway/taxilane separations will be

based on ADG II standards. **Table 4-25** lists the safety areas for taxiways and taxilanes based upon this criteria.

TABLE 4-25 TAXIWAY AND TAXILANE SAFETY AREAS		
Item	**IA/B**	**II**
Taxiway Protection		
Taxiway/Taxilane Safety Area	49’	79’
Taxiway OFA	89’	131’
Taxilane OFA	79’	115’
Taxiway Separation		
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	70’	105’
Taxiway Centerline to Fixed or Moving Object	44.5’	65.5’
Taxilane Centerline to Parallel Taxilane Centerline	64’	97’
Taxilane Centerline to Fixed or Movable Object	39.5’	57.5’
Wingtip Clearance		
Taxiway Wingtip Clearance	20’	26’
Taxilane Wingtip Clearance	15’	18’
Source: FAA AC 150/5300-13A Change 1		

Current taxiway and taxilane data for ACQ is listed in **Table 4-26** and **Table 4-27**.

TABLE 4-26 TAXIWAY/TAXILANE CRITICAL AIRCRAFT		
	Existing	**Future**
Aircraft	Beech King Air 200D	Beech King Air 350i
Cockpit to Main Gear	14.92 (14’11”)	16.25 (16’ 3”)
Main Gear Width	17.17 (17’2”)	17.17 (17’ 2”)
Design Group	1A	2
Sources: Beechcraft Textron Aviation Aircraft Data, 2017 and FAA AC 150/5300-13A Change 1		

TABLE 4-27 TAXIWAY AND TAXILANE DESIGN CRITERIA		
	Existing	**Future**
Taxiway Design Group	1A	Same
Taxiway Width	25’	35'
Taxiway Safety Area Width	49'	79’
Taxiway Object Free Area Width	89'	131’
Taxiway Edge Safety Margin	5'	7.5’
Taxiway Shoulder Width	10'	15’
Taxilane Design Group	1A	1/2
Taxilane Width	15’/35'	25'/35’
Taxilane Object Free Area Width	79'	79’/115’
Taxilane Safety Area Width	49'	49’/79’
Source: FAA AC 150/5300-13A, Airport Design		

Taxiway A and B

There are currently no airfield signs at X26. As noted, Taxiway A was a former runway and runs on the east side of the west airport apron. From initial measurements, it appears that portions of Taxiway A may be wider than the required width of 35 feet. Narrowing the Taxiway to the correct width will likely open up apron space for aircraft movement to and from various aircraft facilities as well as provide area for aircraft apron parking. Taxiway A is not equipped with any lighting, and will likely need to be remarked to clearly identify the taxiway movement area and allowable apron parking positions.

Taxiway B is located on the north side of Runway 10-28, and provide full parallel access to the runway. Taxiway B provides access to the west side of the airport as well as the north side of the airfield and infield areas. The taxiway is in satisfactory condition, and the taxiway is not equipped with lights. Since Sebastian Airport is primarily used during daylight hours, the existing taxiways are equipped with reflectors only rather than taxiway lights.

Taxiway B currently is used as the primary taxiway to access facilities around the airfield property. The taxiway is currently 35 feet in width and is designed to support B-II aircraft.

To maintain APRC and DPRC B-II design standards, the recommended safety areas for Taxiway A are based on an ADG II aircraft which includes a safety area width of 79 feet and an object free area width of 131 feet. Both the current TSA and TOFA are clear of objects. The current runway centerline to Taxiway B centerline separation is 240 feet satisfying the standard for B-II operations with approach visibility minima not lower than greater than 1 statute mile.

New Taxiways C, D and E

In 2016, the City and Airport management worked with Infrastructure Engineering Consultants to design several new taxiways for the airport which would improve aircraft and airport vehicle movements as well as improve safety and access to planned development. All taxiways were designed to accommodate TDG Group 2 aircraft. Taxiway C was designed as a full parallel taxiway to Runway 5-23. This runway is equipped with four connector taxiways as well as an aircraft runup area. Construction of Taxiway A will also allow for access to the Northeast quadrant of the airport, which will allow for aviation development within the northeast portion of the airfield.

Taxiway D was designed to provide access to Runway 5-22 and the new corporate area development, aprons and the terminal apron. The Taxiway was designed to not provide direct access to Runway 5-23, thus eliminating any unforeseen runway incursions.

Taxiway E provides access to and from the terminal area apron and taxilane and the Runway 28 threshold. This runway is planned to be located on the south side of Runway 28 to allow direct access to the terminal area. The taxiway will be located 240 feet from the runway centerline.

All taxiways including connector taxiways are designed to accommodate Taxiway Design Group 2 aircraft represented by the existing critical aircraft, King Air B-200D, and the future critical aircraft the King Air 350i. Thus, all parallel taxiways and access taxiways to existing and proposed facilities should be designed to a 35 foot standard. In addition, all

taxiways are not equipped with any type of lighting but are rather equipped with taxiway reflectors.

Taxilanes

The pavement leading to and in between hangars are important to ensuring the safe passage of aircraft to the taxiway system, and subsequently the national airspace system. The taxilanes include the taxilanes leading to the hangars and the taxilanes between those hangars. The pavement conditions vary amongst the taxilanes from fair to satisfactory condition.

Taxilanes must allow the safe passage of aircraft between hangars and to other facilities. Taxilanes which provide access to and from the t-hangars on the west side of the airport appear to be only 15 feet wide. Thus, it is recommended that all taxilanes be designed to support at least TDG Category 1A and 1B aircraft requiring a width of 25 feet. Although the T-hangar is currently full, the size of the taxilanes limit its use by slightly larger aircraft. Therefore, proposed development will be designed to satisfy the taxilane object free area separation of 79 for ADG I aircraft, and 115 feet for ADG II aircraft.

Parachute Landing Areas/Drop Zones

A major tenant of Sebastian Municipal Airport is Skydive Sebastian. Skydive Sebastian leasehold is located within the northwest quadrant of the airport property. The parachute landing area (PLA) drop zone is designated in the infield north of Taxiway B. A Swoop Pond was recently installed near the closed runway on the northeast side of the airport. Skydive Sebastian has several buildings including a tiki bar, hangar, as well as a building providing bathroom facilities. Skydive Sebastian attracts jumpers from all over the world and holds special events at the Airport throughout the year. Skydive Sebastian also has an above ground Jet A fuel tank used for their operations only, and the airport has provided as part of their leasehold property that may be used for camping. Skydive Sebastian is looking to expand their facilities. Therefore, as part of proposed development, the Master Plan team considered planned Skydive Sebastian's plans to allow for compatible development.

Sebastian Skydive provides a variety of opportunities including student training, tandem jumps as well as jumps designed for experience skydivers.

FIGURE 4-10
AIRPORT DROP ZONE



Although the airport is listed as a drop zone according to the United States Parachutists Association, there is not a specified landing area currently marked on the airfield. According to DOT/FAA/AR-11/30, *Development of Criteria for Parachute Landing Areas on Airports*, May 2012, provides recommendations for development of on-airport parachute landing areas (PLAs) to be incorporated into FAA AC 150/5300-13A. The PLA's must be hazard free. The size of the PLA is dependent upon the parachutists experience and type of activity. Three PLAs are recommended:

TABLE 4-28 PARACHUTE LANDING AREA REQUIREMENTS				
Parachute Activity	**Minimum PLA Size Using Ram-Air Canopies (sq. ft.)**	**Minimum PLA Size Using Round Canopies (sq. ft.)**	**Minimum Radial Distance From Hazards (ft)**	**Experience Level**
Student/training	338,000	3,041,900	40	Least experienced parachutists
Tandem	84,500	N/A	40	B- and C-licensed parachutists and tandem operations
All other activity	5,000	338,000	40	Most Experienced Parachutists

Examples of Minimum PLAs include:

- Student/training PLAs and requires (100 m radius from hazards)^2 x π≈ 338,000 SF:
  - 582 x 582 foot square
  - 656 ft diameter circle
  - 700 x 483 ft rectangle or
  - Any other shape with an area equaling 338,000 square feet
- Tandem PLAs and requires (50 meter radius from hazards)^2 x π≈ 84,500 SF
  - 292- by 292-ft square
  - 328-ft-diameter circle
  - 340- by 250-ft rectangle
  - Any other shape with an area equaling 84,500 sq. ft
- All Other Activity PLAs and requires ((12-m radius from hazards)^2 x π ≈ 5000 sq. ft.).
  - 70- by 70-ft square
  - 80-ft-diameter circle
  - 85- by 60-ft rectangle
  - Any other shape with an area equaling 5000 sq. ft.

The edge of the PLA must be located at a minimum of 40 feet from any hazard. PLAs should not be located within a runway safety area or object free areas.

Recommended PLA Markings

On-airport PLAs perimeter boundaries should be marked to distinguish the PLA from the surrounding areas, and allow the parachutist to discern the landing area from the air. Sample type of markings include:

- Dashed line, a minimum of 3 inches wide in white or orange chalk, paint, or engineering tape
- Traffic-style cones
- Flags
- Streamers or
- Landscaping

It is also recommended to use different types of markers when designating areas within the PLA and the perimeter of the PLA.

Approach and Navigational AIDS

Instrument Approach Facilities

X26 does not currently utilize on-airport instrument approach facilities. Instead, there are designated GPS approaches to Runway 5 and 23, which do not require on-site equipment. No plans are currently in place to reduce the minimums at X26 to less than 3/4 statute mile. However, the feasibility of lowering the visibility minimums to less than 1 mile but more than 3/4 statute mile will be evaluated as part of the airfield alternatives analysis. Although not required, approach facilities are recommended for airports with less than one mile approaches. In July 2008, Sebastian Airport became the first airport in the United States to have an operational ADS-B tower.

Visual Landing Aids

X26 also uses a number of visual landing aids, such as those listed in **Chapter 2**, *Existing Airport Inventory*. Sebastian is equipped with two beacons: the first is located at the top of the arrival and departure building and the backup beacon is located in the parking lot near the electrical vault. The Airport is also equipped with a lighted wind cone and segmented circle, and the runup area near the Runway 5 threshold is equipped with a magnetic wind rose. All runways are equipped with PAPI-2s, but only Runway 5-23 is equipped with any runway edge lighting. As part of the analysis related to the viability

of lowering the approach to Runway 5 or 23, runway end identification lights (REILs) would also be considered.

Weather Reporting

As previously mentioned in **Chapter 2**, *Existing Airport Inventory*, the current Super Automated Weather Observing System (AWOS) is being replaced with an AWOS-3, which will allow better coverage. In addition the new AWOS-3 will be equipped with dual coverage allowing users to hear both weather as well as airport traffic communications within the airport airspace. The new AWOS-3 is being located within the infield area between future Taxiway C and Runway 10-28 within the southwest quadrant of the airport property. This location provides unobstructed coverage, which should provide accurate weather and wind data.

Airfield Signage and Pavement Markings

Airfield Signage

X26 is not currently equipped with any airfield signage for the runway or taxiways. It is suggested the airport install taxiway and runway signs. FAA Advisory Circular 150/5345-44K, *Specification for Runway and Taxiway Signs* details signage requirements at airports.

Pavement Markings

Runway 5-23 is marked as a non-precision instrument approach since both Runway 5 and 23 are equipped with RNAV GPS approaches. Non-precision markings are the standard for runways with instrument approach minima greater than or equal to one mile as well as for approach minima greater than or equal to 3/4 mile.

Runway 10-28 is still marked as a Basic runway since it continues to only support visual approaches with runway visibility greater than 1 mile, and is limited to daytime use only. Based upon the most recent inspection, the runway markings on both 5-23 and 10-28 are in fair to good condition.

Aircraft Aprons and Tie-Downs

The Airport has several aprons around the airport which provide aircraft parking and movement areas to adjacent facilities. The terminal area apron provides approximately 7 to 10 tie-down spaces. There is also aircraft parking on the apron south of the T-hangar facilities and on the northwest apron adjacent to Pilot's Paradise facilities. In all, there are approximately 25 tie-downs for general aviation aircraft.

However, according to leasehold data, the northwest apron is part of the Pilot's Paradise lease and they obtain revenue from tie-down parking. Still, based upon on-site inspections, the area is not well marked which causes some adjacent tenants to be blocked from their facilities. Thus as part of the Apron redevelopment and rehabilitation, remarking Taxiway A along with adding movement area and parking markings to more efficiently use the existing apron facilities was considered as part of the alternatives analysis.

Airport tie-down demand consists of both based aircraft and transient aircraft demand. Aircraft parking requirements were based upon the length and wingspan of the typical aircraft fleet at X26 as well as a 10 and 20 foot buffer around the aircraft. The proposed parking criteria for the typical aircraft using the airport are outlined in **Table 4-29**.

TABLE 4-29 AIRCRAFT PARKING SPACE REQUIREMENTS			
Make/Model*	**Length (INCHES)**	**Wing Span (INCHES)**	**Required Parking Area[1] (Square Yards)**
Beech 200D	526	654	266
DH6-300	621	780	374
King Air 350i	560	695	301
Piper Cherokee	279.5	360	78
Velocity TXL	240	372	69
Velocity XL	240	372	69
Velocity XL-5	240	372	69
Velocity SE	228	352	62
Velocity V-Twin	240	418	78
Cessna 208 Caravan	451	625	218
Embraer Phenom 300	506	638	249
Helicopter Parking Areas	40 x 40 ft		178
Sources: Aircraft manufacturer data, AC 150/5300-13a and TKDA 2017			

Using this data along with forecast transient peak hour demand along with anticipated based aircraft parking demand, a low and high apron and aircraft parking demand forecast was development to assist Airport management. If shade and other hangars are not provided to satisfy demand, then increase apron parking demand was anticipated. Table 4-x highlight the anticipated low and high apron parking demand forecasts.

TABLE 4-30
FORECAST APRON PARKING DEMAND

	Based Aircraft				Transient Aircraft				
Year	SEP/MEP	Turbine/Rotor	Other*	Apron Parking Demand (SY)	SEP/MEP	Turbine/Rotor	Other	Apron Parking Demand (SY)	Parking Demand (SY)
Low Forecasts of Demand									
2017	5	0	0	400	2	0	0	355	755
2018	5	0	0	390	1	1	0	452	842
2022	5	0	0	390	1	1	0	452	842
2027	6	0	1	593	1	1	0	452	1,045
2032	6	0	0	468	1	1	0	452	920
2037	6	0	1	537	1	1	0	452	989
High Forecasts of Demand									
2017	18	0	0	1,414	2	0	0	355	1,769
2018	22	0	3	1,923	2	0	0	357	2,280
2022	23	0	3	2,001	2	0	0	370	2,371
2027	24	0	4	2,148	2	1	0	388	2,536
2032	32	0	4	2,772	2	1	0	409	3,181
2037	32	0	13	3,393	2	1	0	431	3,824

Sources: TKDA 2017

Aircraft Hangars

As part of the inventory process, it was determined that there was a need for additional hangar facilities at the Airport including small shade through conventional hangar facilities. In preparation of continued growth and demand, Airport management's goal is to provide for an on-site corporate industrial park using the 150 acres gained by closing Runway 13/31. Management would also like to attract additional aviation services and construct additional T-hangars and/or 'condo' hangars.

Using a breakdown of aircraft storage demand from historical data as well as other nearby and similar airports, the following percentages were applied to traffic forecast to determine the likely need as illustrated in **Table 4-31**.

TABLE 4-31
BREAKDOWN OF HANGAR DEMAND

Aircraft Type	Conventional	Corporate	T-Hangar	Shade	Apron	Total
Single Engine	10%	5%	45%	30%	10%	100%
Multi-Engine Piston	25%	15%	30%	20%	10%	100%
Turbo-Prop	50%	50%	0%	0%	0%	100%
Jet/VLJ	50%	50%	0%	0%	0%	100%
Helicopter (Rotor)	50%	20%	10%	10%	10%	100%
Experimental	50%	50%	0%	0%	0%	100%
Light Sport	0%	35%	55%	5%	5%	100%
Other	0%	50%	50%	0%	0%	100%

*Note: Conventional Hangars typically accommodate 4 aircraft

Corporate Hangars accommodate typically can accommodate 2 aircraft

Sources: TKDA 2017

Based upon this demand estimate and forecast activity levels, forecast hangar demand was identified as illustrated in **Table 4-32**.

TABLE 4-32
FORECAST HANGAR DEMAND

	Conventional	Corporate	T-Hangar	Shade	Total	Apron Tie-Downs
Actual	**6**	**0**	**40**	**0**		**15**
2017	2	4	27	13	46	9
Surplus/(Deficit)	4	(4)	13	(13)		6
2018	3	5	29	22	59	7
Surplus/(Deficit)	3	(5)	11	(22)		8
2022	4	5	33	23	65	7
Surplus/(Deficit)	2	(5)	7	(23)		8
2027	4	6	36	23	69	9
Surplus/(Deficit)	2	(6)	4	(23)		6
2032	1	8	38	32	79	8
Surplus/(Deficit)	5	(8)	2	(32)		7
2037	2	8	36	40	86	9
Surplus/(Deficit)	4	(8)	4	(40)		6

Sources: Airport historical records and TKDA, 2017

Aircraft Fuel Storage

Both the City of Sebastian and Pilot's Paradise sell 100LL fuel. Pilot's Paradise provides full service at their location on the west side of the airfield, and the City provides self-service facilities adjacent to the Airport Terminal building. Pilot's Paradise is equipped with one 10,000 gallon tank as well as a 1200 gallon fuel truck. Sebastian Skydive also has their own personal tank, 10,000 gallons, which contains Jet A, but they use it only for fueling their own aircraft. The City is also equipped with one 10,000 gallon fuel tank that provides 100LL as well as a fuel truck and self fueling equipment.

Using the fleet mix forecast of operations in addition to historical fuel demand, the following forecasts of fuel demand were developed. It is recommended that the City of

Sebastian obtain either an additional 10,000 gallon fuel tank to support Jet A operations or obtain a dual use tank in order to provide Jet A, MoGas, or biofuel, whichever demand warrants.

The forecast of anticipated fuel demand for key forecast years is provided in **Table 4-33**.

TABLE 4-33
FORECAST FUEL – 14 DAY PEAK DEMAND

Year	Avgas Sold (Gal per Ops)	Peak Month Ops	Peak Month Fuel	14 Day Peak Fuel
2017	1.25	3,788.79	4,735.99	2,431.14
2018	1.24	3,861.24	4,773.00	2,450.14
2022	1.18	4,147.53	4,903.11	2,516.93
2027	1.12	4,475.60	5,003.88	2,568.66
2032	1.06	4,817.69	5,094.08	2,614.96
2037	1.00	5,173.85	5,173.85	2,655.91
Year	**Jet A (Gal per Ops)**	**Peak Month Ops**	**Peak Month Fuel**	**14 Day Fuel**
2017	43.00	300	12,908.95	6,626.59
2018	43.53	313	13,604.92	6,983.86
2022	45.73	367	16,787.84	8,617.76
2027	48.63	441	21,460.22	11,016.25
2032	51.72	530	27,396.25	14,063.41
2037	55.00	635	34,938.14	17,934.91

Sources: Airport and tenant historical fuel records, operational data and TKDA forecast of demand, 2017

Arrival/Departure Building

The general aviation terminal building at Sebastian was completed and dedicated in October 2006. This building is located on the east side of the airport's 620 acre property and is accessed from Main Street to Airport Drive. The 10,000 square foot general aviation terminal building houses several tenants as well as the airport administration offices. Adjacent to the terminal apron facilities is a self-serve station that provides 100LL fuel only.

According to **Chapter 3**, *Forecasts of Aviation Activity*, the anticipated peak hour passengers likely to use the GA terminal building ranged between 6 and 7 passengers.

Since two wings of the terminal building are currently rented to tenants and one wing is used by the Airport administration, the following estimate of Terminal Area demand was determined as illustrated in **Table 4-34**.

Automobile Parking

Peak hour parking demand was based upon peak hour itinerant and local passenger demand and tenant parking demands. The airport has approximately 135 parking spaces scattered around the airport which includes parking adjacent to the Arrival and Departure building, new corporate hangars, and parking facilities located off Airport Drive West. Applying spacing recommendations provided in the City of Sebastian Ordinance Sec. Sec. 54-3-10.6., *Design and specifications for parking areas*, paragraph h, and Transportation Research Board publication, *Measuring Airport Landside Capacity, guidance,* a 40 square yard area was used to determine parking space and parking movement lane needs.

Peak hour parking demand was established by determining itinerant and local aircraft parking needs based upon the type of operation (i.e. air taxi, personal use and skydiving). Using historical and forecast data outlined in Chapter 3, the following passenger estimates were used to determine peak demand based upon forecast peak hourly operations shown in **Table 3-17**.

TABLE 4-34
TERMINAL AREA DEMAND

Year	Air Taxi	Itinerant GA	Skydiving	Local GA	Total Peak Hour Passengers	Terminal Tenants (SF)	Airport Offices (SF)	Passenger Demand (SF)	Total Demand	Est. Terminal Area	Surplus/(Deficit)
2017	2	4	12	0	6	5000	2000	903	7,903	10000	2,097
2018	2	4	12	0	6	5000	2000	909	7,909	10000	2,091
2022	2	4	15	0	6	5000	2000	935	7,935	10000	2,065
2027	2	4	15	1	6	5000	2000	969	7,969	10000	2,031
2032	3	4	18	1	7	5000	2000	1,008	8,008	10000	1,992
2037	3	4	21	1	7	5000	2000	1,050	8,050	10000	1,950

Sources: Airport historical data, peak hour demand, and TKDA, 2017

TABLE 4-35
ESTIMATED PEAK HOUR PASSENGER DEMAND

Year	Air Taxi		Itinerant GA		Skydiving Local		Local GA		Total Passengers
	Avg Enplanements	Total Passengers per 50% peak hour operations	Avg Enplanements	Total Passengers per 50% peak hour operations	Avg Enplanements	Total Passengers per 50% peak hour operations	Avg Enplanements	Total Passengers per 50% peak hour operations	
2017	2	2	1.5	5	6	12	1	0	19
2018	2	2	1.5	5	6	12	1	0	19
2022	2	2	1.5	5	6	15	1	0	22
2027	2	2	1.5	5	6	15	1	1	23
2032	3	3	1.5	5	6	18	1	1	27
2037	3	3	1.5	5	6	21	1	1	30

Sources: Airport historical records and TKDA 2017

Discussions with tenants and on-site inventory showed that during peak hours, on-airport tenant surface parking demand was approximately 55 spaces. As the airport attracts more tenants, this number is anticipated to grow. However, to establish a baseline for likely tenant parking demand, a correlation of 2.90 tenant spaces per peak hour passenger parking demand was applied.

The City of Sebastian Code Ordinance also has requirements for handicap parking spaces as illustrated in **Table 4-36**.

TABLE 4-36 HANDICAP PARKING SPACE ORDINANCE REQUIREMENTS	
Total Spaces Required	**Required Number of Handicap Spaces**
1—25	1
26—50	2
51—75	3
76—100	4
101—150	5
151—200	6
201—300	7
301-400	8

On-site inventory identified approximately 135 total parking spaces (5,400 square yards) of which at least five are designated as handicapped. Applying forecast demand to existing facilities, parking surplus and deficits were determined as illustrated in **Table 4-37.**

TABLE 4-37
AUTOMOBILE PARKING DEMAND

Fiscal Year	Peak Tenant Demand	Peak Hour Passenger Demand	Peak Hour Parking Space Demand	Parking Spaces Available	Surplus (Deficit)	Handicap Spaces Needed	Handicap Spaces Available	Surplus (Deficit)	Peak Hour Parking Area Demand	Parking Area Available (SY)	Surplus/(Deficit) (SY)
2017	55	19	74	135	61	3	5	2	2,960	5,400	2,440
2018	55	19	74	135	61	3	5	2	2,960	5,400	2,440
2022	64	22	86	135	49	4	5	1	3,440	5,400	1,960
2027	67	23	90	135	45	4	5	1	3,600	5,400	1,800
2032	78	27	105	135	30	5	5	0	4,200	5,400	1,200
2037	87	30	117	135	18	5	5	0	4,680	5,400	720

Sources: Peak Hour Demand, Historical airport data, aviation activity forecast and TKDA 2017

Although surplus parking may be identified, the location and condition of the parking may not support forecast demand. Therefore, both surface access and automobile parking needs were further evaluated as part of the airport development analyses.

Stormwater Drainage

Stormwater drainage at X26 is provided via a series of on-site manmade and natural ditches, swales and retention basins which are located on the airport golf course. Drainage faiclities are used to divert runoff from the paved airport operating areas well as the skydiving jump zone. Based upon Indian River County FEMA Flood Insurance Rate Information, updated December 4, 2012, airfield stormwater runoff drains from the north and west toward retention areas to the south and east of the airport property. During heavy rain events, standing water can be found in the infield area of the airport due to the type of airport soils. However, most of this water dissipates between 24 and 48 hours of such an event. The current drainage system adequately supports current operations and infrastructure at the airport. Further, there is some available capacity to support additional demand.

Still, future improvements including increased impervious surfaces such as runways, taxiways, apron, buildings, etc. will require additional treatment areas. As part of any future development, evaluation of stormwater discharge and containment should be evaluated to limit any potential impacts to environmentally sensitive habitat on and adjacent to the airport property. Stormwater drainage improvements to accommodate potential airport development is provided in **Chapters 5**, *Airport Alternatives and Recommended Development*, and 8, *Airport Implementation Plan*, of this report.

Land Use and Potential Acquisition

Current airport property encompasses 620 acres of which approximately 1/3 is used by the Sebastian Municipal 18-hole golf course. In addition to the golf course, portions of the current airport property was designated as conservation to support Scrub Jay, Gopher Tortoise and other habitats. According to federal funding grants, conservation is not an acceptable on-airport land use. Therefore, in conjunction with this master plan update, an airport environmental study is being performed. This study along with the property encumbrance report and Exhibit 'A' Property Map identifies the 88 acres of airport property that were identified for conservation but now may be used for aviation project construction. In addition, with the closure of former runway 13-31 on the north side of the airfield, this opened up along with other areas within the existing property approximately 100 acres for industrial development and an additional 70 acres for corporate park development

Airfield improvements which may shift required safety areas may require additional property acquisition either via fee simple or via an easement agreement. Land necessary to support planned airport development, to maintain compliance with FAA directives, and support compatible contiguous land use were identified in Chapters 5 and 6 of this report. Recommendations related to land acquisition or sale to support long-term airport development including likely funding sources is provided in detail in Chapter 8, Airport Implementation Plan, of this report.

Summary

This chapter has discussed the needs of the airport, and the wants that may not be justified, but should be protected for when they become justified. The following tables summarize the facility requirements at X26.

TABLE 4-38
AIRSIDE FACILITY NEEDS

Facility	**Deficiency**	**Action**
Jump/Drop Zone	Unmarked Drop Zone	Provide some marking to designate drop zone
Navigational Aids	None	Recommend adding REILs to Runways 5 and 23
Visual Aids	No signage	Consider adding signage
Airspace (Part 77)	Primary surface obstructions	Clear hazards or perform 7460
Airspace (APDS)	Approach and Departure surface obstructions	Clear obstructions

Source: FAA AC 150/5300-13A, Airport Design; TKDA 2017

TABLE 4-39 AIRSIDE FACILITY FUTURE NEEDS		
Facility	**Future Condition**	**Action**
Runway	Maintenance and runway rehabilitation	Monitor aircraft operations from critical aircraft
Taxiway	Full-parallel	Extend when justified
Taxiway Lighting	MITLs	Add MITLs instead of reflective markers to Taxiway C and D to support airfield development
Approaches	Evaluate viability 3/4 ≤ X < 1 Mile	Evaluate and Ensure other requirements can be met (RPZ, clearance, etc.)
Aeronautical Survey Required	Vertically Guided	Approaches are < 1 Mile
Source: FAA AC 150/5300-13A, Airport Design; TKDA 2017		

TABLE 4-40 LANDSIDE FACILITY NEEDS		
Facility	**Deficiency**	**Action**
Hangars	Need 8 new hangar units	Construct 8-10 unit T-hangar
Apron	Tie-down in TOFA	Reconfigure apron, apron expansion
Parking	Five spaces needed	Add more parking; parking for skydivers and spectators
Security	Easy access to hangars	Relocate fenceline in conjunction with proposed airport development. Keep access gate closed or monitor. Add additional security cameras to Hangar C.
RPZ	Incompatible Uses	Perform further RPZ analysis
Land Acquisition	Acquire easement to property located within existing runway protection zones	Acquire land to obtain control of these safety area
Source: FAA AC 150/5300-13A, Airport Design; TKDA 2016		

This Page was Intentionally Left Blank

CHAPTER FIVE
Airport Alternatives and Recommended Development

Chapter Overview

The airport alternatives developed as part of this chapter were based upon facility needs and deficits identified in **Chapter 4**, *Facility Requirements*, as well as concerns and opportunities identified by the Sponsor. During project initiation, the several elements were identified for further evaluation and long-term impacts. These included changes to FAA design, funding, sustainability and operational mandates, including FAA Modernization and Reform Act of 2012 new guidelines, Florida Department of Transportation (FDOT) airport operational, environmental, zoning and land use guidance, as well as the City's need to identify and quantify airport development that coincides with planned regional growth including planned road connectivity. Further, in coordination with this Master Plan Update, an environmental study is being performed to address the on-airport property currently shown as conservation on the Airport Layout Plan. Since airport property is to be used to support aviation activity, the need for this area and its impacts on airport development were considered. The findings and recommendations of the Airport Environmental Study are included in this chapter as well as the remaining chapters of this report and identified on the ALP. Ultimately, the findings and recommendations will be incorporated into the City's Comprehensive Plan and may be used as the baseline for any additionally required environmental analyses.

Using the forecasts and facility requirements as the baseline for proposed development, several airfield, terminal and landside development options were considered. The depth of analysis depended upon the viability of the alternative in relation to short and long-term needs and vision for the airport. **Table 5-1** summarizes long term demand and anticipated facility needs.

TABLE 5-1 2037 FACILITY REQUIREMENTS SUMMARY Airport Facility	2037 Demand
Hangar Demand:	
Shade Hangar	40
T-Hangar	36
Corporate/Box Hangar	8
Conventional Hangar	4* (development is driven by business demand)
Apron Tie-Down	
Based aircraft tie-downs	7
Transient aircraft tie-downs	2* (Based upon peak hour demand)
Fuel Demand (14 day peak fuel demand)	
100 LL	2,656 gallons
Jet A	17,935 gallons
Terminal Building Area	4,050 SF
Auto Parking Spaces (Peak Hour Demand)	113
Support Facilities:	
Airfield Fencing/Security	Relocate and possible expansion depending upon recommended development
Roadway Access	Expansion
Utilities	Extend and expand lines to support planned development (water, sewer, electricity, phone/cable, etc.)
Land Acquisition	To support runway approach and departure protection zones.
Obstruction Mitigation	Remove trees and add obstruction lighting as needed to immovable objects
Source: TKDA 2017	

Alternative Development

As noted in FAA Advisory Circular 150/5070-6B, Airport Master Plans, the FAA's Airport Improvement Handbook (FAA Order 5100.38D), and the Florida Department of Transportation's Guidebook for Airport Master Planning, airport alternative

development consists of an iterative process. In other words, multiple options exist to address the facility needs and opportunities impacting the airport, and, therefore, each option was evaluated based upon a specific set of criteria in order to identify the best options for airport development. These elements included, but were not limited to the following:

- Technical feasibility;
- Economic and fiscal soundness;
- Aeronautical utility;
- Viability of phased development;
- Environmental factors;
- Access to the various functional areas of the Airport;
- Future expansion potential beyond the 20-year planning horizon, and
- Qualitative/Quantitative Short List.

The goal of this analysis is to identify and evaluate alternative that address the current and future needs of the airport, the sponsor and local community while also addressing the overall strategic vision for airport development and use. Because of continued strong growth, one of the opportunities being pursued at Sebastian Municipal Airport includes a change in its FAA 3-letter designation. The current airport designation is X26, which the Sponsor and users feel negatively impacts airport development by providing a connotation that Sebastian caters only to small general aviation aircraft. This to some extent holds true for its previous marketing efforts which advertised Sebastian Airport as a small “boutique” airport.

Thus as part of this planning effort and considered as part of the alternatives analysis, Airport Management is proactively working with FAA to change their designator from X26 to SEB. This is part of the Airport Management’s overall strategic plan to market and develop the airport. This strategic vision combined with new and recommended regulatory needs drove development of various airport options and the ultimate airport design plan (ADP). The recommended ADP is illustrated in the Airport Layout Plan and estimated costs for the plan are detailed in the airport capital improvement program (CIP).

Stakeholder and Public Involvement

Upon initiation of the master plan process, a public involvement program was created to include members of the community, tenants, airport users, aviation professors, professionals from nearby airports, special interest groups, regulatory agency staff as well as local government. Information on public involvement throughout this master plan process is provided in **Appendix C** of this report. According to AC 150/5070-6B, public involvement should reflect the size of the airport and community interest in the planning process and airports are also required to include such involvement as part of the FAA Grant Assurances (Grant Assurances 7, 8 and 9). FDOT also requires public involvement as part of the master plan process as outlined in FDOT Topic No. 000-525-050, Public Involvement. Like the FAA, the FDOT has grant assurance requirements as part of their Joint Participation Agreement (JPA) with Florida airports. There are currently 24 FDOT Aviation Program Assurances in which an Airport Sponsor must comply as part of their FDOT grant funding. Although the assurances do not specifically address public involvement, these assurances do require making materials available for public review and open access to governmental proceedings.

Further, since the Airport is owned by a public entity, the City of Sebastian, under Florida Statutes Chapter 286.011 (AKA "Florida Sunshine Law"), airport meetings are subject to public review and input. In order for the City and Airport to remain in compliance with all public input requirements, a number of meetings and groups were formed to provide input into the ultimate Airport Design Plan (ADP).

A kick-off meeting was held with the Airport Manager, City Manager and critical staff to discuss the master plan process and identify members for the Technical Advisory Committee (TAC). The TAC has met a minimum of four times at key points throughout the planning process to obtain input and insight regarding existing and future demand and needs.

The preliminary alternatives analysis was presented to City Council on June 14 with a public meeting held from 1 pm to 5 pm on June 15. This public meeting was also taped and presented on the City's website.

TKDA has also presented information and requested input from the Sebastian City Council and presented the final draft report in Mid November 2017 prior to review by the regulatory agencies. In addition to these meetings, because of public interest, the Airport Manager held a meeting on June 28 with airport neighbors, Friends of the Sebastian River, the Roseland Community Association, and the Collier Club to discuss the findings of the master plan so far as well as to obtain input on preliminary airport development options. Management with TKDA support also held a Pilot Briefing and lunch at the airport on August 12, 2016. This 2 hour briefing in which TKDA participated provided an overview of the master plan, the forecast and facility needs findings as well as alternative development options. These attendees along with member of the community and concerned organizations provided input which was incorporated into the recommended airport design plan. All these individuals were invited to attend the final presentation to the City Council held on November 22 and to provide any additional input regarding ultimate development.

The TAC, regulatory agencies, and city staff received electronic copies of all chapters as part of the review process, and will receive final hard copy publication and a disk with the electronic files upon final approval by the agencies. Summary sheets and data were presented to the public and were available through the Airport Manager's office to facilitate transparency with the community. Since Sebastian Municipal Airport is owned and operated by the City of Sebastian, the findings of this report are available to the public and will be incorporated into the City's overall comprehensive plan.

Existing and Emerging Trends

Several existing and emerging trends were identified in Chapter 4 of this report including airport sustainability, NextGen technology, technological improvements and demand related to light sport aircraft and unmanned aerial vehicle technology, new federal rules and guidance as well as emergency and community support. In identifying airport development options, the impacts of these trends on airport operations and facilities were used to derive airfield, general aviation and landside development options and opportunities. Sebastian Municipal Airport (X26) and its Sponsor (the City of Sebastian) have and continue to aggressively pursue both aviation and non-aviation prospects.

The City has already completed design work for the construction of new Taxiways C, D and E to improve overall airport capacity and aircraft movement while improving access to new corporate hangar development and businesses within the southeast portion of the airport property. Taxiway development will also improve access to the northwest quadrant of the airport which will facilitate future aviation growth.

Because of these actions along with the FAA and FDOT support of continued aviation development at X26, development of various airfield, landside, general aviation, support facilities and other miscellaneous considered the impacts and opportunities associated with airport sustainability, NextGen, unmanned aerial systems, light sport aircraft, aircraft sport license, as well as current and future service and role of the airport during the next twenty-plus years.

Prior Recommended Development

The previous Airport vision as illustrated on the 2010 Airport Layout Plan recommended the following improvements:

- Two parallel taxiways to Runway 5-23,
- A partial parallel taxiway south of Runway 28
- Lowering approach visibility on Runway 5-23 to greater than ¾ mile and 34:1 approach slope
- Upgrading Runway 5-23 to a Runway Design Group of B-II from A-II
- Upgrading Runway 10-28 from a B-I Small to a B-II and adding non-precision approaches with 1 mile or greater visibility (20:1 approach slope)
- Adding Runway End Identification Lights (REILs) to all runway thresholds
- Adding Medium Intensity Runway Lights (MIRLs) to both Runway 5-23 and 10-28
- Adding Medium Intensity Taxiway Lights (MITLs) to all taxiways
- Relocating the Parachute Drop Zone
- Land Acquisition as well as
- Airfield pavement removal projects and extensive hangar and apron development.

However, the City and Airport's current vision does not support such extensive commercial aviation development. As noted in previous chapters, the Airport is

surrounded by recreational facilities, residential homes and environmentally sensitive lands. Thus, as part of its "good neighbor" policy, management wants a plan that allows for ultimate airport self-sufficiency while also supporting the needs of the local community. Therefore, options outlined in the previous Airport Layout Plan in addition to new development alternatives were considered based upon forecast demand, user needs and the ultimate airport vision provided by the Sponsor and community at large.

Primary Alternative Elements

FAA AC 150/5070-6B, Airport Master Planning, primary elements include those facilities that require large swaths of contiguous land (i.e. runways, taxiways, apron, and GA development). Secondary elements while still important are more flexible and their location is often defined in relation to the primary elements (i.e. support facilities and landside facilities).

Once the primary and secondary elements were identified, various options for each element were considered and evaluated based upon:

- Technical feasibility;
- Economic and fiscal soundness;
- Aeronautical utility;
- Viability of phased development;
- Environmental factors;
- Access to the various functional areas of the Airport;
- Future expansion potential beyond the 20-year planning horizon, and
- Qualitative/Quantitative Short List.

The preferred development option will include recommended primary and secondary elements. Further evaluation in relation to environmental, airport sustainability, and fiscal viability are analyzed in Chapters 6, 7 and 9, respectively, of this report.

Airfield Alternatives

The Airfield represents the largest portion of contiguous land use on any airport. Airfield modifications and upgrades drive all other aviation related, on-airport land use. As part of the airfield alternatives evaluation, several runway, taxiway, NAVAID and general aviation improvements were considered. Further, since Taxiways C, D and E are

already have already been designed and construction will start in FY 2018, primary alternative options considered these taxiways as already constructed for this analysis.

Runway Options

Runway 5-23, the primary runway, is equipped with runway threshold lights and low intensity runway edge lighting (LIRLs). All other portions of the airfield however are not equipped with in-ground lights but rather reflectors. Runways 5, 23, 10 and 28 are each equipped with 2-light precision approach path indicator lights (PAPIs) to support aircraft approach procedures. Again, only Runway 5-23 at the time of this writing is equipped with LPV/LNAV GPS approaches allowing for non-precision instrument approaches down to 1-statute mile (SM) visibility. In addition, controlled airport property on Runway 10-28 is from Roseland Road to the Indian River County Conservation Area boundary.

During several Technical Advisory Meetings as well as community and user meetings, a number of runway alternative options were identified and discussed as to their long term viability. These alternative options as illustrated in **Figures 5-1** and **5-2** include:

- **Option A1:** Extend Runway 23 300 feet to the north and east, remain non-precision instrument runway with 1 mile visibility.
- **Options A2:** Extend Runway 23 400 feet to the north and east, remain non-precision instrument runway with 1 mile visibility.
- **Option B:** Displace Runway 5 landing threshold by 200 feet to allow additional clearance over 3 story house within direct line to the approach, extend Runway 23 by 200 feet, and maintain non-precision instrument approach with no less than 1 mile visibility
- **Option C:** No extension to Runway 5-23 but add a blast pad to Runway 23 and lower the approach on Runway 23 to not less than ¾ mile with 34:1 approach slope and includes 40:1 departure surface
- **Option D:** No change to Runway 5-23

FIGURE 5-1
RUNWAY EXTENSION OPTIONS

Source: TKDA 2017


THRESHOLD
RSA
RSA
RSA
RSA
RPZ
RPZ
RPZ

In addition to the options discussed regarding Runway 5-23, several options were developed for Runway 10-28. These included:

- Option E: Upgrading Runway 10-28 from a B-I Small to B-II runway, adding non-precision GPS approaches, runway edge lighting and decreasing visibility to 1 mile or greater with 20:1 approach slope.
- Option F: Design Runway 10-28 to support B-II Small aircraft and visual operations only with visibility greater than 1 mile and 20:1 approach slope.
- Option G: Upgrade Runway 10-28 to support B-II aircraft and maintain visual only approach with 20:1 visibility

FIGURE 5-2
RUNWAY 5 200 FT. DISPLACED THRESHOLD

Source: TKDA 2017



Before moving into the runway alternatives evaluation, some development considerations must be addressed including critical aircraft and runway design criteria,

runway length needs, runway protection zone impacts, declared distances, and lower approach minima.

Critical Design Aircraft and Runway Design Criteria

The most demanding aircraft that regularly operates at Sebastian Airport is the Beechcraft King Air 200D (ADG B-II), and the Beechcraft King Air 350i (B-II) is expected to represent the future critical aircraft. As outlined in Chapter 4, Runway 5-23 is the primary runway at X26 at a length of 4,023 feet. It can support aircraft with operating weights greater than 12,500 lbs., it is equipped with non-precision GPS approaches to either threshold, is marked as a non-precision runway and is equipped with low intensity runway lights. As a result, the most demanding aircraft will utilize Runway 5-23.

Runway 10-28 has a published length of 3,199 feet and its pavement strength is unpublished. Therefore, it is assumed that the pavement strength is 12,500 lbs. or less. The runway is not equipped with any runway edge or threshold lights, and it does not support non-precision instrument approaches or approach visibility of 1 mile. The primary users of Runway 10-28 are the flight students from nearby Vero Beach and FIT as well as other small aircraft tenants. The current runway length limits its use to small light aircraft, which typically have a ramp weight of 12,500 lbs. or less. Since some B-II small aircraft do fairly regularly use Runway 10-28, it was recommended in the facility section to upgrade the runway from a B-I small to a B-II small to support small aircraft with approach speeds of 50 knots or greater but with MTOW of less than 12,500 lbs.

In addition, according to Table 3-4 of AC 150/5300-13A, the following minimum requirements are necessary to support an instrument approach:

TABLE 5-2 INSTRUMENT APPROACH REQUIREMENTS		
Visibility Minimums	¾ to <1 Statute Mile	≥1 statute mile straight in
HATh	≥250 ft.	≥250 ft.
TERPS GQS	Clear	Clear
TERPS Approach Slope	20:1	20:1
Minimum Runway Length	3,200 ft.	3,200 ft.
Runway Markings	Non-precision	Non-precision
Holding Position Signs and Markings	Non-precision	Non-precision
Runway Edge Lights	HIRL/MIRL	MIRL/LIRL
Parallel Taxiway	Required	Recommended
Approach Lights	Recommended	Recommended
Applicable Runway Design Standards	>3/4-statute mile approach visibility minimums	>3/4-statute mile approach visibility minimums
Survey Required	Vertical Guidance or Non-Visual Guidance depending upon type of approach	Non Visual Guidance
Source: Table 3-4, FAA AC 150/5300-13A		

Runway Length Needs

As discussed in **Chapter 4**, the recommended runway lengths for both Runway 5-23 and 10-28 were evaluated based upon the most demanding aircraft or family of aircraft likely to regularly use the runway. The runway length evaluation used the methodology outlined in both FAA AC 150/5325-4B and draft AC 150/5325-4C. It was determined that the draft runway length methodology, which involves using the manufacturer balanced field length for the most demanding aircraft and then applying the airport elevation, mean max temperature and runway grade change, provided a more accurate runway length requirement.

Using this methodology for the King Air 350i, the future critical aircraft for Runway 5-23, a dry runway length of 3,851 feet was determined. Since the King Air 350i has turboprop engines rather than turbojet engines, an adjustment for wet pavement was not needed. Still looking at the manufacturer's aircraft specifications data, this aircraft can safely operate on Runway 5-23 4,023 foot runway under the majority of regularly occurring weather conditions.

The same methodology was applied to determine the recommended length for Runway 10-28. It appears from observations, discussions with users, and historical data that the primary users are flight students and sometimes by Sebastian Skydiving. Therefore, the most demanding aircraft likely to use Runway 10-28 were the Twin Otter DHC-6-300 and the Cessna 208. Applying the airport's elevation, mean maximum temperature and changes in runway grade to the balanced field lengths for each aircraft resulted in a recommended length of 3,151 feet for the DHC-6-300 and 2,404 for the Cessna 208.

Following this analysis, the consulting team met with airport users and tenants regarding these lengths and if an extension was warranted. It was found that an extension was not needed, and that Sebastian Skydive primarily uses Runway 5-23 rather than 10-28 for most of their operations. Therefore, the current lengths of both Runway 5-23 and 10-28 are adequate to meet existing and forecast demand.

Lower Approach Minima

Another request by the TAC and held over from the 2010 approach airport layout plan was the viability of lowering the approach visibility on Runway 5 and 23 to greater than ¾ mile. Lower approach visibility may support expanded airport use, but it does have impacts on several runway safety zones. As a result the opportunities must be weighed against the anticipated impacts.

Table 5-3 outlines the changes in design criteria associated with lower approach minima.

TABLE 5-3
RUNWAY VISIBILITY MINIMA

	Runway 5-23		Runway 10-28			
	Existing	With >¾ mile approach	Existing	B-II Small 1-Mile Visibility	B-II Small Visual Only	B-II 1 Mile Visibility
Approach Reference Code	B-II-5000	B-II-4000	B-I(S)Vis	B-II(S)-5000	B-II(S)Vis	B-II-5000
Approach Runway Protection Zone						
Length	1000	1700	1000	1000	1000	1000
Inner Width	500	1000	250	250	250	500
Outer Width	700	1510	450	450	450	700

TABLE 5-3 RUNWAY VISIBILITY MINIMA						
	Runway 5-23		Runway 10-28			
	Existing	With >¾ mile approach	Existing	B-II Small 1-Mile Visibility	B-II Small Visual Only	B-II 1 Mile Visibility
Acreage	13.770	48.978	8.035	8.035	8.035	13.770
Runway Approach Slope (Table 3-2)	20:1	20:1				
Departure Runway Protection Zone						
Length	1000	1000	1000	1000	1000	1000
Inner Width	500	500	250	250	250	500
Outer Width	700	700	450	450	450	700
Acres	13.770	13.770	8.035	8.035	8.035	13.770
FAR Part 77, Obstructions to Air Navigation						
Runway Type	Other than Utility (NPI-B)	Other than Utility (NPI-C)	Utility (Vis-A)	Utility (NPI-A)	Utility (Vis-A)	Other Than Utility (NPI-B)
Primary Surface/Approach Surface Inner Width	500 ft.	500 ft.	250 ft.	500 ft.	250 ft.	500 ft.
Horizontal Surface Radius	10,000 ft.	10,000 ft.	5,000 ft.	5,000 ft.	5,000 ft.	10,000 ft.
Approach Surface Outer Width	3,500 ft.	3,500 ft.	1,250 ft.	2,000 ft.	1,250 ft.	3,500 ft.
Approach Surface Length	10,000 ft.	10,000 ft.	5,000 ft.	5,000 ft.	5,000 ft.	10,000 ft.
Part 77 Approach Slope	34:1	34:1	20:1	20:1	20:1	34:1
Sources: FAA AC 150/5300-13A, FAR Part 77, and TKDA 2017						

Runway Protection Zone Impacts

In 2012, the FAA released additional guidance clarifying acceptable land use within the Runway Protection Zone. The Runway Protection Zone is a two-dimensional surface defined as a trapezoidal-shaped area centered about the extended runway centerline that is used to enhance the safety of aircraft operations. It begins 200 feet beyond the end of the runway or area usable for takeoff or landing. The RPZ dimensions are functions of the design aircraft, type of operation and visibility minimums. The RPZs function is to protect people and property on the ground. The RPZ is also sometimes

referred to as the 'Clear or Crash Safety zone' since, although rare, aircraft more often experience incidents or accidents during takeoff or landing.

AC 150/5300-13A, Section 310(d) and Interim Land Use within the RPZ Memorandum, 9/27/2012 provides allowable or compatible land use within the RPZs. Although recommended, airports may not have full control over property located within the runway RPZ. Therefore, guidance was provided to evaluate land use in case the following modifications to the airfield were considered:

- An airfield project that may require a runway extension, runway shift or other changes to the runway;
- A new or revised instrument approach procedure that increases the RPZ dimensions; or
- A local development proposal in the RPZ.

As a result of any of these changes would likely cause the following items to be located within the RPZ, an RPZ analysis must be performed.

- Buildings and structures (e.g. residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (e.g. golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities. (e.g. Rail facilities -light or heavy, passenger or freight; Public roads/highways; vehicular parking facilities)
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities; or
- Above-ground utility infrastructure (i.e. electrical substations), including any type of solar panel installations.

As a result, if a lower approach or runway extension is determined to be needed to support long term development, a preliminary Runway Protection Zone analysis will be performed to address mitigation options associated with Roseland Road and Airport Drive West.

Runway Declared Distance Criteria

Declared distances pertain to takeoff run available (TORA), takeoff distance available (TODA), accelerate-stop distance available (ASDA), and landing distance available (LDA). TORA is the length of runway declared available and suitable for a ground run of an airplane. It is typically implemented when an obstruction to an approach or departure surface cannot be moved or mitigated. Declared distances typically include different landing and takeoff thresholds. Currently, there are no displaced thresholds at X26.

However, there is a three story home that was built approximately 1,486 feet from the Runway 5 threshold. Clearance at 20:1 over the roofline is approximately 30 feet or less depending upon weather conditions. Although there have been no issues thus far, using declared distances by shifting the landing threshold will allow for increased elevation clearance from the structure.

As noted in Option C, the TAC requested the viability of lower the approach visibility minima to ¾ mile or greater visibility with approach of 34:1. Lowering the approach to ¾ mile on Runway 5 will require the landing threshold to shift approximately 1,046 feet to the east to provide adequate clearance over the home. Lowering the approach minima on Runway 23 is just as problematic: 1. an extension of this runway east will be impacted by City and County owned conservation property, and lowering the threshold would increase the number of obstructions currently located within the approach; 2. No extension can be added to Runway 5, so any additional length will need to be made to Runway 23. This option would keep the Runway 23 landing threshold at its current location thus limiting landing length to 4,023 feet of less; 3. Lastly, lowering the approach surface to less than 1 mile will trigger greater runway protection and safety area requirements as well as a 40:1 departure surface requirement.

Discussions with the TAC and Agencies recommended avoiding, if possible, the use of declared distances when recommending long-term preferred airfield development. One of several reasons is that declared distance calculations are confusing to most recreational pilots as well as pilots in training; therefore, they are discouraged unless absolutely necessary at general aviation airports. **Table 5-4** outlines declared distance dimensions associated with Runway options A-G.

TABLE 5-4 DECLARED DISTANCE ESTIMATED DISTANCES												
	Runway 5						Runway 23					
	Existing	Option A1	Option A2	Option B	Option C[3]	Option D	Existing	Option A1	Option A2	Option B	Option C[4]	Option D
Takeoff Runway Available	4,023	4,323	4,423	4,223	3,523	4,023	4,023	4,323	4,423	4,223	4,023	4,023
Takeoff Distance Available	4,023	4,323	4,423	4,223	4,023	4,023	4,023	4,323	4,423	4,223	4,023	4,023
Accelerate Stop Distance Available	4,023	4,323	4,423	4,223	3,523	4,023	4,023	4,323	4,423	4,223	4,023	4,023
Landing Distance Available	4,023	4,323	4,423	4,023	4,023	4,023	4,023	4,323	4,423	4,223	3,523	4,023
	Runway 10				Runway 28							
	Existing	Option E	Option F	Option G	Existing	Option E	Option F	Option G				
Takeoff Runway Available	3,199	3,199	3,199	3,199	3,199	3,199	3,199	3,199				
Takeoff Distance Available	3,199	3,199	3,199	3,199	3,199	3,199	3,199	3,199				

TABLE 5-4
DECLARED DISTANCE ESTIMATED DISTANCES

	Runway 5						Runway 23					
	Existing	Option A1	Option A2	Option B	Option C[3]	Option D	Existing	Option A1	Option A2	Option B	Option C[4]	Option D
Accelerate Stop Distance Available	3,199	3,199	3,199	3,199	3,199	3,199	3,199	3,199				
Landing Distance Available	3,199	3,199	3,199	3,199	3,199	3,199	3,199	3,199				

Sources: FAA AC 150/5300-13A and TKDA 2017

Runway Development Options

The runway options evaluation considered forecast need, technical feasibility, economic need as well as benefits vs costs, environmental impacts, compatible land use as well as future expansion potential beyond the twenty year planning horizon. These alternatives along with input regarding the remaining primary and secondary elements were identified and discussed during at least two TAC meetings, during the community meeting hosted by the Airport Manager, as well as the Airport tenant and user lunch held in August 2017.

Runway Options A through E focus on changes to Runway 5-23 and Options F through H focus on proposed development of Runway 10-28. The preferred runway development option will include one scenario for each runway either based upon one of the options discussed or a combination.

Option A1: Extend Runway 23 northeast for 300 feet and maintain non-precision approach with 1 statute mile (SM) visibility (**Figure 5-1**).

- Constructively Feasible
  - An extension of 300 feet to Runway 23 could be completed, but will require significant clearance of trees and other obstructions to support the 20:1 approach (FAR Part 77 Obstruction Clearance of 34:1 and Aircraft Approach Slope of 20:1). It will shift the safety areas further to the east requiring additional land acquisition, and the will likely require a relocation of part of the golf course to support development.
  - As part of this extension, edge lighting will need to be added, new markings, the PAPI-2 will need to be relocated, and a new taxiway connector will need to be constructed to provide access to the new threshold.
- Critical Aircraft and Forecast Operational Need
  - The existing and critical aircraft established for Runway 5-23 was the Beech King Air 200 (B-II) and the Beech King Air 350i. Both the existing and future critical aircraft require a balanced field length of less than 4,000 feet. Similar turboprop aircraft within this category can and have

safely operated on runways of 4,000 feet or less. Unless the airport is interested in attracting jet traffic, which was not the intent of the sponsor or local community, then there is no forecast need or justification for an extension of Runway 5-23 at this time.

- Economic Need vs Costs
  - At a minimum, the cost for the runway extension alone is estimated at approximately $200,000. Additional costs for the taxiway connector, land acquisition, obstruction removal, NAVAID relocation, environmental mitigation, etc. are anticipated to add another $400,000 to $500,000 to the cost.
  - If the FAA and FDOT deem that an extension is justified, this will still require the City of Sebastian to pay at least $80,000 for development.
  - Since the Sponsor and the Community have repeatedly stated that they are not interested in attracting large jet aircraft to Sebastian, the cost of the extension is not justified.
- Environmental Impacts
  - Although the extension will remain on airport property, it will shift the runway safety area and runway protection zone further east. There are currently trees associated with the golf course that are already obstructions to air navigation. This would increase the number of obstructions to the Runway 23 as well as potentially impact environmentally sensitive property owned by the City and County.
  - Although scrub jay habitat was not identified in this area, an extension will require relocation of gopher tortoises and make some changes to natural habitats due to safety area clearance requirements.
- Land Use Compatibility and Acquisition
  - An extension to Runway 23 of 300 feet is technically feasible. However, it will shift the runway protection zone (RPZ) off airport property as well as shift a portion of the runway safety area (RSA) to outside the current airport property line. A combination of fee simple and easement property acquisition will be required.
- Other

- Maintaining the existing approach visibility minimums will not increase the various FAA and Part 77 safety services, and should avoid potential Roseland Road impacts to Runway 5 approach and departure RPZs.
- This option will provide a slightly longer runway for takeoff. However, it will require significant land acquisition and costs for very little benefit.

Based upon this analysis, Option A1 was removed from further review.

Option A2: Extend Runway 23 northeast for 400 feet and maintain non-precision approach with 1 statute mile visibility (**Figure 5-1**)

The impacts associated with Option A2 are similar as those identified in A1 but to a greater extent. The extension will have an even greater impact on the surrounding properties, require additional land acquisition, impact environmentally sensitive property adjacent to the airport as well as will impact the municipal golf course which provides significant revenue for the City. The cost of the extension is not justified at this time by the need based upon current forecasts of demand. Therefore, Option A2 was removed from further review.

Option B: Displace Runway 5 landing threshold by 200 feet to allow additional clearance over three-story home located within the runway approach path. Extend Runway 23 by 200 feet, and maintain non-precision instrument approach with no less than 1 mile visibility (**Figure 5-2**).

- Constructively Feasible
  - To support a displaced threshold, a new landing threshold will need to be marked and the PAPI-2 must be relocated.
  - Construction of a 200 ft. extension will remain on existing airport property, but will require relocation of the PAPI-2, relocation of taxiway connectors as well as relocation of the airport perimeter road east of the runway.
  - Additional lighting and conduit will need to be added to support the pavement extension and the runway will need to be remarked.
  - The runway extension will also shift the runway safety area and the runway protection zone further ease increasing the number of tree

obstructions within the approach. The extension will also impact the golf course requiring relocation of one or more of its greens and holes.

- Critical Aircraft and Forecast Operational Need
  - This option would allow for increased clearance over the home located approximately 1500 feet from the Runway 5 threshold as well as greater clearance over Roseland Road.
  - The critical aircraft requires a balanced field length on dry pavement of 3,851 feet. This considers both takeoff and landing requirements. Reviewing both the Beechcraft 200 and 350i manufacturer landing criteria, both aircraft can safely land within 3,400 feet or less.
  - Regular use of Sebastian Airport by aircraft larger or requiring a significantly longer balanced field length then the King Air 350i is not anticipated.
  - Even limited use by light jets such as the Embraer Phenom 300 still require a balanced field length of approximately 3,661 feet on dry pavement and 4,210 on contaminated or wet pavement.
- Economic Need vs Costs
  - The cost for relocating the threshold on Runway 200 feet is minor. However, there is a fairly significant cost of extending the runway 200 feet to the east to recapture the pavement lost due to the displaced threshold. Costs would include additional conduit and lighting, relocating the PAPI-2 at each end, remarking the runway and relocating the taxiway connectors.
  - It is also unlikely that FAA AIP funding could be used to support such an extension since it is merely to recoup the pavement lost as part of the displaced landing threshold and is not needed to support critical aircraft takeoff operations.
  - The rough order of magnitude estimated cost associated with the 200 foot extension is approximately $150,000 - $200,000 with an additional $100,000 estimated for relocation of the threshold, additional lights and conduit, relocation of PAPIs, etc.
  - The costs for the extension would far outweigh the benefits unless aircraft requiring at least 4,000 feet of runway regularly use the airport.

- However, the cost of relocating the threshold, may have positive community effects with little to no impact to safe aircraft operations.

- Environmental Impacts
  - Similar to Options A1 and A2, an extension will shift the runway safety area and runway protection area further east, which will impact the municipal golf course and potentially some environmentally sensitive areas protected by the City and County.
  - Other environmental impacts will likely include mitigation and relocation of some gopher tortoise habitat as well as tree trimming and removal.
  - There will likely be some limited environmental construction impacts, but those are expected to be minimal
  - Also, based upon the anticipated fleet mix and type of operations, noise impacts and INM contours will remain on airport property.
- Land Use Compatibility and Acquisition
  - Although the impacts would not be as great as those discussed in Options A1 and A2, relocation of the Runway 23 end will require a shift in the runway safety area as well as runway protection zone. Thus, any extension to Runway 23 will impact the golf course and may require the City to acquire additional either through fee simple or easement in order to control the property in the RPZ.
  - As mentioned in Chapter 4 and earlier in this chapter, several tree obstructions associated with the golf course are already impacting the approach to Runway 23. Shifting the runway even further east increases the number of trees encroaching upon the approach surface which need to be trimmed or removed.

This is a viable option although it is unlikely that FAA AIP funding could be used to support the 200 foot extension unless strong evidence is provided. The balanced field required to support the King Air 350i and other similarly sized aircraft is 3,851 feet. Therefore, adding a 200 foot or less displaced threshold on Runway 5 could be established to allow for greater altitude clearance over the home.

However, according to the Sponsor, there have been no issues with the home owner concerning airport operations. Thus, at this time, a displaced threshold is not required.

Still, this option is available to the Airport and Sponsor if the need arises. Therefore, since there is no anticipated need and based upon input from the TAC, community and sponsor, Option B was removed from further review.

Option C: No extension to Runway 5-23 but add blast pad and lower approach visibility on Runway 23 to less than 1 mile and greater than ¾ mile. Lowering the approach visibility was requested to be reviewed by the TAC as part of this master plan analysis. A lower approach visibility minimum on both Runways 5 and 23 was recommended as part of the 2010 Airport Layout Plan Update along with the installation of blast pads beyond each threshold.

Shoulders and blast pads are typically added to runways that support turbojet operations since they are susceptible to erosion associated with jet blasts. Paved shoulders and blast pads are recommended for runway serving airport design group (ADG) III or higher. Turf, aggregate-turf, soil cement, lime or bituminous stabilized soil are recommended adjacent to paved surfaces accommodating ADG-I and II aircraft. Both the blast pad must be designed to accommodate the occasional passage of aircraft in addition to maintenance and emergency equipment. However, blast pads may not be included in any takeoff, landing or available stop distance calculations.

- Constructively Feasible:
  - Lowering the approach visibility to Runway 23 will trigger a variety of additional requirements including: upgrades to runway edge lighting (LIRL to MIRL); installation of runway end identifier lights, and removal of obstructions to the 34:1 approach slope. This most likely include trees on the golf course as well as some in the environmentally protected areas off the airport property.
  - Lowering the approach visibility minimums will also require the airport to upgrade lighting on Runway 5-23 from low intensity to medium intensity edge lighting preferably LED. Runway end identification lighting (REILs) must also be added at a minimum to the Runway 23 threshold as part of the lower approach.
  - Parallel Taxiway C must be equipped with medium intensity taxiway lights along with lighted airfield signage.

- Installation of a lower approach will require a greater number of trees on the golf course to be removed and may require relocation of a portion of the golf course.
- The runway protection zone will also increase from 13.770 acres (500 x 1000 x 700 feet) to 49 acres (1000 x 1700 x 1510 feet)
- 95 x 150 foot blast pads consisting of aggregate-turf or soil cement is recommended to be constructed at each end of the runway. The cost for installation of the blast pads could be decreased if using millings and pavement removed as part of another pavement project (i.e. taxiway construction and apron pavement expansion and rehabilitation)

- Critical Aircraft and Forecast Operational Need
  - Aircraft forecast to regularly use Sebastian Municipal Airport include a combination of piston engine and turboprop aircraft. Jet engine aircraft operations with the exception of some light jets and use by small corporate aircraft operators is expected to be infrequent during the 20 year planning period. Growth in the light sport aircraft market as well as continued growth in new turboprop aircraft that can operate on shorter runways are anticipated to represent the likely fleet mix and operational demand at Sebastian Airport.
  - These fixed wing aircraft along with skydiving transport aircraft, ultralights, rotorcraft as well as other experimental aircraft, based upon discussions with users, will continue to use the airport.
- Economic Need vs Costs
  - Blast pads are typically installed on runways that support turbojet aircraft or that have significant problems with soil erosion or debris. During site visits to the airport and preliminary analysis of airfield soils, it does not appear that Sebastian Airport has this issue. If blast pads were to be constructed, they would not qualify for FAA or FDOT funding.
  - As noted, there will be significant costs to upgrade and adding lighting to both Runway 5-23 and Taxiway C and REILs will need to be installed as well. Since this is the primary runway, upgrades to Runway 5-23 may be eligible for FAA AIP funding beyond the $150,000 general aviation annual entitlement. Prior to obtaining funding, FAA Flight Standards must

determine if a lower approach visibility can be installed safely at the airport.
    - Additional costs include obstruction removal, property acquisition, potential loss of revenue associated with the larger runway protection zone, and environmental mitigation costs.
    - Based upon an analysis of demand and fiscal responsibility, the cost of lowering the approach to support only a few likely operators does not offset the anticipated cost of upgrades.
- Environmental Impacts
    - A lower approach to Runway 23 will increase the approach slope from 20:1 to 34:1 and require a larger runway protection zone (FAR Part 77 Obstruction Clearance of 34:1 and Aircraft Approach Slope of 20:1).
    - Installation of the blast pads may increase stormwater runoff as a result of construction of a less permeable surface.
    - Additional impacts may require mitigation related to acquisition and easement of property located in the new runway protection zone, tree removal and trimming, increased noise due to the lower approach angle over the golf course, as well as potential lighting and glare impacts which may affect nearby residents and endangered wildlife.
- Land Use Compatibility and Acquisition
    - Installation of a lower approach on Runway 23 will increase the current runway protection zone acreage from 13.770 to 48.978 likely requiring the Airport/Sponsor to acquire 12.8 acres of additional property.
    - This option will also still require the Airport to acquire approximately 1 acre of land prior to Runway 5 in order to control that runway protection zone.
    - The lower approach will require the relocation of the airport perimeter road as well as removal of several trees and vegetation in the approach zone.
    - The larger RPZ will also impact the golf course most likely requiring relocation of several holes and off airport property to the east designated as conservation.
- Other

- Decreasing the approach and adding upgrades to airport lighting may unintentionally increase night operations.
- The airport has a number of voluntary noise abatement procedures in place to limit impacts to residential properties located near the airport. An increase in nighttime traffic as well as possible glare from airfield lighting could negatively impact nearby homes. Possibly eroding the good will the airport and City have built with the local community.
- The lower approach will most likely require a relocation of one or two golf holes associated with the Municipal Golf Course since trees and other obstructions will need to be removed to provide clearance.

This option was discussed with the TAC and Airport/City Management, and ultimately was removed from further review.

Option D: No change to Runway 5-23

- Constructively Feasible – No impacts since no change to the Runway infrastructure is planned as part of this alternative option.
- Critical Aircraft and Forecast Operational Need
  - As noted earlier, the existing critical aircraft is the King Air 200 and the future critical aircraft in the King Air 350i. Both of these aircraft are turboprop aircraft and can operate on runways with a full passenger and fuel load of less than 4,000 feet.
  - Based upon anticipated demand, no extension of Runway 5-23 is warranted at this time.
- Economic Need vs Costs
  - Costs associated with this option are related to pavement and facilities maintenance as well as recommended acquisition of property within the existing Runway 5 RPZ. No additional costs are anticipated in conjunction with this option.
- Environmental Impacts
  - No environmental impacts are associated with this option.
- Land Use Compatibility and Acquisition

- The only parcel recommended for acquisition is part of the Runway 5 RPZ that crosses Roseland Road. Since this is unlikely to be obtained through fee simple acquisition, an easement is recommended in order to maintain control of the RPZ.
- All other safety areas remain on the airport property. However, as noted in Chapter 4, some trees on the golf course were identified as obstructions to air navigation. These objects will need to be removed or trimmed in order for the airport to maintain its non-precision approach to Runway 23.

- Other
  - With the development of NextGen and other technology, it is anticipated that lower approach minimums without larger runway protection zone requirements will be implemented in the future. This is due to the accuracy of satellite navigation and technological upgrades to aircraft.
  - Since no upgrades are being implemented on Runway 5-23, a runway protection zone analysis to address the impacts and mitigation options associated with Roseland Road is not required at this time.

Through discussions with the Sponsor and TAC along with concerns voiced by the public, this option was the preferred development option for Runway 5-23.

Option E: Upgrade Runway 10-28 from B-I small to B-II runway, add non-precision GPS approaches to one or both ends, and decrease visibility to 1 mile or greater.

- Constructively Feasible
  - Low intensity or medium intensity runway edge lights will need to be installed along with conduit.
  - Depending upon analysis of pavement condition and subbase, the runway may need to be reconstructed to provide adequate strength to support aircraft with operating weights greater than 12,500 lbs.
  - Runway 10-28 will need to be remarked to illustrate that it is a non-precision instrument runway
  - Runway end identification lighting on both Runway 10 and 28 are also highly recommended.

- It is also recommended that Taxiway B, parallel taxiway, be equipped with medium intensity taxiway lighting.

- Critical Aircraft and Forecast Operational Need
  - The existing and future critical aircraft for Runway 10-28 are the Cessna 208 and DH-6-300, primarily used by Sebastian Skydiving. Operational demand on this runway is fairly high since it provides secondary wind coverage for lighter and smaller planes, especially light sport aircraft and those associated with flight training.
  - Adding a non-precision approach may increase the flexibility of airfield use. However, without adding any length to the runway, it will automatically limit operations to smaller and lighter aircraft.
  - Forecast demand overall at Sebastian is anticipated to remain heavily skewed toward piston and turboprop aircraft. Based upon observations and the capacity analysis, the airport is not capacity constrained.
  - Strictly based upon anticipated fleet mix and operational demand, installation of a non-precision approach is not warranted.
- Economic Need vs Costs
  - Installation of a non-precision instrument approach on Runway 10-28 and upgrading the runway to support larger and heavier aircraft will require significant infrastructure improvements.
  - Runway 10-28 is not equipped with any edge or approach lighting. It has an unpublished pavement strength, which will need to be reviewed to determine the condition of the pavement and subbase. It also will need to be remarked as a non-precision runway.
  - Parallel Taxiway B is also not equipped with taxiway lighting which is recommended for taxiways supporting non-precision instrument runways.
  - Anticipated costs associated with these upgrades alone will likely exceed $1,000,000, and they may not be eligible for FAA AIP funding
  - Additional costs include property acquisition associated with the runway protection zones of Runway 10 and 28. According to current property records, approximately 1.3 acres and 7.9 acres, respectfully, must be acquired to support Runway 5 and 23 RPZs.

- Environmental Impacts
  - Although no pavement expansion is planned as part of this alternative, there will likely be some level of environmental impacts associated with construction and installation of new conduit and lighting on both Runway 10-28 and Taxiway B.
  - Other construction impacts anticipated include rehabilitation of Runway 10-28 to support heavier aircraft, limited noise impacts as well as potential mitigation/relocation of wildlife such as gopher tortoises.
- Land Use Compatibility and Acquisition
  - With the exception of the property acquisition associated with the Runway 10 and 28 RPZs, no other property acquisition is required to support this development.
  - Also all proposed improvements to the airfield are compatible with existing land use.

This is the option recommended in the last master plan update. Based upon the costs, impacts and lack of demand, it was recommended that Alternative F be removed from further review.

Option F: Update Runway 10-28 to support B-II small aircraft and visual operations only.

- Constructively Feasible
  - Runway 10-28 is currently marked as a visual runway, and has an unpublished pavement strength. It is also not equipped with any edge or approach lighting. It is however equipped on either end with two box PAPIs.
  - Proposed changes to support his option are minimal. It is recommended that the runway protection zones be decreased from 500 ft. x 1000 ft. x 700 ft. and 13.770 acres to 250 ft. x 1000 ft. x 450 ft. and 8.035 acres. No other changes are needed.
- Critical Aircraft and Forecast Operational Need
  - The current critical aircraft includes a combination of airport design group B-I and A-II aircraft. Therefore, the critical runway design group for Runway 10-28 is B-II. However, both of these aircraft maximum takeoff

weights are less than 12,500 lbs. Therefore, they are considered light aircraft.
    - Although Runway 10-28 is used fairly regularly, it is primarily used by small and light aircraft who are impacted by lower crosswind components and can operate on a runway length of 3,199 feet.
    - Since the airport does not have any airfield capacity issues, aircraft during lower visibility and/or poor weather conditions will use Runway 5-23.
    - Forecast demand anticipates shows that Sebastian Airport will continue to support small and medium sized piston and turboprop aircraft with the occasional light jet. The airport's proximity to nearby Vero Beach Regional Airport allows Sebastian to cater to light sport, experimental, small business and recreational users.
- Economic Need vs Costs
    - Costs associated with this option are minimal, primarily updating the runway protection zone on the airport layout plan and publishing the new information in the Airport Master Record and the FDOT Airport Facility Directory.
- Environmental Impacts
    - As part of this development, no environmental impacts are anticipated.
- Land Use Compatibility and Acquisition
    - Property acquisition of 0.7 acres and 5 acres maximum would need to be acquired by the Airport either through fee simple or easement acquisition to control the runway protection zones for Runway 5 and 23, respectively.
    - The decrease in the RPZ on both Runway 10 and 28 will also open up additional airport property for future development and revenue generation.
    - The decrease in the size of the RPZ on Runway 5 also decreases the impact of Roseland Road and Airport West Drive which are both currently located within the RPZ of Runway 10.
- Other
    - Although having a road in a RPZ is considered an incompatible land use. An RPZ analysis is not triggered unless:

- An airfield project that may require a runway extension, runway shift or other changes to the runway;
- A new or revised instrument approach procedure that increases the RPZ dimensions; or
- A local development proposal in the RPZ.

In this case, none of these factors are triggered. Therefore, it is requested that the Roseland Road and Airport West Drive be grandfathered in and that no RPZ analysis is warranted at this time.

Based upon this analysis and input from the Sponsor and public, it is recommended that Option F be retained for further evaluation and review.

Option G: Upgrade Runway 10-28 to support B-II aircraft but maintain visual approach only.

- Constructively Feasible:
  - This option does not require any extension to Runway 10-28, but will require the runway to be strengthened to support larger aircraft.
  - Further, existing runway protection zones, safety areas as well as FAA Part 77 Surfaces will increase in size to support larger aircraft operations.
- Critical Aircraft and Forecast Operational Need
  - The current critical aircraft identified for Runway 10-28 were the Cessna 208 and the DHC-6-300. Both aircraft weigh less than 12,500 lbs. and can operate on a runway length of 3,199 feet.
  - However, the airport critical aircraft is the King Air 350i. According to manufacturer data adjusted physical factors specific to X26, the King Air 350i requires a runway length of 4,023 feet. Further, based upon review of aircraft with maximum takeoff weights of greater than 12,500 lbs., all larger and heavier aircraft will require a runway length that exceeds Runway 10-28's current length.
- Economic Need vs Costs:
  - The airport currently caters to smaller lighter aircraft and is home to several light sport manufacturers, the cost to strengthen the runway to

support heavier aircraft is negated by the fact that larger and heavier aircraft will not be able to use the runway due to limited length.
    - Further, since the runway is not equipped with any type of runway lighting and is not equipped with any type of instrument approaches, the likelihood of larger aircraft users regularly using Runway 10-28 is further decreased.
    - Further, the costs associated with the upgrading the runway pavement strength will not likely compete effectively for state or local funding since Runway 10-28 is a crosswind runway which is needed to support small, light aircraft that are impacted by crosswind conditions of 10.5 knots or less. Larger aircraft are not as susceptible to crosswinds, and, therefore, FAA and state funding may not be available.
    - Therefore, the costs associated with upgrading Runway 10-28 to support B-II aircraft outweigh any anticipated benefits.
- Environmental Impacts
    - A preliminary assessment of potential environmental impacts include the likelihood of increased noise, poorer air quality, and community impacts as well as some potential impacts to protected species and contiguous environmentally sensitive lands.
    - Noise and air quality impacts are expected since larger aircraft having to use a short runway for takeoff or landing will "spool" up the engines near the runway threshold to almost full power so that they are able to take off on a shorter runway. Spooling engines to full power while not moving increases fuel emission and decreases air quality as well as causes increase noise impacts.
- Land Use Compatibility and Acquisition
    - Any development or project that triggers a change to the current airport operations will require an RPZ analysis. Currently, Airport West Drive is located within the Runway 10 RPZ which is an incompatible land use. Therefore mitigation may include closure, road relocation, Runway 10 threshold relocation or some type of modification to standards.

Therefore, based upon the information identified above, Option G was removed from further valuation.

After evaluating the needs, opportunities and potential impacts associated with the various runway alternative options, the TAC and Sponsor agreed that the preferred options based upon their long-term vision of the airport were Option D, no physical changes to Runway 5-23, and Option F, Upgrading Runway 10-28 to support B-II small aircraft and maintain visual approaches only to Runways 10 and 28.

Taxiway Options

Taxiway options are related to proposed airfield and general aviation development. The design of Taxiways C, D and E have already been completed and submitted to FAA for review and approval. Construction is expected to begin early in fiscal year 2018 (fall 2017). Additional taxiway and taxilane improvements include remarking Taxiway A to provide a consistent 35 foot width to support Taxiway Design Group (TDG) 2 aircraft (e.g. King Air 350i). Since Taxiway A runs along the apron edge, any excess pavement will be remarked as part of the general aviation apron improvements.

As part of the northeast airfield development, it is recommended that former Runway 15/33 be converted to a taxiway with a width of 35 feet in order to support future development. The runway pavement is recommended to be used as subbase as part of the Taxiway construction as well as contiguous apron construction.

The 2010 Master Plan Update also recommended construction of another full parallel runway on the south and east side of Runway 5-23, designated as future Taxiway D. However, based upon runway and taxiway separation requirements, the new taxiway would impact the primary stormwater drainage ditch for the airport. This would ultimately require the drainage ditch to be relocated along with the fenceline.

Evaluating forecast demand and airfield capacity needs, construction of this second parallel taxiway is not needed to support short or long-term demand. Further, the cost of installation and environmental impacts does not warrant construction. The Sponsor and users have stated that it would be more conducive to have an internal perimeter road that would allow access from the terminal and corporate hangars to and from the west quadrant of the Airport property. This would negate the need for airport business

tenants and their employees to cross two active runways to access the apron and aircraft parking facilities on the west side of the airfield. This will be discussed in more detail as part of the general aviation and support facility requirements later in this chapter.

The pavement leading to and in between hangars are important to ensuring the safe passage of aircraft to the taxiway system, and subsequently the national airspace system. The taxilanes include the taxilanes leading to the hangars and the taxilanes between those hangars. The pavement conditions vary amongst the taxilanes from fair to satisfactory condition.

Taxilanes must allow the safe passage of aircraft between hangars and to other facilities. Taxilanes which provide access to and from the t-hangars on the west side of the airport appear to be only 15 feet wide. Thus, it is recommended that all taxilanes be designed to support at least TDG Category 1A and 1B aircraft requiring a width of 25 feet. Although the T-hangar is currently full, the size of the taxilanes limit its use by slightly larger aircraft. Therefore, proposed development will be designed to satisfy the taxilane object free area separation of 79 for ADG I aircraft, and 115 feet for ADG II aircraft.

Remaining taxilane improvements will be incorporated as part of proposed general aviation development. Depending upon the location of the facilities and the fleet mix in which they support, taxilane widths will vary from 25 to 35 feet. This is part of the FAA and FDOT's efforts to right size facilities for specific forecast needs and demand. In addition, new taxilanes will be added as part of planned new development to allow adequate and safe movement of aircraft in and around existing and planned infrastructure.

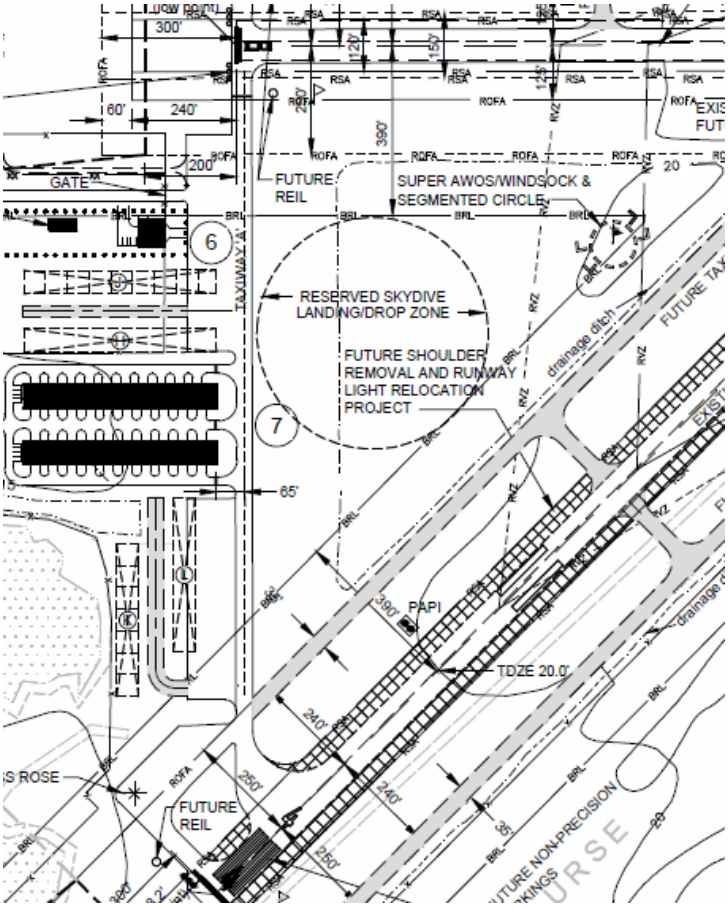
Parachute Landing Zone

The parachute landing zone is located in the north infield of the airport across north of Taxiway B. The location is directly across from Skydive Sebastian's leasehold. Operations and activity associated with Skydive Sebastian has grown significantly since the previous 2002 master plan and even from the 2010 ALP update. Growth is expected to remain strong throughout the planning period.

Because of the continued growth, in 2015, the City of Sebastian installed a Swoop Pond on the northeast section of the drop zone near the old runway. The new pond is over 100 x 300 feet and approximately 4 feet in depth and it fed by a well. The space around the pond is designed to allow for running courses in either direction and also includes zone accuracy pits on either end. The inclusion of the swoop pond allows the airport to support a variety of parachuting organizations and is now part of the Florida Canopy Piloting Association Swoopleague. Currently only Sebastian Airport and Skydive City at Zephyrhills Municipal Airport are equipped with swoop ponds.

The 2010 Airport Layout Plan recommended relocating the drop zone to the south infield area between Runway 10-28 and 5-23, as shown in **Figure 5-3**, to allow for aviation commercial development in the north infield. However, this option would require skydivers to cross both an active taxiway and runway. Further, DOT/FAA/AR-11/30, *Development of Criteria for Parachute Landing Areas on Airports*, May 2012, the edge of the parachute landing area/drop zone should be located at least 40 feet from any known obstacle. Although, the drop zone is located approximately 100 feet from the edge of the t-hangars, it is adjacent to an active taxiway (Taxiway A). Since Skydive Sebastian supports student training, tandem and professional parachute operations, the center of the drop zone should be located approximately 300 feet from the nearest obstruction.

FIGURE 5-3
2007 AIRPORT LAYOUT PLAN UPDATE RECOMMENDED DEVELOPMENT
Source: 2010 Sebastian Airport ALP, The LPA Group Inc.



Since the existing location already meets those safety requirements and the Sponsor has already invested in infrastructure to support continued parachute/skydive operations, it is recommended that the drop zone remain at its current location.

FIGURE 5-4
AIRPORT DROP ZONE
Source: Google Earth Aerial Image, 2017



However, as noted in **Chapter 4**, on-airport parachute landing area perimeter boundaries should be marked in some way to allow parachutists to discern the landing are from the air. Therefore, it is recommended that some type of markings or other method of identifying the drop zone be added. This could include one or more of the following options:

- Dashed line, a minimum of 3 inches wide in white or orange chalk, paint, or engineering tape
- Traffic-style cones
- Flags
- Streamers or
- Landscaping

It is also recommended to use different types of markers when designating areas within the PLA and the perimeter of the PLA.

Navigational Aids, Lighting, and Signage

As noted in Chapter 4, Sebastian Airport was the first airport in the United States to have an operational ADS-B Tower. Other navigational aids at the airport include: two airport beacons, a lighted wind cone and segmented circle, and the run-up area near the

Runway 5 threshold is equipped with a magnetic wind rose. Runways 5-23 and 10-28 are also equipped with PAPI-2s.

The airfield is equipped with limited lighting. Only Runway 5-23 is equipped with threshold lights and low intensity runway lights, while Runway 10-28 and Taxiways A and B are equipped with reflectors. As part of the new Taxiway C, D and E construction, these taxiways will also be equipped with edge reflectors instead of taxiway lights.

Although it is not recommended that a lower visibility approach be added to Runway 5-23, runway end identification lights (REILs) are recommended to be added to Runway 5 and 23. Although not required, the FAA recommends adding REILs to runways equipped with non-precision instrument approaches with 1 mile visibility. The REILs will improve overall runway visibility during low light or poor conditions, and increase the overall safety of the airport. Since Runway 5-23 is the primary runway, lighting upgrades are recommended. Further, the REILs can be shielded to limit glare and lighting impacts.

In addition to adding REILs to Runway 5-23, lighted airfield signage is also recommended. The airport is not currently equipped with any airfield signage. This could cause confusion to users unfamiliar with the airport. Therefore, in accordance with FAA AC 150/5340-18F, Standards for Airport Sign Systems, 2010, the following reflective signs should be added to the airfield:

- **Holding Position Sign** for Taxiway/Runway Intersections – mandatory instruction sign per AC.
- **Holding Position Sign** for Runway/Runway Intersections – mandatory instruction sign per AC.
- **Runway identification signage**
- **Location signs.** These signs identify the taxiway or runway where the aircraft is located. It has a yellow inscription with a yellow border on a black background. The location sign does not contain arrows.
- **Holding position signs** along with taxiway location signs installed on all taxiways that intersect the runways
- **Holding position signs** have been installed at the intersection of the two runways

- **Exit signs** should be installed at the taxiways where aircraft normally exit.
- **Direction and Outbound and Inbound Destination Signs** since the airport is uncontrolled. Direction signs have black inscriptions on a yellow background and always contain arrows. The arrows should be oriented to approximate the direction of turn. A destination sign has a black inscription on a yellow background and always contains an arrow.

Mandatory instruction signs have white inscription with a black outline on a red background. Signs are always placed on the left side of the taxiway. Signs are not to be installed between the taxiway/runway holding position sign and the runway. According to the AC airfield signage should be illuminated when runway and taxiway lights are illuminated. Since the only runway equipped with lights is Runway 5/23, several options may be available including solar powered or retroreflective signage. The addition of signs along with holding markings on the taxiways should limit runway incursions and improve the safe movement of aircraft.

At the time of this writing, the Sponsor was replacing its old Super Automated Weather Observing System (AWOS) with an AWOS-3, which will provide better coverage. The new AWOS-3 will be equipped with dual coverage to allow users to hear both weather as well as airport traffic communications within the airport airspace. The new AWOS-3 is located within the infield area between future Taxiway C and Runway 10-28 within the southwest quadrant of the airport property. This location provides unobstructed coverage, which should provide accurate weather and wind data.

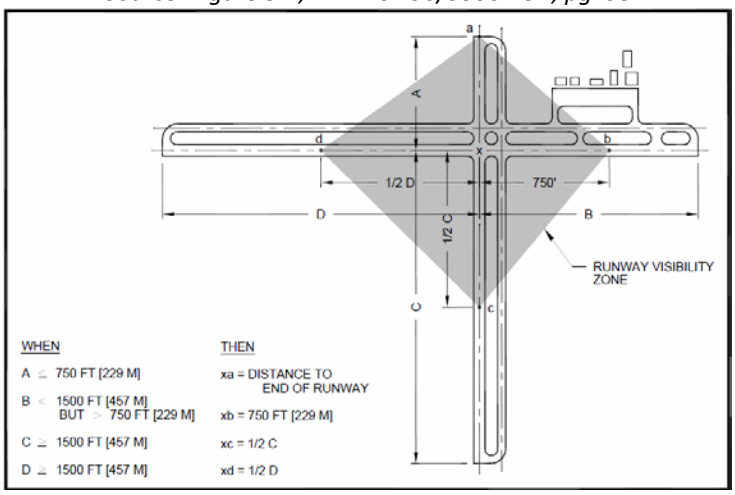
Runway Visibility Zone

Since Sebastian Airport is not equipped with an air traffic control tower and it is has multiple runways, a runway visibility zone was defined based upon the recommended runway configurations identified in Runway Options D and F. The Runway Visibility Zone (RVZ) is an area of the airport that must be kept clear of permanent object so as to allow unobstructed line of site from any point five feet above the runway centerline to any point five feet above the intersecting runway centerline.

The runway visibility zone is defined as an area formed by imaginary lines connecting the two runways' line of sight points. Locate the runway line of sight points as follows: "(1) The end of the runway if runway end is located within 750 feet (229 m) of the crossing runway centerline. (2) A point 750 feet (229 m) from the runway intersection (or extension) if the end of the runway is located within 1,500 feet (457 m) of the crossing runway centerline or extension. (3) A point one-half of the distance from the intersecting runway centerline (or extension), if the end of the runway is located at least 1,500 feet (457 m) from the crossing runway centerline or extension."[1] A sample RVZ is provided in **Figure 5-5**.

Based upon these dimensions and the preferred runway configurations, the RVZ was established and was used to define the location of future development on the airfield.

FIGURE 5-5
SAMPLE RUNWAY VISIBILITY ZONE
Source: Figure 3-7, FAA AC 150/5300-13A, pg. 58



General Aviation Alternatives

Sebastian is a general aviation airport that supports recreational, training, aircraft manufacturing and some limited maintenance, as well as corporate and limited air taxi operations. General Aviation Alternative development was broken into four airport

[1] FAA AC 150/5300-13A, Runway Visibility Zone, page 58, 2012

quadrants: Northwest Airfield quadrant, Southwest Airfield quadrant /T-Hangars, Northeast Airfield quadrant/North Ramp and South Airfield Quadrant/Terminal Area.

Development options considered facility needs identified in Chapter 4 as well as safety area and development object free area requirements to support planned development beyond the 20-year planning period. Note, the recommendations provided allow for maximum use of airport existing land and facilities. However, development is flexible and hangar and parking options may be modified to address an immediate need.

Summary of Facility Needs

Development of general aviation alternative options considered forecast demand and facility needs identified in Chapter 4. **Table 5-5** summarizes the long-term facility needs based upon forecast demand.

TABLE 5-5
2037 FACILITY REQUIREMENTS SUMMARY

Airport Facility	2037 Demand
Hangar Demand:	
Shade Hangar	40
T-Hangar	36
Corporate/Box Hangar	8
Conventional Hangar	4* (development is driven by business demand)
Apron Tie-Down	
Based aircraft tie-downs	7
Transient aircraft tie-downs	2* (Based upon peak hour demand)
Fuel Demand (14 day peak fuel demand)	
100 LL	2,656 gallons
Jet A	17,935 gallons
Terminal Building Area	4,050 SF
Auto Parking Spaces (Peak Hour Demand)	113
Support Facilities:	
Airfield Fencing/Security	Relocate and possible expansion depending upon recommended development
Roadway Access	Expansion

TABLE 5-5 2037 FACILITY REQUIREMENTS SUMMARY	
Airport Facility	**2037 Demand**
Utilities	Extend and expand lines to support planned development (water, sewer, electricity, phone/cable, etc.)
Land Acquisition	To support runway approach and departure protection zones.
Obstruction Mitigation	Remove trees and add obstruction lighting as needed to immovable objects
Source: TKDA 2017	

Building Restriction Lines

A building restriction line (BRL) is a line on the airport layout plan depicting where buildings and other infrastructure can be built in relation to the airport operating area (AOA). The BRL must be set beyond the Runway Protection Zones (RPZs), the Obstacle Free Zones (OFZs), the Object Free Areas (OFAs), the runway visibility zone, NAVAID critical areas, areas required for terminal instrument approach procedures (TERPS), and ATCT clear line of sight (LOS).

The location of the BRL is dependent upon the selected allowable structure height. According to FAA AC 150/5300-13A, typical allowable structure height is 35 feet (10.5 m) above ground level. The closer development is allowed to the Aircraft Operations Area (AOA), the more impact it will have on future expansion capabilities of the airport.

As part of this analysis, a BRL of 57 feet above ground level was used to allow for expansion of the terminal and other facilities on the airport without impacting the current and future airfield design. This height takes into consideration changes in elevation between the airfield, general aviation, and landside development.

Southwest Airport Quadrant/T-Hangar Area

The Southwest Airport Quadrant/T-Hangar Area included all infrastructure south or Runway 10 and north of Runway 5. This area currently supports the Airport T-Hangars and general aviation apron area.

Alternative 1

Alternative 1 as illustrated in **Figure 5-6** includes the addition of two new 14 unit T-hangar buildings, and expanded apron and installation of 15 shade hangars, the remarking of Taxiway A to 35 feet and construction of additional apron space to support small aircraft tie-downs. This apron will also include a 25 foot wide taxilane to support aircraft movement.

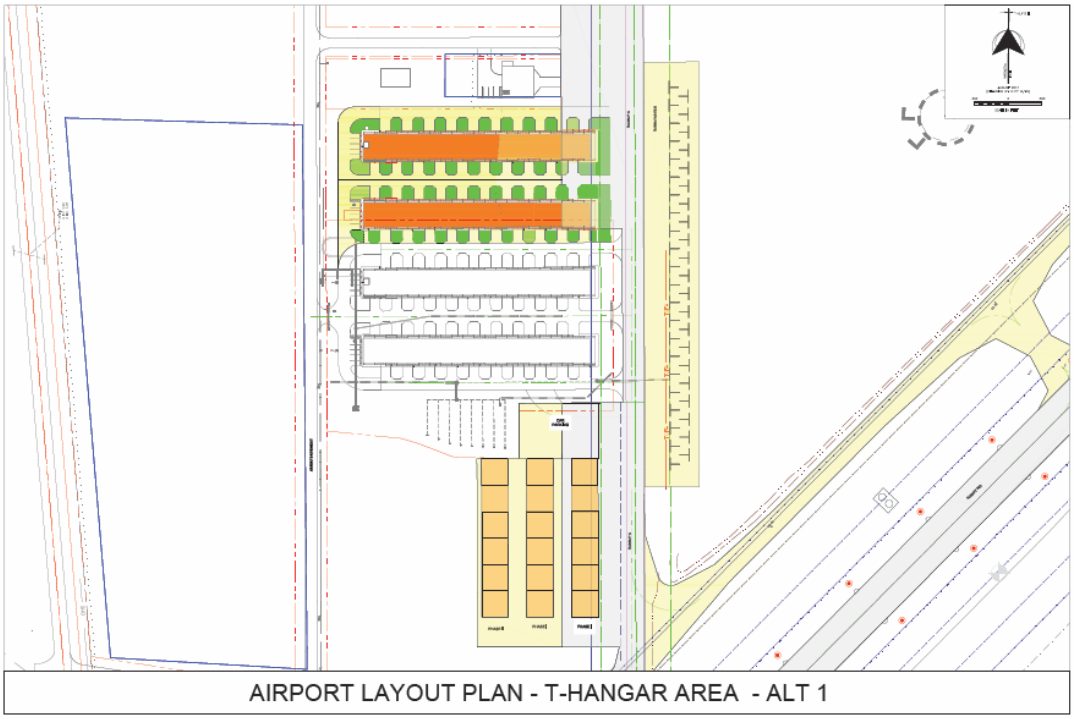
Strengths and weaknesses associated with this alternative include:

SOUTHWEST AIRPORT QUADRANT/T-HANGAR ALTERNATIVE 1	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Allows for reuse of the south apron and development of shade hangars ▪ Provides additional small aircraft storage facilities ▪ Easy access is provided via Airport Drive west and Roseland Road ▪ Does provide additional tie-down apron and movement areas.	▪ Demand for T-hangars is low. The current T-hangar facilities are not fully leased ▪ Revenue from T-hangars limited since part of Sheltair Lease ▪ Taxilane between t-hangars and size of hangars are limited to small aircraft only ▪ Limited flexibility since development is designed for small aircraft ▪ Will require additional stormwater retention areas, relocation of existing drainage ditches and permitting

FIGURE 5-6

ALTERNATIVE 1

Source: TKDA 2017



Alternative 2

Alternative two, as illustrated in **Figure 5-7**, provides for the following development:

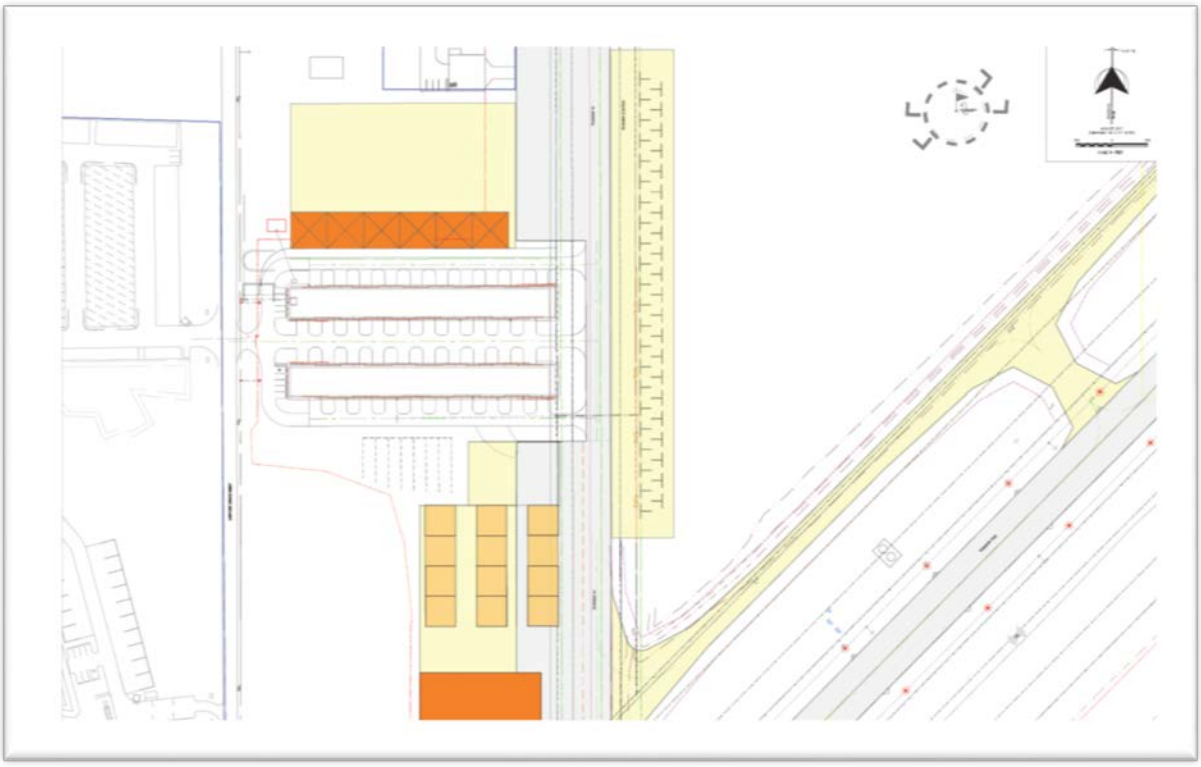
- Apron expansion to the north, south and east of the T-hangar facilities.
- Construction of 6 60 x 60 Box hangars north of the T-hangars and installation of 35 foot taxilane
- Installation of 12 shade hangars
- Construction of 100 x 80 foot multi-use hangar facility, and
- Construction of aircraft parking/tie-down infrastructure with 25 foot edge taxilane.

Strengths and weaknesses associated with this alternative include:

SOUTHWEST AIRPORT QUADRANT/T-HANGAR ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible development to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs ▪ Provides higher source of revenue generation ▪ Allows for reuse of the south apron and development of shade hangars ▪ Easy access is provided via Airport Drive west and Roseland Road ▪ Does provide additional tie-down apron and movement areas.	▪ Demand may be limited in the short term ▪ Cost and competition from nearby airports could impact development ▪ Will require additional stormwater retention areas, relocation of drainage ditches and associated permitting

FIGURE 5-7
ALTERNATIVE 2

Source: TKDA 2017



Northwest Airport Quadrant

The northwest airport quadrant consists of leaseholds north of Runway 10 and west of Airport West Drive. As part of planned development, the Sponsor has had utilities and other infrastructure expanded to allow for construction of a consolidated public works compound adjacent to the airport. Since the public works department assists the airport with on-site maintenance, this is a compatible land use.

Blue lines shown in both **Figures 5-8 and 5-9** demonstrate the existing leaseholds of the current tenants. During meetings with Skydive Sebastian, the company has plans to expand their facilities including adding off site camping grounds. Other tenants located in this area have also discuss possible expansion plans, but none have provided any specific details.

According to leasehold data, the northwest apron is part of the Pilot's Paradise lease and they obtain revenue from tie-down parking. Still, based upon on-site inspections, the area is not well marked which causes some adjacent tenants to be blocked from their facilities. Thus as part of proposed development, remarking Taxiway A along with adding movement area and parking markings to more efficiently use the existing apron facilities was considered.

Airport tie-down demand consists of both based aircraft and transient aircraft demand. Aircraft parking requirements were based upon the length and wingspan of the typical aircraft fleet at X26 as well as a 10 and 20 foot buffer around the aircraft.

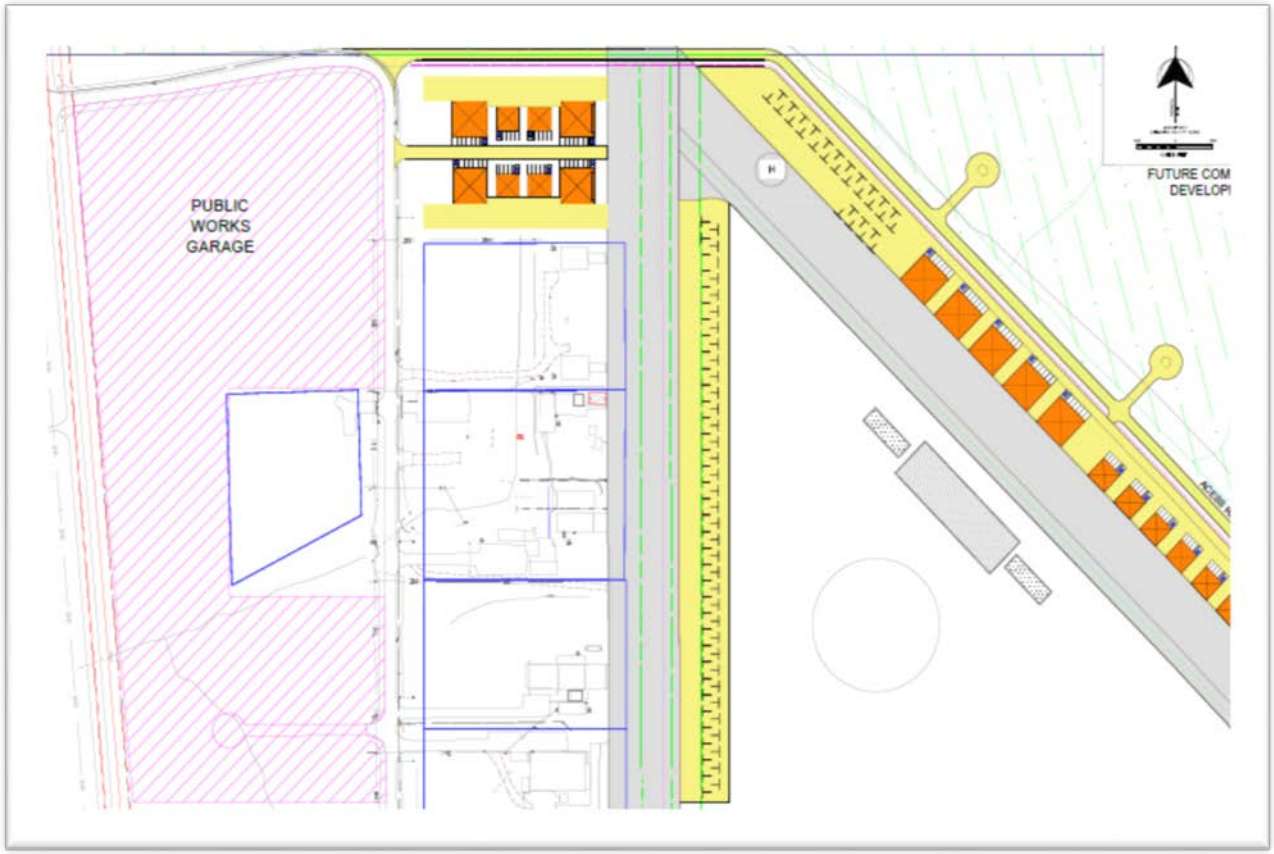
Alternative 1:

Alternative 1 highlights the property that is not currently leased and could be used for future aviation development. Since utilities have already been expanded to support the planned public works development, site preparation to support box and corporate hangar development will be reduced. Hangar development outlined in this scenario is recommended for third party development rather than airport sponsor development.

This alternative recommends:

- Construct four 80 x 80 box hangars
- Construct four 60 x 60 box hangars
- Construct access road, two 2900 SY of adjacent apron, and auto parking.
- Taxiway A should be remarked to provide a 35 foot width to support TDG 2 aircraft, and the remainder of the pavement will be marked as apron movement areas, in addition to
- Construction of additional apron to provide movement area and parking.

FIGURE 5-8
ALTERNATIVE 1
Source: TKDA 2017



Strengths and weaknesses associated with this alternative include:

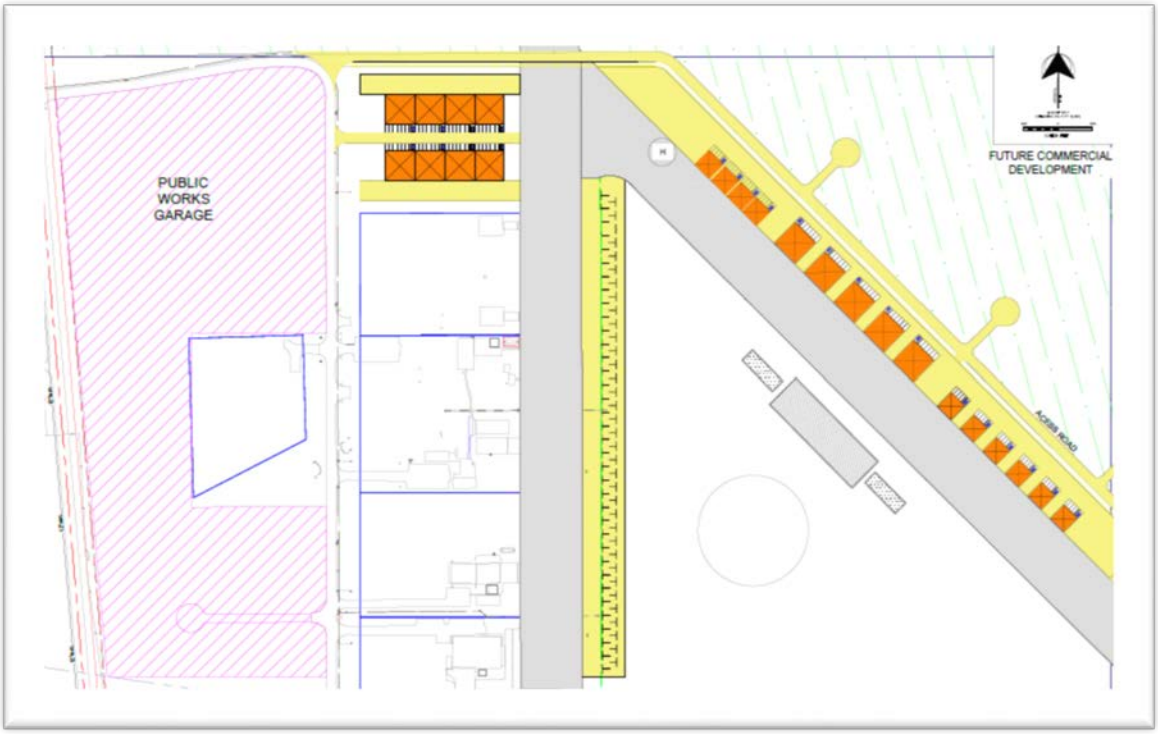
NORTHWEST AIRPORT QUADRANT ALTERNATIVE 1	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible development to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs ▪ Recommends third party/private funding for development ▪ Provides higher source of revenue generation ▪ Easy access is provided via Airport Drive west and Roseland Road ▪ Does provide additional tie-down apron and movement areas.	▪ Expanded apron east could impact Drop Zone ▪ Costs for apron construction to provide additional parking may not be cost effective use. Current issue of parking and aircraft movement due to Tenant leaseholds ▪ Requires stormwater drainage relocation associated with apron and tie-down development

Alternative 2:

Alternative 2 has similar recommendations as Northwest Alternative 1 except it shows the full build-out of the north area to allow for 8, 80 x 80 box hangars. Proposed infrastructure improvements associated with Alternative 2 include:

- Construct eight 80 x80 box hangars
- Construct access road, two 2900 SY of adjacent apron, and auto parking.
- Taxiway A should be remarked to provide a 35 foot width to support TDG 2 aircraft, and the remainder of the pavement will be marked as apron movement areas, in addition to
- Construction of additional apron to provide movement area and parking.

FIGURE 5-9
ALTERNATIVE 2
Source: TKDA 2017



Strengths and weaknesses associated with this alternative include:

NORTHWEST AIRPORT QUADRANT ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ This option shows full buildout with 8 80 x 80 SF hangars ▪ Provides flexible development to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs	▪ Expanded apron east could impact Drop Zone ▪ Costs for apron construction to provide additional parking may not be cost effective use. Current issue of parking and aircraft movement due to Tenant leaseholds ▪ Requires stormwater drainage relocation associated with apron and tie-down development

NORTHWEST AIRPORT QUADRANT ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Recommends third party/private funding for development ▪ Provides higher source of revenue generation ▪ Easy access is provided via Airport Drive west and Roseland Road ▪ Does provide additional tie-down apron and movement areas.	

Since T-hangar demand at Sebastian is down, this option provides the greatest flexibility by allowing areas both north and south of the t-hangars to be developed for alternative aircraft storage (i.e. box hangars and shade hangars). This option allows for private hangar development and sizing allows for more than one aircraft to be stored in one building. However, if demand for T-hangar facilities returns, there is ample room to add an additional 6 unit T-hangar and move the box hangars further north or replace some of the planned development to south with a 12-14 unit T-Hangar building.

Northeast Airport Quadrant/North Ramp

The northeast quadrant is currently undeveloped. The only related aviation infrastructure in the northeast ramp is the former 150 foot runway. The pavement is currently in disrepair and is not currently being used. Discussions with the Sponsor, airport management and TAC considered potential development options for this area. Discussions were held with FAA concerning through the fence operations and private development, but the Agency stated that this was not an approved operation. Therefore, alternative aviation development options were considered including private organization hangar development, flying clubs, helicopter parking and storage, and other support infrastructure.

Since this area is not currently equipped with utilities or landside access, development of the northeast apron is anticipated to begin no sooner than 2030 unless unforeseen demand for development is warranted. Development proposed adjacent to the airfield would be aviation facilities requiring direct access to the AOA. Additional commercial development could include businesses supporting aviation research and development,

training, education, and other commercial opportunities to create alternative revenue streams for the airport.

Alternative 1:

Figure 5-10 illustrates proposed development which includes:

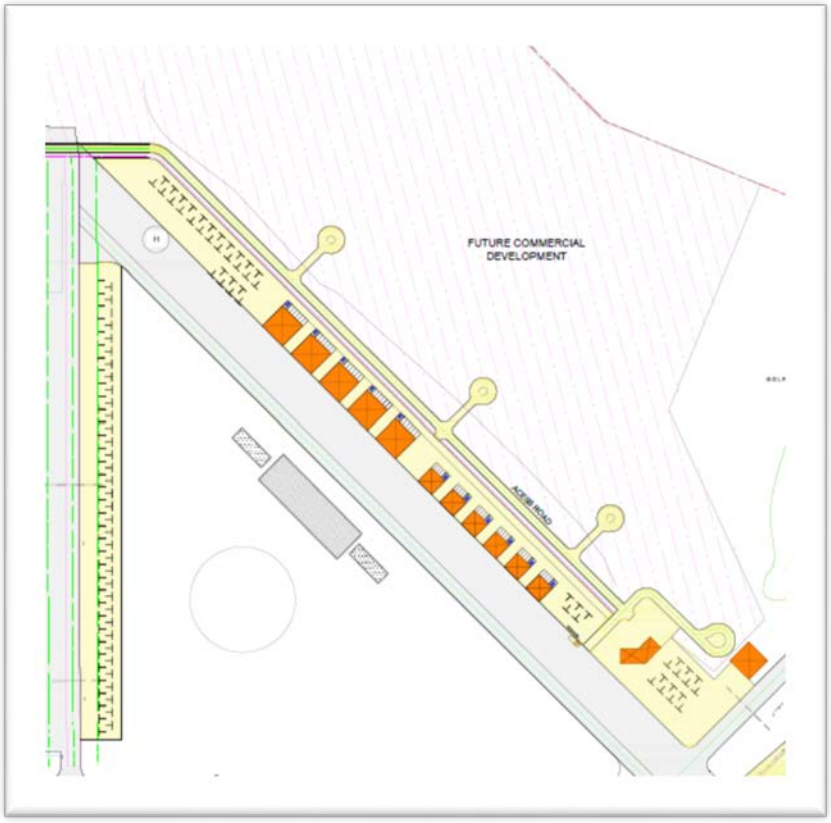
- Construction of a 35 foot taxiway
- Construction of expanded apron area
- Installation of new access road and expanded utilities
- Construction/installation of 100LL and Jet A self-fueling facilities
- Installation of additional tie-down parking
- Construction of 5 80 x 80 corporate/box hangars
- Construction of 60 x 60 box hangars
- Construction of taxilanes, auto parking and other associated facilities

Strengths and weaknesses associated with this alternative include:

NORTHEAST AIRPORT QUADRANT/NORTH RAMP ALTERNATIVE 1	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible development to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs ▪ Provides higher source of revenue generation ▪ Allows for multi-use development; combination of aviation, aviation support and non-aviation growth ▪ Provides alternative revenue sources for airport growth	▪ No infrastructure in this location including utilities, access, etc. ▪ No immediate demand or need for development ▪ Current infrastructure is not being used ▪ Tie-down facilities do not typically provide a strong source of revenue ▪ Will require stormwater retention facilities and possible offsite mitigation ▪ Possible wind impacts to Skydiving operations

FIGURE 5-10

ALTERNATIVE 1
Source: TKDA 2017



Alternative 2:

Alternative 2 considers more efficient use of the area for revenue development. Instead of tie-downs, this option recommends various corporate and box hangar development as well as supporting infrastructure and helicopter parking to support forecast demand and private aviation development. Recommended hangar development merely illustrates potential options for development. Need and tenant demand will drive infrastructure improvements along the North Ramp area. This alternative recommends:

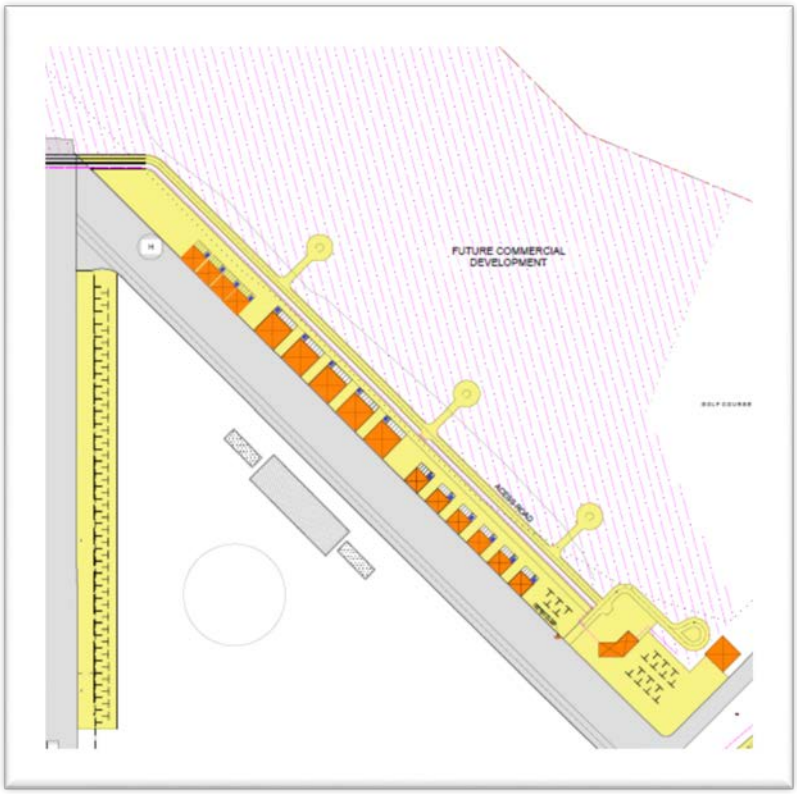
- Two helicopter landing and parking areas
- 10 60 x 60 box hangars

- 5 80 x 80 box hangars
- Construct 35 foot taxiway and 35 foot taxilanes
- Construct new access road and provide site preparation for future commercial development
- Install Jet A and 100LL self-fueling system

Strengths and weaknesses associated with this alternative include:

NORTHEAST AIRPORT QUADRANT/NORTH RAMP ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible development to allow multi-use of facilities ▪ Allows for phased development ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs ▪ Provides higher source of revenue generation ▪ Allows for multi-use development; combination of aviation, aviation support and non-aviation growth ▪ Provides alternative revenue sources for airport growth	▪ No infrastructure in this location including utilities, access, etc. ▪ No immediate demand or need for development ▪ Current infrastructure is not being used ▪ Will require stormwater retention facilities and possible offsite mitigation

FIGURE 5-11
ALTERNATIVE 2
Source: TKDA 2017



Terminal Area

Table 4-33 of the Facility Requirements shows that total terminal area demand based upon current tenants, peak hour passengers, airport offices, etc. is approximately 8,050 square feet (sf). The current terminal building is 10,000 sf., which shows a surplus of 1,950 sf. However, although there is a surplus of area, there is an opportunity to expand the building to support additional tenant demands and growth. The terminal is located in a prime location and is easy to access. There is plenty of parking, and the location and appearance of the facility is a positive reflection on the airport.

Since GA Terminals often provide a visitor a first impression of the city and local community, two proposed expansion and development options were identified for Sebastian Airport.

Alternative 1:

Proposed development related to alternative 1 include expansion of the Terminal Building to provide up to 20,000 SF of usable space for available lease and revenue development. Since the terminal apron is located near the large corporate hangars, it is recommended that the current tie-downs be relocated to another portion of the apron and the self-fueling facilities would be expanded to allow Jet A and 100 LL. As part of that development, a 35 ft. wide taxilane along the terminal apron edge and temporary fueling area would be established near the fuel area to allow for the efficient movement of aircraft. Other development includes construction of a 100 x 300 multi-bay hangar facility to support additional small aviation business development and research.

Strengths and weaknesses associated with this alternative include:

TERMINAL AREA ALTERNATIVE 1	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible space and development options to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodates existing and future fleet mix needs ▪ Provides higher source of revenue generation ▪ Provides an area near new Hangar C for helicopter parking ▪ Allows additional revenue development and leasehold opportunities ▪ Easy access to facilities and auto parking ▪ Possible opportunities for public/private development	▪ Cost and competition from nearby airports could impact development ▪ Requires removal of existing fuel facilities and installation of new facilities and spill prevention infrastructure. ▪ Proposed self-fueling location limits the apron movement area, parking and requires fuel trucks to cross the existing apron. ▪ Requires relocation of existing tie-downs ▪ Currently no demand to justify terminal expansion

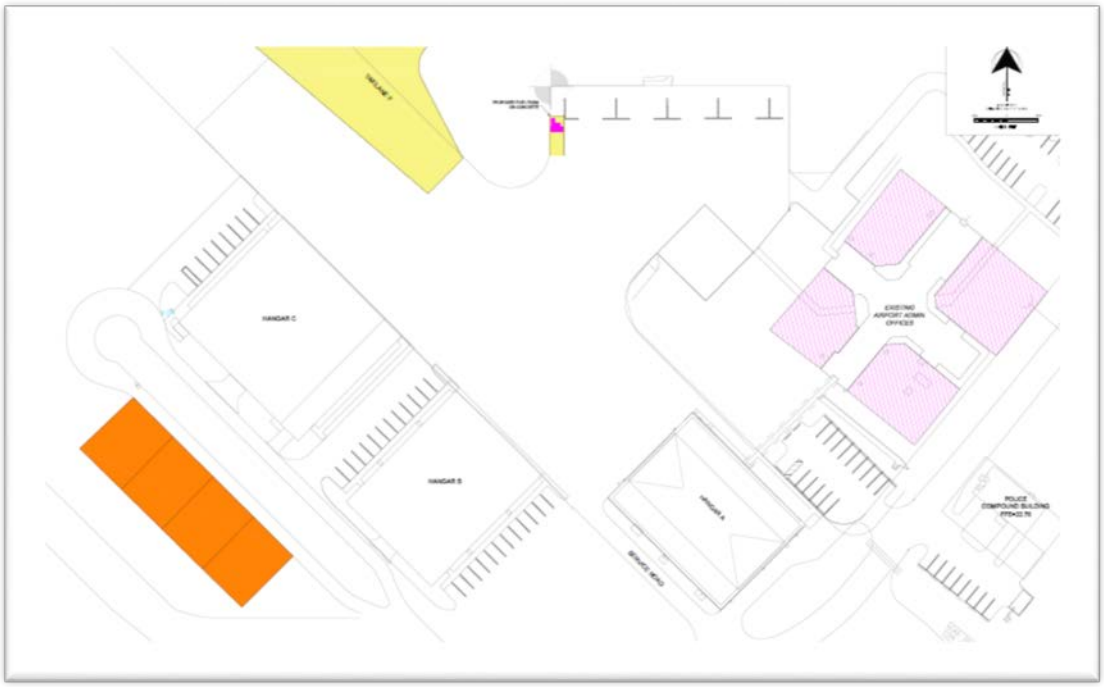
FIGURE 5-12
ALTERNATIVE 1
Source: TKDA 2017



Alternative 2:

Terminal Alternative 2 is similar to Alternative 1 with the exception of relocating and expanding the fuel facilities to the northwest corner of the terminal apron. This will still require relocation of existing tie-downs but is anticipated to allow for better aircraft and fuel truck access to self-fueling facilities. Proposed development is recommended to be phased and based upon need. Currently, there is ongoing demand for corporate style hangar facilities and Jet A fuel. **Figure 5-13** illustrates the proposed terminal area development.

FIGURE 5-13
ALTERNATIVE 2
Source: TKDA 2017



Strengths and weaknesses associated with this alternative include:

TERMINAL AREA ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Utilizes available space to maximize revenue expansion ▪ Provides flexible development to allow multi-use of facilities ▪ Opens up opportunities for third party development ▪ Provides for phased development as needed. ▪ Accommodate existing and future fleet mix needs ▪ Provides higher source of revenue generation ▪ Allows for reuse of the south apron and development of shade hangars	▪ Cost and competition from nearby airports could impact development ▪ Requires removal of existing fuel facilities and installation of new facilities and spill prevention infrastructure. ▪ Requires relocation of existing tie-downs ▪ Currently no demand to justify terminal expansion

TERMINAL AREA ALTERNATIVE 2	
Strengths	**Weaknesses**
▪ Easy access is provided via Airport Drive west and Roseland Road ▪ Does provide additional tie-down apron and movement areas.	

General Aviation Development Evaluation

Eight general aviation alternatives were developed, two per sector, to identify development that would most effectively achieve the Sponsor and communities vision of the airport. Screening factors included flexibility, phasing/construction, environmental effects, and operational effectiveness and safety considerations.

- ***Flexibility*** – pertains to the total growth potential of each concept and the process inherent to achieving that growth. The evaluation criteria associated with this category include the ability to respond to uncertain demand levels, the balance of support functions, the ability to satisfy changing tenant demands as well as fiscal responsibility and soundness of the development (i.e. minimize cost compared to revenue development).

- ***Phasing/Construction*** – pertains to designated land uses and associated impacts to on-airport operations and the level of difficulty involved in implementing the proposed land uses. The evaluation criteria associated with this category include the ability to phase construction, the impact on existing facilities, and the ability to incrementally expand site development.

- ***Environmental Effects*** – performs a general assessment to determine the degree proposed land uses would potentially impact various components of the surrounding environment.

- ***Operational Effectiveness*** – compares the overall efficiency levels and usage of existing or proposed infrastructure associated with the general aviation area. The evaluation criteria associated with this category includes the compatibility with the long-range airfield, roadway access to development area, the competitive

environment, and assures the highest and best use.

- ***Safety Considerations*** – measures each component for compliance with FAA standards that have a direct effect on the daily operations and safety at the airport facility. Evaluation factors include the overall compatibility with the Airport Operations Areas and Part 77 surfaces, and airport security.

- ***Community Recommendations/Acceptance*** – performs a general assessment of the likelihood to which the proposed landside improvements meet the recommendations outlined by the Sponsor and the Technical Advisory Committee as well as acceptance by the community at large.

Table 5-6 presents an evaluation matrix that addresses the aforementioned criteria. The range of the analysis was from 0 to 5 with 5 representing if an element or recommendation meets the evaluation criteria by 100 percent. This matrix summarizes the consultant's analyses of the development concepts.

TABLE 5-6 EVALUATION MATRIX								
	SW Quadrant/T-Hangars		NW Quadrant		NE Quadrant/North Ramp		Terminal Area	
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
Flexibility:								
Ability to Respond to Uncertain Growth	2	4	3	3	4	4	3	3
Balance of Support Functions	3	4	2	2	4	4	3	4
Ability to Satisfy Changing Tenant Demands	2	4	3	3	5	5		
Revenue Creation and Collateral Development	2	4	4	4	3	5	4	4
Phasing and Construction:								
Ability to Phase Construction	3	4	4	4	4	4	4	4
Impact to Existing Facilities	3	3	2	2	4	4	2	2
Ability to Incrementally Expand	2	4	4	4	4	4	3	3
Environmental Effects:	5	5	4	4	4	4	5	5
Operational Effectiveness:								
Compatible with Long-Range Airfield	2	4	3	3	5	5	5	5
Roadway Access to Potential Development Areas	4	4	4	4	1	1	5	5
Safety Considerations:								
Compatibility with Airport Operations Areas and FAR Part 77 Surfaces	4	4	3	3	5	5	5	5
Airport Security	4	4	4	4	4	4	4	4

TABLE 5-6 EVALUATION MATRIX								
	SW Quadrant/T-Hangars		NW Quadrant		NE Quadrant/North Ramp		Terminal Area	
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
Community Recommendations/Acceptance:								
Likelihood of Public Acceptance	4	4	3	3	4	4	3	4
Compatible with Adjacent Land Use	4	4	3	3	4	4	2	3
TOTAL	**44**	**56**	**46**	**46**	**55**	**57**	**48**	**51**

Secondary Element Alternatives

As noted in both FAA AC 150/5070-6B, Airport Master Plans, and the FDOT Airport Master Planning Guidebook, secondary elements are those infrastructure improvements that support the primary elements. Their location is somewhat dependent upon the orientation and location airfield and general aviation infrastructure. These support elements may be located in areas unsuitable for primary facilities.

In this analysis, secondary elements consisted of support infrastructure and alternative land use options for revenue enhancement.

Support Facility Alternatives

Although not indicated on the various alternatives shown in this chapter, expansion and growth of airport support facilities are necessary to account for increases in aviation activity which will result from the proposed development options. The following paragraphs highlight potential improvements to various support facilities including: security fencing, fuel storage, utilities, stormwater management, etc.

Fuel Farm/Self-fueling Facilities

Two fuel farms are located at Sebastian Airport, Pilot's Paradise the local FBO located on the west side of the airport provides 100LL fuel. Pilot's Paradise is equipped with one 10,000 gallon tank as well as a 1200 gallon fuel truck. There is also a self-fueling, 100 LL system located on the south side of the terminal apron. The City is also equipped with one 10,000 gallon fuel tank that provides 100LL as well as a fuel truck and self-fueling equipment. The area is marked to allow aircraft to pull up to the pump without impacting existing airport parking or other movement areas. The self-fueling facility on the terminal is owned and operated by the City of Sebastian. Neither Pilot's Paradise nor the City sell Jet A. Skydive Sebastian aircraft use Jet A fuel, but they have their own 10,000 gallon tank onsite.

Based upon the fleet mix forecast, demand for Jet A is currently needed to support existing and future demand. Demand for 100LL was anticipated to remain fairly stable with an average 14-day peak month fuel need of 2,517 gallons. Whereas Jet A was expected to grow exponentially. Current peak month 14-day demand is roughly 6,600 gallons. This is expected to growth to more than 17,000 gallons by 2037.

In addition changes in environmental regulatory requirements, including emissions, spill prevention, monitoring, removal of underground tanks, as well as demand for clean burning fuel will likely change demand. There has and continues to be a push to discontinue 100LL and replace it with some clean burning bio fuel. As of yet, this has not become feasible. However, development of this technology may require different aircraft dispensing requirements.

Therefore, based proposed development, at least three self-fueling facilities were recommended. It is recommended that Airport Management have a discussion with the FBO concerning the existing fuel system and future development. It may be more cost effective for the Sponsor to allow the FBO to provide fuel and oversee the maintenance and upkeep of the fuel farm while paying a percentage on the gallon to the airport. This option along with others will be discussed in more detail in later chapters of this report.

Utilities

The majority of the airport property with the exception of the North Ramp area are equipped with all needed facilities including water, sewer, electric, phone/cable, etc. As part of planned construction of Public Works facility near the Northwest airport quadrant, utilities have expanded along Airport Drive West. Utilities are also available along Airport Road East, which will support expansion of the terminal area as well as potential non-aviation commercial or educational development along Airport Drive East. There is excess utility capacity on and adjacent to the airport that will support growth. However, significant site preparation and utility infrastructure will be require before development of the North Ramp area may be fully realized.

Stormwater Drainage

Stormwater drainage at X26 is provided via a series of on-site manmade and natural ditches, swales and retention basins which are located on the airport golf course. Drainage facilities are used to divert runoff from the paved airport operating areas well as the skydiving jump zone. Based upon Indian River County FEMA Flood Insurance Rate Information, updated December 4, 2012, airfield stormwater runoff drains from the north and west toward retention areas to the south and east of the airport property. During heavy rain events, standing water can be found in the infield area of the airport due to the type of airport soils. However, most of this water

dissipates between 24 and 48 hours of such an event. Further according to our analysis and information obtained from stormwater management, there is existing capacity on the airport.

Proposed tie-down areas on the west side of the airport will require some relocation and expansion of drainage ditches to accommodate additional non-pervious surfaces. Since tie-down needs are limited to the northwest apron area, it is recommended that a phased approach be taken to expanded apron development to limit impacts to stormwater drainage.

Auto Parking

An analysis of auto parking requirements based upon visitor and forecast demand was presented as part of **Chapter 4**, *Facility Requirements*. It was determined that Sebastian had surplus parking facilities based upon the available number of parking spaces and the airport and forecast demand. On-site inventory identified approximately 135 total parking spaces (5,400 square yards)

However, the location of these parking facilities in some cases do not support demand. Therefore, recommended parking facilities associated with general aviation and terminal development are recommended as follows:

- Additional parking adjacent to box and corporate hangar infrastructure. A 60 x 60 SF hangar is estimated to require at least 3 to 5 parking spaces whereas larger facilities will increase exponentially based upon facility size and use.
- Parking facilities adjacent to the terminal building are adequate to support anticipated demand. However, with proposed expansion of the terminal building to support additional tenants and users, expansion of the parking facility will likely be warranted.

Airport Security

In July 2017, the Transportation Security Administration released Security Guidelines for General Aviation Airport Operators and Users[2] which provides specific guidance to address GA airport vulnerabilities, infrastructure hardening, operational recommendations, training, etc.

[2] https://www.tsa.gov/sites/default/files/2017_ga_security_guidelines.pdf

Since 9/11 with the strengthening of commercial airport security and infrastructure, the concern is that "bad actors" will switch to softer targets like GA airports. Traditionally, security issues at GA airports primarily were related to theft, vandalism and trespassing. Today, Airport Operators and users must work together to not only address these traditional issues but also increased threats related to domestic and international terrorism.

Recommended improvements include additional fencing and construction of internal perimeter road. Installation of additional access gates and security equipment. Fencing and monitoring of the electrical vault and fuel facilities is also recommended. Ultimately, the best way for a small airport to handle security is to work with tenants and other users to become aware of who and who should not have access to the airfield as well as keeping gates closed and monitored at all time.

Compatible Land Use

Current airport property encompasses 620 acres of which approximately 1/3 is used by the Sebastian Municipal 18-hole golf course. In addition to the golf course, portions of the current airport property was designated as conservation to support Scrub Jay, Gopher Tortoise and other habitats. According to federal funding grants, conservation is not an acceptable on-airport land use. Therefore, in conjunction with this master plan update, an airport environmental study is being performed. This study along with the property encumbrance report and Exhibit 'A' Property Map identifies the 88 acres of airport property that were identified for conservation but now may be used for aviation project construction. In addition, with the closure of former runway 13-31 on the north side of the airfield, this opened up along with other areas within the existing property approximately 100 acres for industrial development and an additional 70 acres for corporate park development

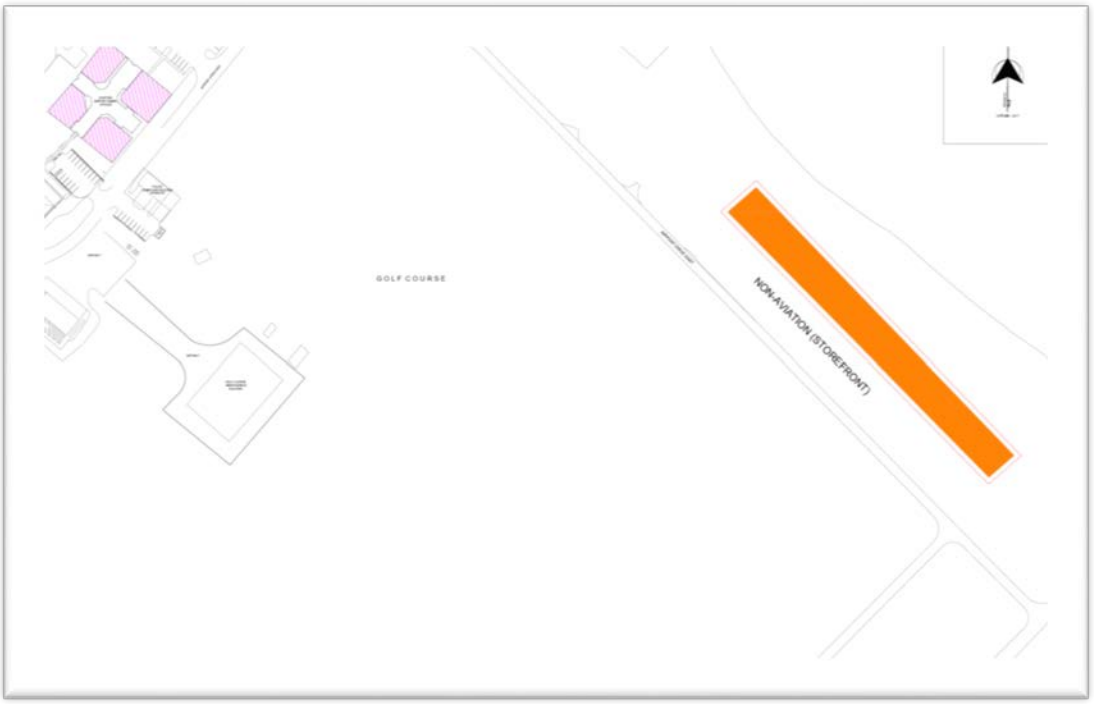
Airfield improvements which may shift required safety areas may require additional property acquisition either via fee simple or via an easement agreement. Land necessary to support planned airport development, to maintain compliance with FAA directives, and support compatible contiguous land use were identified in Chapters 5 and 6 of this report. Recommendations related to land acquisition or sale to support long-term airport development including likely funding sources is provided in detail in Chapter 8, *Airport Implementation Plan*, of this report.

Alternative Revenue Generation – Non-Aviation Use

The Sponsor may designate some areas of the airport for non-aviation use with FAA approval. Some recommended non-aviation development is illustrated along Airport Drive East as illustrated in **Figure 5-14**. However, aeronautical facilities must be dedicated to use for aviation purposes. Limiting certain areas to the airport strictly for aviation use will ensure that airport facilities are available to meet demand. The FAA states that aviation tenants and aircraft owners should not be displaced by non-aviation commercial uses that could be conducted off airport property. Further, leases associated with non-aviation development cannot be longer than 20 years and must include a revocation clause allowing the sponsor to retake the property if needed to support aviation development. These leases must also be developed based upon fair market value of property and infrastructure.

The FAA's policy, outlined in FAA Order 5190.6B, Airport Compliance Manual, paragraph 22.6, September 30, 2009, a designated aeronautical facility must obtain approval from the FAA for any non-aeronautical purpose, even if temporary. The identification of non-aeronautical use of aeronautical area receives special attention as part of the FAA airport land use compliance inspections. Areas of the airport designated for non-aeronautical use must be shown on the airport's ALP.

FIGURE 5-14
NON-AVIATION DEVELOPMENT
Source: TKDA 2017



AIRPORT DRIVE EAST

Clearly identifying non-aeronautical facilities not only keeps aeronautical facilities available for aviation use, but also assures that the airport sponsor receives at least Fair Market Value (FMV) revenue from non-aviation uses of the airport. The AAIA requires that airport revenues be used for airport purposes, and that the airport maintain a fee structure that makes the airport as self-sustaining as possible. 49 U.S.C. 47107(a)(13)(A) and (b)(1). The FAA and the Department of Transportation Office of the Inspector General have interpreted these statutory provisions to require that non-aviation activities on an airport be charged a fair market rate for use of airport facilities rather than the aeronautical rate. See *FAA Policies and Procedures Concerning the Use of Airport Revenue,* (64 FR 7696, 7721, February 16, 1999).

If an airport tenant pays an aeronautical rate for a hangar and then uses the hangar for a non-aeronautical purpose, the tenant may be paying a below-market rate in violation of the sponsor's obligation for a self-sustaining rate structure and FAA's Revenue Use Policy. Confining non-

aeronautical activity to designated non-aviation areas of the airport helps to ensure that the non-aeronautical use of airport property is monitored and allows the airport sponsor to clearly identify non-aeronautical fair market value lease rates, in order to meet their federal obligations. Identifying non-aeronautical uses and charging appropriate rates for these uses prevents the sponsor from subsidizing non-aviation activities with aviation revenues.

A sponsor's Grant Assurance obligations require that its aeronautical facilities be used or be available for use for aeronautical activities. If the presence of non-aeronautical items in a hangar does not interfere with these obligations, then the FAA will generally not consider the presence of those items to constitute a violation of the sponsor's obligations. When an airport has unused hangars and low aviation demand, a sponsor can request the FAA approval for interim non-aeronautical use of a hangars, until demand exists for those hangars for an aeronautical purpose. Aeronautical use must take priority and be accommodated over non-aeronautical use, even if the rental rate would be higher for the non-aeronautical use. The sponsor is required to charge a fair market commercial rental rate for any hangar rental or use for non-aeronautical purposes. (64 FR 7721).

Recommended Development

With input from the Sponsor, TAC and Public, preliminary recommended development was established. A summary of proposed development is provided as follows:

Airfield Improvements: Airfield improvements were based upon Runway options D and F as well as recommended taxiway, parachute drop zone, and NAVAIDs.

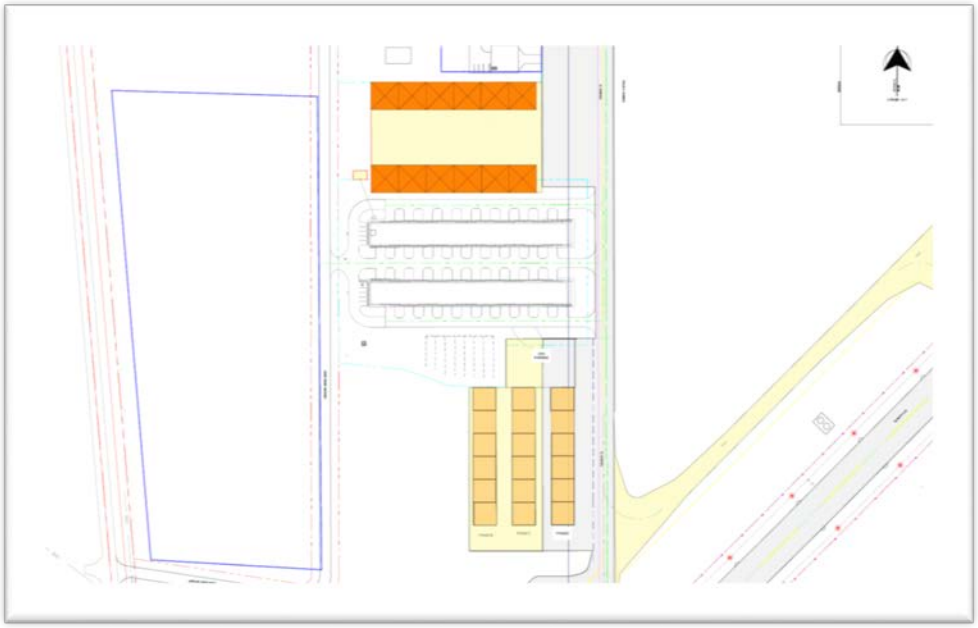
- Maintain Runway 5-23 at current length
- Maintain 1 Mile Non-precision approach to both Runways 5 and 23
- Pavement rehabilitation of Runway 5-23 recommended for 2022
- Maintain Runway 5-23 as B-II-5000 with approach slope of 20:1
- Add Runway End Identifier Lights (REILs) to Runway 5-23 thresholds
- Acquire property easements for Runway 5 and 23 runway protection zones
- Remove obstructions to approach to regain lower approach LPV approach visibility; currently using circling approach minimums
- Change Runway 10-28 from B-I small to B-II small

- Maintain visual approach only (greater than 1 mile) and basic runway markings
- Rehabilitate Runway 10-28 and determine actual pavement strength in 2027
- Rehabilitate Taxiway B in conjunction with Runway 10-27
- Decrease Runway Protection Zones from 500 x 1000 x 700 to 250 x 1000 x 450 feet on both Runway 10 and 28.
- Decrease Runway 10-28 primary surface to 250 feet
- Request modification to standards for Airport Drive West and portion of Roseland Road located in Runway 10 RPZ
- Acquire property or obtain easement for property(s) located within the Runway 10 RPZ
- Narrow Taxiway A to 35 feet to allow for adjacent movement area and development
- Redevelop former runway into 35 foot taxiway to support future development
- Provide additional connector taxiways
- Maintain drop zone in current location. Add markings to designate area.
- Construct two helipad parking areas: one near existing terminal and Corporate Hangar C and the second on the northwest side of the proposed North Quadrant redevelopment.
- Airport is in the process of upgrading the AWOS to newer model.
- Add self-serve fuel location including Jet A and 100LL (or new bio equivalent) to the south corner of the North quadrant development in conjunction with second FBO development.
- Add lighted wind cone near infield and north ramp to support skydiving activity.

GA and Terminal Improvements: General aviation development and terminal improvements include a combination of various aircraft storage hangars, apron expansion and redevelopment, site preparation for private hangar development as well as aircraft tie-down and parking facilities. Recommended development based upon forecast demand, fleet mix, and highest and best land use and growth in support of airport fiscal self-sustainability. Hangar development with the exception of the shade hangars were recommended to be privately developed with the City/Airport receiving land lease revenues. If fuel services will be operated by the FBO, a renegotiated rate on the gallon and dollar should be implemented. The same is true regarding tie-down and aircraft parking fees. Proposed GA development is illustrated in **Figures 5-15** through **Figure 5-18.**

Southwest Quadrant: Proposed development is based upon Alternative Option 2 with some modifications including removal of multi-use hangar facility, expansion of apron and shade hangars, expansion of corporate hangar and box hangar development as well as removal of the expanded apron to the east and associated aircraft tie-downs. With the exception of the apron and the shade hangars, the airport will provide land leases to private development for hangar construction and expansion. Also, limiting expansion of the apron will decrease impervious surfaces and eliminate the impacts to the on-site drainage ditches.

FIGURE 5-15
RECOMMENDED SOUTHWEST QUADRANT DEVELOPMENT
Source: TKDA 2017



Northwest Quadrant: Most of the northwest quadrant of the airport is leased including the apron area in front of the existing hangars. As part of the Pilot's Paradise (on-site Fixed Based Operator {FBO}) lease agreement, they are responsible for parking and movement on the apron area along the northwest and southwest quadrants. Due to parking and lack of movement area, there is a need for additional tie-down spaces. Thus, instead of adding 400 LF of additional apron, it was instead recommended to only add approximately 12 to 14 parking spaces along with an apron edge taxilane adjacent to Taxiway A near the intersection of

Taxiway B. This will provide needed parking to support Pilot's Paradise operations as well as open up movement areas for contiguous leaseholds.

Other recommended development includes construction of a controlled north airport access road off of Airport Drive West to allow development within the north corner of the airport as well as support future growth of the Northeast Quadrant of the airport. Development could consist of multiple corporate hangars or one large hangar and apron facility to support another aircraft manufacturer, corporate aircraft maintenance, repair and overhaul facility, another FBO, or even a flight academy or other aviation business with need for direct access to the runways.

FIGURE 5-16
RECOMMENDED NORTHWEST QUADRANT DEVELOPMENT
Source: TKDA 2017



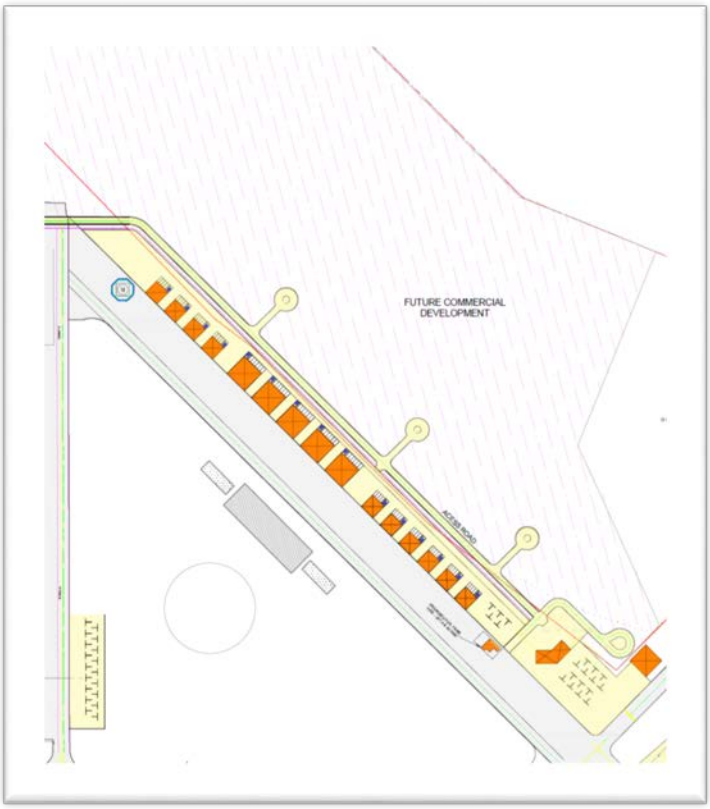
Northeast Quadrant: The Northeast Quadrant is identified for long-term development but provides an excellent opportunity for additional aviation and commercial support growth at the Airport. It is suggested that the City and Airport Management work with local economic development to identify potential interested parties. Development of this area again should be phased based upon need and demand. The southeast quadrant closest to the terminal area could be developed first since expansion of utilities is viable. This is another location that may

be feasible for another large aircraft manufacturing or FBO operation. Growth includes installation of additional Jet A and 100LL or bio-fuel facilities to support anticipated demand.

Costs could be kept to a minimal for the Sponsor and the airport by keeping site preparation to a minimal and offering development for approved private development. The airport also has property in this area that does not provide direct access to the airfield without significant infrastructure improvements. Some of this area could be used for aviation support and non-aviation opportunities. The ultimate purpose is to allow the Airport to remain financially self-sustaining while remaining a good neighbor to the local community.

FIGURE 5-17
RECOMMENDED NORTHEAST QUADRANT DEVELOPMENT

Source: TKDA 2017



Terminal Area Development: The Terminal area provides the ideal location for corporate development. The area currently supports two aircraft manufacturer showroom and manufacturing facilities as well as offices for several businesses within the terminal building. There is room for additional hangar development including a multi-use flexible hangar to the west of the large corporate hangar facilities.

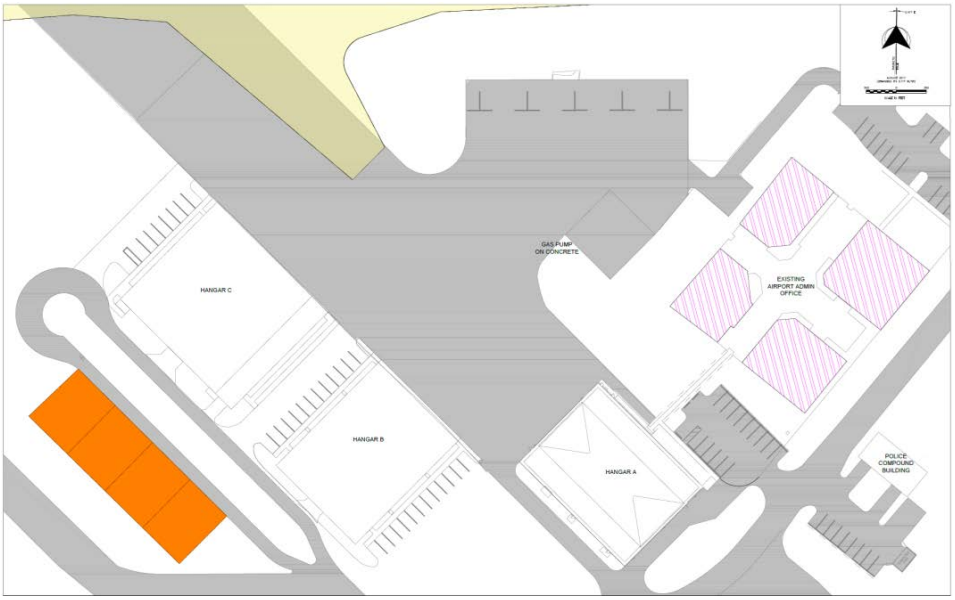
Fuel storage and self-fuel facilities currently located on the southwest corner of the apron in the short to mid-term need to be upgraded or retrofitted to comply with new EPA aviation fuel regulations. This is recommended to coincide with limited expansion of the existing fuel storage to support Jet A or biofuel demand.

Initially expansion of the terminal facilities and apron area were recommended along with relocation of existing aircraft tie-down and fuel facilities. However, based upon input from airport management and existing tenants, more cost effective options are available. In the short to mid-term, relocation of a non-aviation tenant from the terminal building to another location, potentially along Airport Drive East, would open up two wings for aviation use. Discussions with airport management included some small changes to the interior of the Terminal Building to support transient and local visitors.

Expansion of the terminal, however, is still recommended for the long-term to allow Airport Management the flexibility to support other potential aviation uses including a pilot store, rental car counter, flight training and pilot amenities, while also opening up the building for different aviation and non-aviation events. This is all part of the City's efforts to make the airport as self-sustaining while providing the flexibility and strong return on investment.

FIGURE 5-18
RECOMMENDED TERMINAL AREA DEVELOPMENT

Source: TKDA 2017



Landside Improvements: Landside improvements include development outside the fence line in support of aviation activity, access to the airport, non-aviation development and land use in addition to proposed land acquisition via easements or fee simple purchase.

- Sebastian Skydive continues to draw individuals and groups to the Sebastian Airport. They currently lease property on the north side of Pilot's Paradise, as shown in **Figure 5-19** designated with the blue box, which includes their Jet A fuel farm and parachute packing hangar facilities. They also lease a large parcel of property that supports the Café and other support facilities including bathrooms and showers. Their lease property also includes land which can be used for parking and on-site camping.

  The company is very interested in expanding their facilities including new hangars and support buildings. They are looking to add some recreational/camping space to their existing leasehold. The area outlined by the red circle is area already leased by Sebastian Skydive for future recreational development.

FIGURE 5-19
SKYDIVE SEBASTIAN LEASEHOLD AND EXPANDED FACILITIES REQUEST

Sources: Google Earth and TKDA 2017



- In addition, changing Runway 10-28 to a utility runway with visual only approaches allows the runway protection zone to shrink from 500 ft. inner width x 1000 ft. length x 700 ft. outer width to 250 ft. x 1000 ft. x 450 ft. or a decrease from 13.770 acres to 8.778 acres. Thus, allowing more room for revenue generation and decreasing the land acquisition requirements on Runway 10 to approximately .7 acres and on Runway 28 to less than 5 acres.
- Other landside improvements include expanded parking in and around the terminal facilities, upgrades to airport fencing and security, along with recommended utility improvements and improved airport access.
- As part of the north ramp development, a new road is recommended to provide access from Airport Drive West and Roseland Avenue to the north and east side of the airport property to allow for continued growth and development.

- Improved access and signage along Main Street will support non-aviation business development along Airport Drive East.
- Recommended long-term expansion of the terminal facilities will also attract tenants and provide facilities for visitors and pilots alike. The airport due to its proximity to City Hall and other venues, the terminal building could also be used to house special events in support of the community.

Non-Aviation Opportunities and Development:

Airport management has recently been approached to support several aviation related and non-aviation opportunities. These include providing space to the Sebastian and Indian River Police Forces for officer training, expansion of the local college facilities, as well as clean laboratory space. Proposed development includes development pf 50 x 900 foot building that can support 18 50 x 50 foot flexible spaces (approximately 45,000 SF) which may be reconfigured to provide larger and smaller facilities to meet tenant needs as illustrated in **Figure 5-20.**

FIGURE 5-20
NON-AVIATION DEVELOPMENT – AIRPORT DRIVE EAST

Source: TKDA 2017



It is recommended that the Airport/Sponsor since all utilities are currently available at this site construct the shell of the multi-use facility and then allow tenants to retrofit the internal design to fit their specific needs. It is recommended that leases be based upon square foot needs and utility requirements. This allows tenants to focus financial resources on their facility needs rather than property acquisition.

Sebastian Airport offers businesses lease terms up to 30 years as well as providing attractive and competitive lease rates. The Airport provides sample lease documents for both aviation and non-aviation tenants are available for download on the Airport's website (http://www.sebastianairport.org.) along with current airport minimum standards and current lease rates. This is part of the Airport and City's continued focus on airport sustainability and the Sponsor's long-term vision for future airport growth.

Miscellaneous Facilities: Miscellaneous facilities include the majority of secondary airport elements including utilities, access, airport security, stormwater management, etc. The airport is only partially equipped with an interior perimeter road, and there is currently no access other than via the airfield to the Northeast Quadrant. Recommendations based upon input from the sponsor and public input are as follows:

- Utilities have already been expanded along Airport Drive West to the north portion of the airport property line to support planned public works department development. Therefore, in conjunction with construction of the north airport access road to the north ramp, utilities could be extended to the northern portion of the north ramp area to allow for development.
- Utility expansion from the south and terminal area to the north ramp area will allow development to move southward to address demand. Development of the north ramp area will be dependent upon need and third party funding. "Through the fence" operations are not allowed, but the area could support a multitude of aviation uses. Depending upon need, development may start in the south corner and move north or vice versa. As part of hangar and building development, consideration must be given to avoid creating wind vortices that could negatively impact parachute operations.
- As part of this analysis, the viability of adding a controlled interior perimeter road to support tenant movement and airport maintenance and operations was also considered. Since a south parallel taxiway to Runway 5-23 is not needed to support

planned development, there is now space to add a 12 ft. wide perimeter road to allow access from the southwest portion of the airfield to the corporate hangar and terminal area. This would limit vehicles driving on active taxiways and runways.

Next Steps

The next steps in the master plan process is to provide a more in-depth analysis of potential environmental impacts and mitigation options, land use and acquisition, as well as identify projects to support airport sustainability over the planning period. **Chapter 6** will also include a summary of findings from the environmental analysis and associated recommendations as well as a solid waste management plan.

The recommendations outlined in this chapter and the remaining chapters of the narrative report are being graphically represented in the Airport Layout Plan. As part of the ALP, an updated Exhibit A property map which identifies all existing airport property with good title as well as existing and future land acquisition, and easements will also be provided. Both the narrative report and ALP are designed to provide the Airport and Sponsor a flexible development plan to address forecast demand and opportunities. Projects shown on the ALP may be eligible for federal and state funding, and **Chapter 9** provides a 20-year fiscally responsible Capital Improvement Program for future development based upon anticipated local share of revenues and expenses and likely FAA and State funding.

This information will be used to create a 20-year Capital Improvement Plan for the City of Sebastian and the Airport that may be used to assist with populating the airport's JACIP.

This Page was Intentionally Left Blank

CHAPTER SIX
Environmental Review and Analysis

Chapter Overview

The airport environmental review and analysis developed in this chapter outlines several environmental components and several different types of studies performed. As part of the Airport Master Plan we are to review current and future environmental impacts to the airport and surround areas for the next 20-years. These basic reviews include land uses around the airport, a two-day wildlife site visit to visual view types of wildlife attracts that are currently on or surround the airport within 2, 5 and 10-mile radius, another impacts that could pose an issue as we start laying out the Airport Layout Plan, 20-year Airport development.

However, due to concerns by the Sponsors, they requested several additional environmental studies which included a FL Scrub-Jay site assessment, general environmental assessment, wetland delineations with recommendations, Habitat Conversation Plan (HCP) review, coordinate with the County and US Fish and Wildlife Services and update if needed. These studies will be outlined later in this chapter.

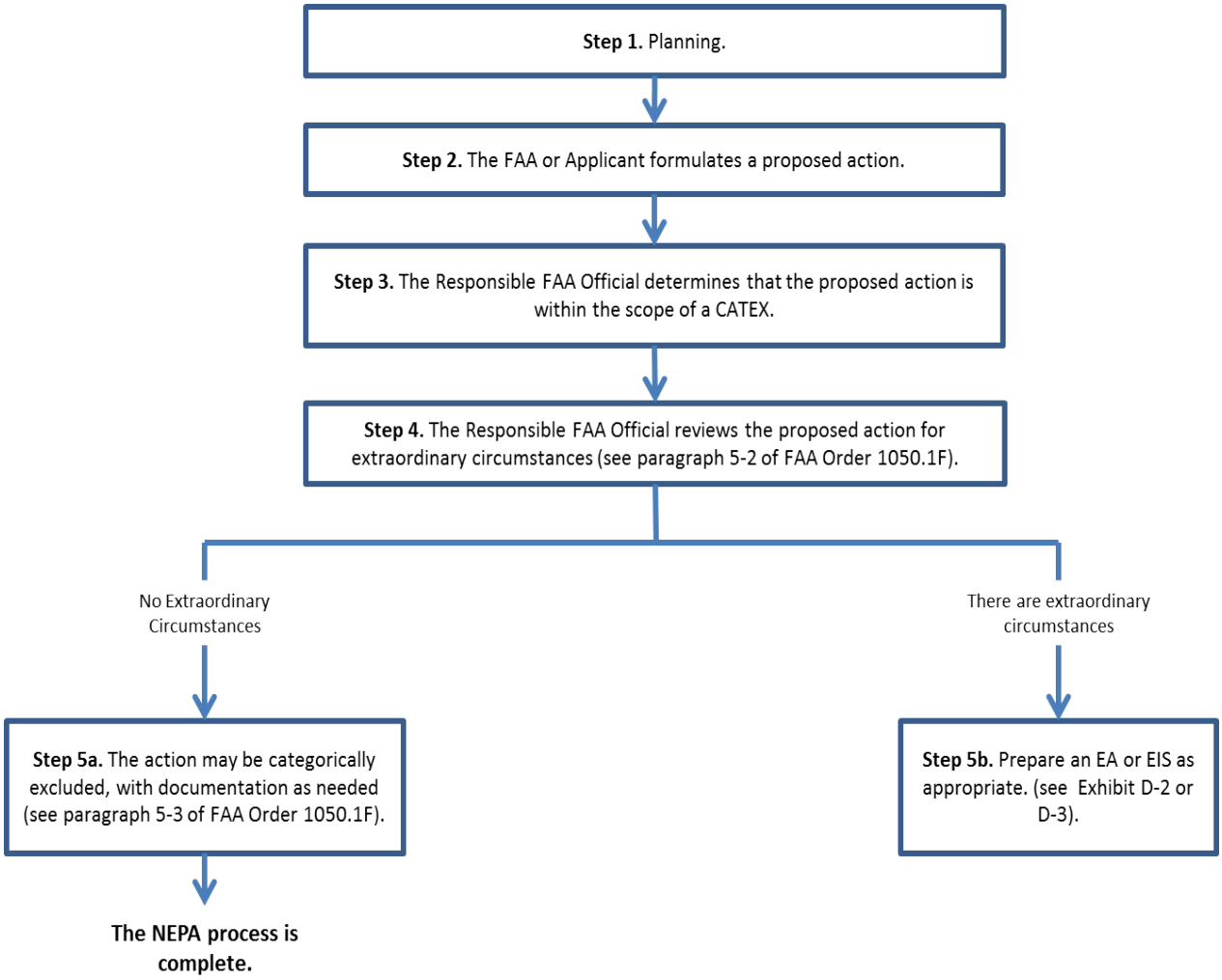
Environmental Action Plan

Existing conditions at X26 were determined using available literature and maps in addition to aerial photographs. FAA Order 1050.1E, *Environmental Impacts and Procedures,* provides guidelines in determining if an Airport project or action will require a categorical exclusion (CE), environmental assessment (EA) or environmental impact statement (EIS) documentation.

Environmental Documentation and Guidance

As airport improvements from the master plan are initiated, the FAA's Airports District Office (ADO) Environmental Program Manager will determine the required level of documentation for each project. **Figures 6-1 through 6-3** provide flowcharts related to typical environmental documentation requirements: Categorical Exclusion; Environmental Assessment and Environmental Impact Statement.

Figure 6-1
Typical Categorical Exclusion Process



Source: FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Appendix D, 7/16/2015

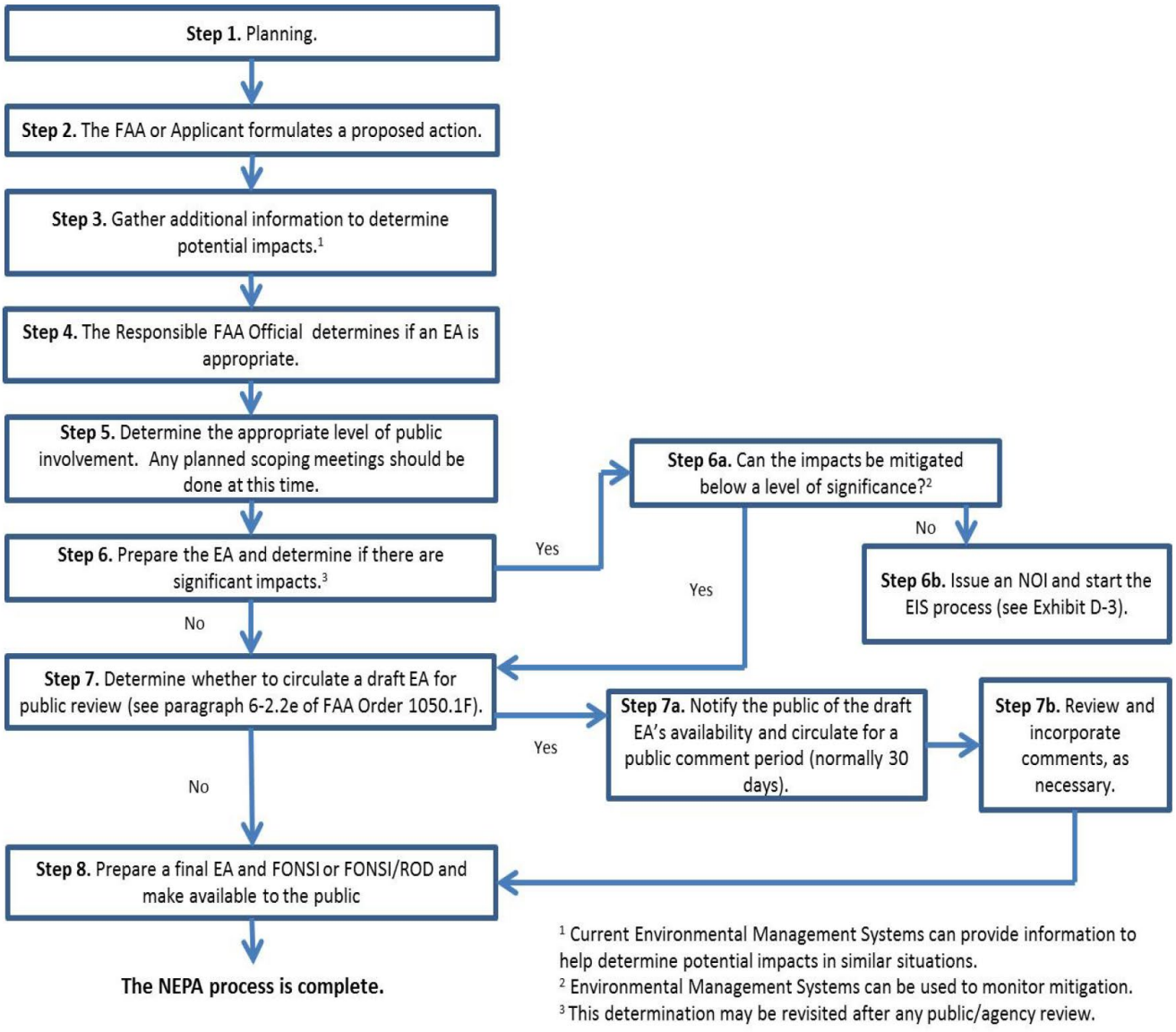
"The CATEXs are organized by the following functions:

- Administrative/General: Actions that are administrative or general in nature;
- Certification: Actions concerning issuance of certificates or compliance with certification programs;
- Equipment and Instrumentation: Actions involving installation, repair, or upgrade of equipment or instruments necessary for operations and safety;
- Facility Siting, Construction, and Maintenance: Actions involving acquisition, repair, replacement, maintenance, or upgrading of grounds, infrastructure, buildings, structures, or facilities that generally are minor in nature;
- Procedural: Actions involving establishment, modification, or application of airspace and air traffic procedures; and

Regulatory: Actions involving establishment of, compliance with, or exemptions to, regulatory programs or requirements."[1]

[1] FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Chapter 4, pg. 5-4, July 16, 2015.

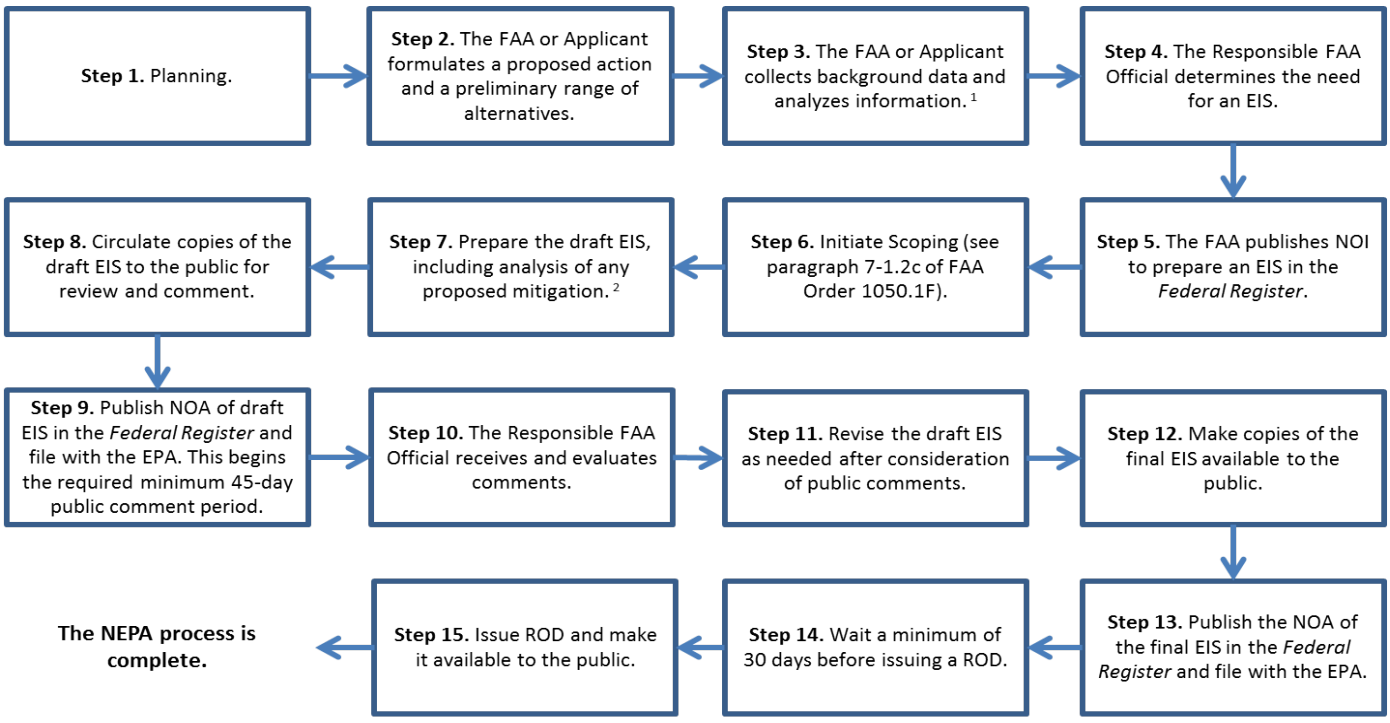
Figure 6-2
Typical Environmental Assessment Process



Source: FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Appendix D, 7/16/2015

Figure 6-3

Typical Environmental Impact Statement Process [22]



[1] Current Environmental Management Systems can provide information to help determine potential impacts in similar situations.
[2] Environmental Management Systems can be used to monitor mitigation.

Source: FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Appendix D, 7/16/2015

[22] In November 2014, DOT released guidance on implementing Section 1319 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a, which alters the EIS process for DOT actions. Section 1319(a) relates to errata sheets and reflects the CEQ regulations (see 40 CFR § 1503.4(c) and Paragraph 7-1.2(f) of this Order). Section 1319(b) requires DOT, to the maximum extent practicable, to expeditiously develop a single document that consists of a final EIS and a ROD, unless certain conditions exist. The DOT guidance is available at http://www.dot.gov/sites/dot.gov/files/docs/MAP-21_1319_Final_Guidance.pdf. AEE is preparing additional, FAA-specific guidance on implementing Section 1319 of MAP-21. LOBs/SOs are encouraged to work with AGC-600 and AEE-400 to ensure compliance with Section 1319(b).

Construction projects were identified as either having a low potential for natural resource environmental impacts or moderate to high potential for environmental impacts. **FAA Order 1050.1E**, Chapter 3, Section 310, *Categorical Exclusions for Facility Siting, Construction and Maintenance,* provides a list of categorical exclusions for FAA actions which are considered "generally minor in nature". However, *"An action on the categorically excluded list is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review paragraph 304, Extraordinary Circumstances, before finalizing a decision to categorically exclude a proposed action".*[2] Moderate to high potential for environmental impact may require either an Environmental Assessment (EA) or Environmental Impact Statement (EIS) since they may cause a change in airport operations and/or land use, such as increased use by heavy corporate jets, or are proposed in areas that may contain streams or forested uplands or are located in undeveloped uplands that do not have existing structures, access roads or buildings.

Anticipated permitting requirements are based upon current federal, state, and local environmental regulations. Anticipated environmental permitting associated with planned development at the airport may include:

TABLE 6-1
ENVIRONMENTAL DOCUMENTATION

Type of Impact	**Permits Typically Required**
Wetland, Swales and additional stormwater treatment	US Army Corps of Engineers (USACE) Section 404
Surface Water Impact	USACE Clean Water Act Section 404 Permit
One acre or more of land impacts	National Pollutant Discharge Elimination System (NPDES) Permit
Stormwater Management	Stormwater Pollution Prevention Plan Permit and Stormwater Construction Permit
Endangered Species	US Endangered Species Act Permit

Source: TKDA 2017

Further an environmental survey is recommended for all construction, drainage and lighting projects to identify and delineate wetlands, swales, surface waters, wildlife habitats, as well as

[2] FAA 1050.1F Desk Reference and FAA Order 1050.1F, July 2015

potential native vegetation impacts. Further, staging areas for the stockpiling of construction debris and materials should be selected in order to avoid impacts to these areas. If impacts to one or more of these areas are unavoidable then permitting, relocation and/or mitigation will be required.

An NPDES construction permit is required if the disturbance of greater than one acre of soil is proposed. If the area of land disturbance, including project staging area, is less than five acres, the NPDES permit would be for a small construction activity. If the area of land disturbance is greater than five acres, an NPDES permit for a large construction activity would be required.

If asbestos removal thresholds would be exceeded (removal of 260 linear feet or more of regulated asbestos containing materials (RACM) on pipe, removal of 160 square feet or more of RACM, removal of 35 cubic feet or more of RACM, proper notification should be provided to Florida Department of Environmental Protection (FDEP) prior to removal of RACM.

Lastly, any anticipated development (e.g. runway strengthening or extension) which may initiate changes to an airport's operations and fleet mix, would likely trigger a FAR Part 150 Noise Study and Environmental Assessment/Environmental Impacts Statement depending upon the level of impacts. Such a determination would be made by the Federal Aviation Administration – Airport District's Office based upon established FAA Orders, current guidelines, and potential local impacts. Additional environmental documentation required in conjunction with proposed development includes a Wetland and Protected Species Enhancement Plan, a Stormwater Pollution and Prevention Plan as well as maintaining and periodically updating the Airport Master Stormwater Drainage Plan.

Wildlife Hazard Site Visit

Because airports typically consist of large areas of open space and may be surrounded by undeveloped properties or property used for grazing or other agricultural uses, they are wildlife attractants. Birds, mammals and reptiles may be a hazard to air navigation when they congregate near the airport operating area (i.e. runways, taxiways, etc.) as well as within the runway approach and departure paths. Since wildlife on and adjacent to an airport can negatively impact aircraft operations, an initial two-day wildlife site visit was included as part of this master plan update as recommended under FAA Grant Assurance 19.

The two-day wildlife site visit was performed by Mr. Gary Exner who is a FAA qualified wildlife biologist and Danielle Gernert (FAA wildlife biologist in training). Mr. Exner and Ms. Gernert conducted daytime wildlife surveys in the morning and evening hours of February 8th - February 10th. The report of their findings based upon existing habitat conditions, observations of current wildlife migration, movement and other knowledge in addition to their interviews with airport staff is provided in of this report.

Although there are only two reported wildlife strikes documented in the FAA Wildlife Strike Databased at X26, there have been unreported bird strikes. According to users and airport staff, bird strikes do occur but have not caused any damage to aircraft.

In addition, Mr. Exner and Ms. Gernert saw many types of bird species, including raptors. In addition, we noticed mammal activity on the airport including small mammals, such as moles, mice, ground squirrels, and rabbits. Although these small mammals do not normally pose a direct hazard to aeronautical activity, their presence may be likely to attract large predatory species of birds and mammals, which can cause damage to aircraft, passenger injury and possible death. Further, since X26 is surrounded by residential and conservation land, the study assumed that other meso-mammals and large mammals such as hogs, coyotes and bobcats may be found within the vicinity of the airport.

The biologists did observe various species of birds and waterfowl within the vicinity of the airport. With the Indian River less than five-miles of the airport's east-side and conservation land on the north and west sides of the airport, biologists noted witnessed birds and waterfowl in the morning coming out of roost, flying over the airport to the river and back again in the evening. Also, noted that a large portion of the airport is surrounded by a very active golf course which in itself is a wildlife attractant. Ponds are known to attract birds, waterfowl and

other wildlife species, discussions with the owner and operators of the ponds as well as airport management, the Sponsor and on-airport tenants have stated that they have never seen any waterfowl or other birds on or near the ponds.

Since wildlife activity both on and around the airport was observed during the morning and evening site visit, it is recommended that a year-long wildlife hazard assessment be performed to determine the level and type of activity. Based upon the wildlife site assessment, it will be subsequently determined if a Wildlife Hazard Management Plan is required for Sebastian Municipal Airport. With new regulations about wildlife management on the horizon, we feel that X26 would benefit greatly and easily be able to implement a Wildlife Hazard Management Plan.

In the meantime, the initial findings and facility recommendations of the preliminary wildlife site visit used to populate the airport layout plan set as well as 20-year Airport Capital Improvement Program developed as part of this master plan update. Facility recommendations include repairs and maintenance to existing fence, (upgrade to approved wildlife fence) around the perimeter of the airport as well as some habitat modification. It was also recommended that X26 staff utilize a wildlife log to record wildlife observations, dispersal and other efforts to keep wildlife off the airport.

These initial recommendations along with others will be incorporated into recommended airport development. Preliminary cost estimates will be created to support infrastructure improvements including fencing and possible pond relocation, if found viable, as well as costs for the recommended year-long wildlife hazard assessment and potential development of a wildlife hazard management plan and associated airport personnel training. Although FAA Airport Improvement Program (AIP) funding may not be available to support a recommended Wildlife Site Assessment and Management Plan since aircraft operations at X26 are not expected to exceed 75,000 during the twenty-year planning period, funding may be available from other sources including FDOT Aviation, United States Wildlife Services, and the airport sponsor. Anticipated project phasing, costs and anticipated funding analysis is provided in Chapter 9, Airport Implementation Plan.

Wildlife Hazard Assessment Site Visit Evaluation Data

DRAFT AC 150/5200-XX (WHSV, WHA, WHMP)

Airport Wildlife Hazard Site Visit Checklist

Airport Name: Sebastian Municipal Airport (X26)		
Date of Site Visit: Feb. 8 – Feb. 10		**Time:** Morning, Midday and Night
Airport Representative: Scott Baker, Airport Director		
Qualified Airport Wildlife Biologist: Gary Exner / Danielle Gernert (Wildlife Biologist)		
	Yes/No	**Comments/Observations**
Information review		
Personnel and departments responsible for airport ops	Yes	
Type of airport/annual movements	Yes	
Recent improvements	Yes	
Strike records (in database or airport records)	Yes	
Depredation permits	n/a	Sebastian currently does not have a Migratory Bird Depredation Permit. **(Recommended)**
Review of habitat management activities		
Mowing	Yes	
Clearing ditches of vegetation	Yes	Some areas need to be addressed for habitat management
Tree removal	Yes	Some trees have been removed; however, in the Master Plan we address additional tree removal along with side-slope vegetation management.
Other		
Review wildlife management activities		
Pyrotechnics	n/a	
Fencing	Yes	Currently 6ft high with 3 strands of barbed wire. Some areas need repair and Wildlife Exclusion Fencing is Recommended for future development.
Wildlife removal (lethal, trapping, etc.)	n/a	
Nest removal	n/a	
Other		
Review Plan (if applicable)	n/a	No management plan
Observe features on airport property that may attract wildlife		
Wetlands	Yes	See Wetland Survey
Ditches	Yes	
Stormwater Treatment Areas	Yes	
Forested/Shrub Areas	Yes	Scrub-Jay on airport property. See Scrub-Jay Assessment
Abandoned Structures	Yes	
Construction Sites/Debris	Yes	Large Dirt Piles

38

DRAFT AC 150/5200-XX (WHSV, WHA, WHMP)

Airport Wildlife Hazard Site Visit Checklist (page 2)

Observe features adjacent to airport property that may attract wildlife (5,000 ft 10,000 ft 5 miles)		
Wetlands	Yes	
Agriculture	No	
Forested/Shrub Areas	Yes	Conversation areas within 5 miles of the Airport
Golf Courses	Yes	On Airport Property. Recommend that the golf course have a habitat management agreement and coordinate with the Airport on best practices.
Other		
Observe and identify wildlife species and/or sign		
List all wildlife observed	Yes	Please list on separate data sheet
List all wildlife sign observed	Yes	Please list on separate data sheet
State and/or Federally Listed Species	Yes	
Site Visit Report		
General airport information	Yes	
Strike data analysis	Yes	Only 2 strikes reported
List of bird/mammal species observed and times of observations	Yes	
State and federal status of species	Yes	
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport	Yes	
Map of airport with location of wildlife attractants on or near airport and observations	Yes	
Recommended actions* for reducing identified wildlife hazards to air carrier operations	n/a	
Recommendation regarding whether a 12-month wildlife hazards assessment is necessary	Yes	Recommended and justified

***Recommendations can include (but are not limited to) the following:**

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed
- Keep vegetation maintained along fencing (clearing and removal as needed)
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

State and Federally Listed Species for Indian River County

State and Federally Listed Species for Indian River County



- Note: Only federally listed plant species are included; "="means a.k.a.; "SA" means similarity of appearance

Scientific Name	Common Name	State	USFWS	Habitats Used
Amphibians				
Rana capito	Gopher (=crawfish) frog	Sp. Spec. Concern		Longleaf Pine/Turkey Oak Hills, Sand Pine Scrub, Scrubby Flatwoods, Xeric Oak Hammock (uses ephemeral wetlands for breeding)
Birds				
Aphelocoma coerulescens	Florida scrub-jay	Threatened	Threatened	Sand Pine Scrub and Scrubby Flatwoods
Aramus guarauna	Limpkin	Sp. Spec. Concern		Mangrove Swamp, Freshwater Marsh & Ponds, Cypress Swamp, Springs, Slough, Sawgrass Marsh, Ruderal (impoundments, canals, sugarcane, etc.)
Athene cunicularia floridana	Florida burrowing owl	Sp. Spec. Concern		N. & S. FL Flatwoods (dry prairie or grassland habitat), Ruderal (primarily pasture)
Egretta caerulea	Little blue heron	Sp. Spec. Concern		N. & S. FL Coastal Strand, Wet Prairie or Slough, Freshwater Marsh & Ponds, Mangrove Swamps, Cypress Swamp, Sawgrass Marsh, Salt Marsh, Shrub Bog & Bay Swamp, Ruderal
Egretta rufescens	Reddish egret	Sp. Spec. Concern		Mangrove Swamp, N. & S. FL Coastal Strand, Salt Marsh
Egretta thula	Snowy egret	Sp. Spec. Concern		N. & S. FL Coastal Strand, Wet Prairie or Slough, Freshwater Marsh & Ponds, Mangrove Swamps, Cypress Swamp, Sawgrass Marsh, Salt Marsh, Shrub Bog & Bay Swamp, Ruderal
Egretta tricolor	Tricolored (=Louisiana) heron	Sp. Spec. Concern		N. & S. FL Coastal Strand, Wet Prairie or Slough, Freshwater Marsh & Ponds, Mangrove Swamps, Cypress Swamp, Sawgrass Marsh, Salt Marsh, Shrub Bog & Bay Swamp, Ruderal
Eudocimus albus	White ibis	Sp. Spec. Concern		N. & S. FL Coastal Strand, Wet Prairie or Slough, Freshwater Marsh & Ponds, Mangrove Swamps, Cypress Swamp, Sawgrass Marsh, Salt Marsh, Shrub Bog & Bay Swamp, Ruderal
Falco peregrinus	Peregrine falcon	Endangered		N. & S. FL Coastal Strands (winter), Various Terrestrial and Ruderal Habitats
Falco sparverius paulus	Southeastern American kestrel	Threatened		Open Forests, Clearings, Ruderal, Various Open Habitats

Page 1 FOTG Section II (D)(1)(c) December 2007

State and Federally Listed Species for Indian River County

- Note: Only federally listed plant species are included; "=" means a.k.a.; "SA" means similarity of appearance

Scientific Name	Common Name	State	USFWS	Habitats Used
Grus canadensis pratensis	Florida sandhill crane	Threatened		N. & S. FL Flatwoods, Wet Prairie or Slough, Dry Prairie, Shallow Freshwater Marsh, Ruderal (pasture, crop fields, etc.)
Haematopus palliatus	American oystercatcher	Sp. Spec. Concern		Exposed Mollusk Reef, N. & S. FL Coastal Strand, Ruderal Areas
Haliaeetus leucocephalus	Bald eagle	Threatened		Nearly throughout (estuarine, lacustrine, riverine, terrestrial); nests are usually near water
Mycteria americana	Wood stork	Endangered	Endangered	N. & S. FL, Everglades & Cabbage Palm Flatwoods, Pitcher Plant Bog, Sloughs, Sawgrass Marsh, Swamp & Bottomland Hardwoods, Cypress Swamp, Freshwater Marsh & Ponds, Salt Marsh, Wetland Hardwood Hammock, Shrub Bog and Bay Swamp, Cutthroat Seeps
Pelecanus occidentalis	Brown pelican	Sp. Spec. Concern		Coastal Islands, Open Water
Platalea ajaja	Roseate spoonbill	Sp. Spec. Concern		Freshwater Marsh & Ponds, Sloughs, Mangrove Swamp, Sawgrass Marsh, Ruderal (impoundments, spoil banks)
Polyborus plancus audubonii	Audubon's crested caracara	Threatened	Threatened	S. FL & Cabbage Palm Flatwoods, Dry Pairie, Wet Prairie or Slough, Wetland Hardwood Hammock, Ruderal (pasture & grasslands)
Rostrhamus sociabilis plumbeus	Everglades snail kite	Endangered	Endang. - Crit. Hab. Designated	S. FL Flatwoods, Sloughs, Sawgrass Marsh, Freshwater Marsh & Ponds, Cypress Swamp
Rynchops niger	Black skimmer	Sp. Spec. Concern		N. FL Coastal Strand, Ruderal (commonly nests in rooftops)
Sterna antillarum	Least tern	Threatened		N. FL Coastal Strand, Ruderal (commonly nests in rooftops)
Fish				
Rivulus marmoratus	Mangrove rivulus; rivulus	Sp. Spec. Concern		Salt Marsh, Mangrove Swamp
Mammals				
Peromyscus polionotus niveiventris	Southeastern beach mouse	Threatened	Threatened	S. FL Coastal Strand
Podomys floridanus	Florida mouse	Sp. Spec. Concern		Longleaf Pine/Turkey Oak Hills, Sand Pine Scrub, Scrubby Flatwoods

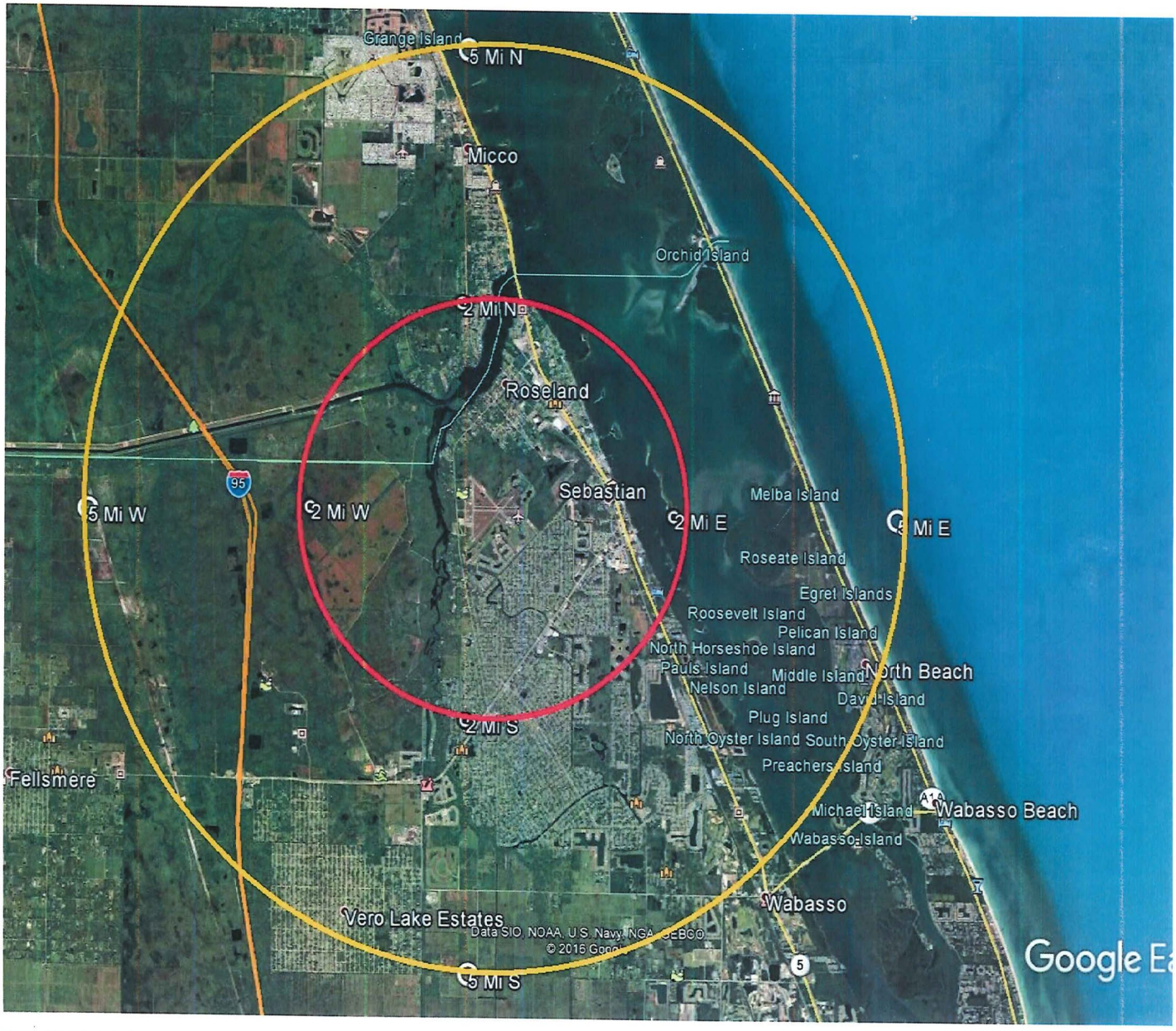
Page 2 FOTG Section II (D)(1)(c) December 2007

State and Federally Listed Species for Indian River County

- Note: Only federally listed plant species are included; "=" means a.k.a.; "SA" means similarity of appearance

Scientific Name	Common Name	State	USFWS	Habitats Used
Sciurus niger shermani	Sherman's fox squirrel	Sp. Spec. Concern		N. & S. FL Flatwoods, Longleaf Pine/Turkey Oak Hills, Ruderal
Trichechus manatus	West Indian (=Florida) manatee	Endangered	Endang. - Crit. Hab. Designated	Mangrove Swamp, Seagrass, Nearshore Reef, Alluvial, Blackwater & Spring-run Streams
Plant - Monocots				
Halophila johnsonii	Johnson's seagrass		Threatened	Seagrass
Reptiles				
Alligator mississippiensis	American alligator	Sp. Spec. Concern		All Flatwoods, Bogs, Sloughs, Swamps, Marshes, Sloughs and Perennial Water Bodies
Caretta caretta	Loggerhead turtle	Threatened	Threatened	N. & S. Coastal Strand, Seagrass, Nearshore Reef
Chelonia mydas mydas	Green sea turtle	Endangered	Endangered	N. & S. Coastal Strand, Seagrass, Nearshore Reef
Dermochelys coriacea	Leatherback turtle	Endangered	Endang. - Crit. Hab. Designated	N. & S. Coastal Strand, Seagrass, Nearshore Reef
Drymarchon corais couperi	Eastern indigo snake	Threatened	Threatened	E. indigo snakes use just about all FL Ecol. Communities, Ruderal
Gopherus polyphemus	Gopher tortoise	Sp. Spec. Concern		N. & S. Coastal Strand, Longleaf Pine/Turkey Oak Hills, Sand Pine Scrub, Scrubby Flatwoods, Tropical Hammock, Ruderal
Nerodia clarkii taeniata	Atlantic salt marsh snake	Threatened	Threatened	Salt Marsh, Mangrove Swamp
Pituophis melanoleucus mugitus	Florida pine snake	Sp. Spec. Concern		Longleaf Pine/Turkey Oak Hills, Scrubby Flatwoods, Xeric Oak Hammock, Ruderal

Map Showing the Observation Radius



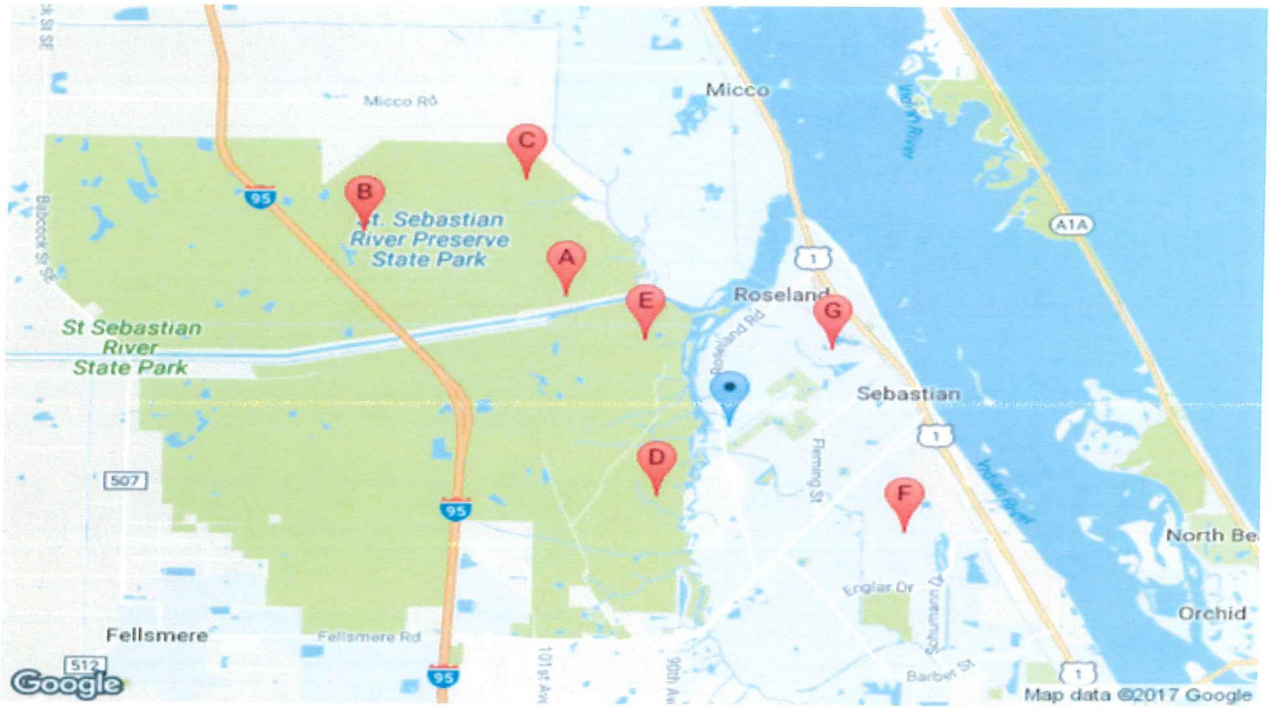
Report and Map Showing Bald Eagle Nest Near the Airport

This report was generated using the bald eagle nest locator at https://public.myfwc.com/FWRI/EagleNests/nestlocator.aspx on 2/8/2017 8:05:11 PM.

Search Entered: Within 5 miles of 202 Airport Drive, Sebastian, FL (latitude 27.8098294 and longitude -80.501977); All Search Results

7 record(s) were found; 7 record(s) are shown

Bald Eagle Nest Map:



Bald Eagle Nest Data Search Results:

Results per page: All

Letter	Nest ID	County	Latitude	Longitude	Township	Range	Section	Gaz Page	Last Known Active	Last Surveyed	Act 11	Act 12	Act 13	Act 14	Act 15	Dist. (Mi)
A	BE014	Brevard	27 50.12	80 31.87	30S	38E	00	96	2012	2012	*	Y	*	*	*	2.51
B	BE035	Brevard	27 50.89	80 34.00	30S	38E	00	96	2012	2012	*	Y	*	*	*	4.76
C	BE043	Brevard	27 51.50	80 32.30	30S	38E	00	96	2002	2012	*	-	*	*	*	4.02
D	IN001	Indian River	27 47.74	80 30.88	30S	38E	00	96	2014	2014	*	Y	*	Y	*	1.25
E	IN004	Indian River	27 49.61	80 31.03	30S	38E	00	96	2014	2014	*	Y	*	Y	*	1.50
F	IN011	Indian River	27 47.32	80 28.27	31S	39E	18	96	2012	2014	*	Y	*	N	*	2.38
G	IN017	Indian River	27 49.50	80 29.05	30S	38E	00	96	0	2014	*	*	*	U	*	1.51

"Y" denotes an active nest
"N" denotes an inactive nest
"-" denotes an unobserved nest
"U" denotes a nest that was visited but status was undetermined
"*" denotes a nest that was not surveyed

Wildlife Hazard Daily Inspection Forms

Wildlife Hazard Assessment Report
Date: February 10, 2017
Observer: Gary Exner/Danielle Gernert/Kristie Anderson

Time	Location	Weather	Animal/Species	Activity	Action Taken
Early AM	Inside AOA	Cool – Partly Cloudy	Cattle Egrets (5)	Foraging	
		Cool – Partly Cloudy	Crows (8)	Flying	
		Cool – Partly Cloudy	3 Active Gopher Tortoise Borrows		
		Cool – Partly Cloudy	Kill Deer (3)	Foraging	
	Outside AOA – 2 miles	Cool – Partly Cloudy	Osprey (2)	Flying	
		Cool – Partly Cloudy	White Pelicans (25-30)	In the Water	
		Cool – Partly Cloudy	Sand Hill Cranes	Foraging on Golf Course	
	Outside AOA – 5 miles	Cool – Partly Cloudy	Bald Eagles (1 Mature & 1 Immature)	Flying	
		Cool – Partly Cloudy	Great Heron	Foraging	
Midday	Inside AOA	Cool – Partly Cloudy	Cattle Egrets (5)	Foraging	
	Outside AOA – 2 miles	Cool – Partly Cloudy	Sea gulls	Flying	
	Outside AOA – 5 miles	Cool – Partly Cloudy	Osprey (2)	Flying	
Evening	Inside AOA	Cool – Partly Cloudy	Kill Deer (3)	Foraging	
		Cool – Partly Cloudy	Night Hawk	Flying	
	Outside AOA – 2 miles	Cool – Partly Cloudy	Raccoon (3)	walking	
	Outside AOA – 5 miles	Cool – Partly Cloudy	Deer (4)	foraging	

Wildlife Hazard Assessment Report
Date: February 9, 2017
Observer: Gary Exner/Danielle Gernert/Kristie Anderson

Time	Location	Weather	Animal/Species	Activity	Action Taken
Early AM	Inside AOA	Cool	Cattle Egrets (8)	Foraging	
		Cool	Tree Swallows (1)		
		Cool	3 Active Gopher Tortoise Borrows		
		Cool	Palm Warbler (3)	Flying	
		Cool	Kill Deer (7)	Foraging	
	Outside AOA – 2 miles	Cool	Mocking Birds (2)	Flying	
		Cool	Hawks (2) - Flying and Nesting in Trees on Golf Course Next to AOA Fence Line		
		Cool	Sand Hill Cranes	Foraging on Golf Course	
	Outside AOA – 5 miles	Cool	Bald Eagles (1 Mature & 1 Immature)	Flying	
		Cool	2 Vultures	Flying	
Midday	Inside AOA	Cool	Cattle Egrets (5)	Foraging	
	Outside AOA – 2 miles	Cool	Sea gulls	Flying	
	Outside AOA – 5 miles	Cool	Bald Eagles (1 Mature & 1 Immature)	Flying	
Evening	Inside AOA	Cool	Kill Deer (3)	Foraging	
		Cool	Night Hawk	Flying	
	Outside AOA – 2 miles	Cool	Raccoon	walking	
	Outside AOA – 5 miles	Cool	Deer (1)		

Wildlife Hazard Daily Inspection Notes of Concern

- Muck with snails
- Various bird prints in muck
- Grass within AOA cut to short
- Trees and vegetation to close to fence
- Large body of water with muck and animal prints
- Several large dirt piles within the AOA allowing for birds to perch

Florida Scrub-Jay Assessment

Florida Scrub-Jay General Survey Guidelines and Protocols

(Updates 08/24/2007 - 05/02/2016 office address only)

Adapted from: *J.W. Fitzpatrick, G.E. Woolfenden and M.T. Kopeny. 1991. Ecology and development-related habitat requirements of the Florida scrub-jay (Aphelocoma coerulescens). Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program Technical Report No. 8. Tallahassee, FL. 49pp.*

The most effective method for surveying a site for Florida scrub-jays is to traverse the area systematically, using a high quality tape recording of Florida scrub-jay territorial scolding in an attempt to attract the jays. The recording should include clear examples of all typical territorial scolds, including the female " hiccup" call. Vocalizations are available by contacting:

Macaulay Library
Cornell Lab of Ornithology
159 Sapsucker Rd.
Ithaca, NY 14850
Contact them via email by clicking here or visit them online at: http://birds.cornell.edu

Map plant communities either on a 7.5 foot U.S. Geological Survey (USGS) topographic map or an aerial photograph at a scale of no more than 400 feet per inch. The vegetation map must show all forms of existing development. On the vegetation map, establish parallel line transects with playback stations along each transect. Space the transects and playback stations so that all different scrub types will be sampled for jays (i.e., so that the taped calls will be effectively broadcast across areas of concern). These scrub types should include not only the more "

classic" xeric oak scrub, scrubby pine flatwoods, scrubby coastal strand, and sand pine scrub, but should also include:

- pine-mesic oak
- xeric oak
- sand live oak
- improved, unimproved, and woodland pastures;
- citrus groves;
- rangeland;
- pine flat woods;
- longleaf pine xeric oak;
- sand pine;
- sand pine plantations;
- forest regeneration areas;
- sand other than beaches;
- disturbed rural land in transition without positive indicators of intended activity; and disturbed burned areas.

The presence of scrub oaks, no matter how sparsely distributed, is the key indicator of " scrub" habitat.

Distances between transects, and between stations along transects, depend on many factors, including power of the speaker used for broadcasting the calls, topography of the site, and the density of the surrounding vegetation. Adequate spacing between transects can be estimated roughly as the distance at which a person listening to the tape directly in front of the speaker perceives the " bird" to be no more than about 100 meters away. A distance of 100 to 200 meters between transects and between stations is generally adequate when using a good-quality, hand-held cassette player broadcasting at full volume.

Surveys should be carried out on calm, clear days about one hour after sunrise, and should terminate before midday heat or wind. Surveys should not be conducted in winds stronger than a moderate breeze (5-8 mph), in mist or fog, or in precipitation exceeding a light, intermittent drizzle. Heat and especially wind lowers the tendency for jays to respond to distant territorial scolds, and wind reduces the distance over which recordings can be heard. Jays are also reluctant to fly on windy days regardless of hour or season. Surveys also should NOT be conducted if accipiters or other scrub-jay predators are present in the area; in the event this is the case, the surveyor should either wait until the predator is gone or come back on another day.

Surveys may be conducted anytime between March 1 through October 31. However, Ideal survey periods include: 1) spring (especially March), 2) fall (September and October), when territorial displays are most frequent and vigorous, and 3) midsummer (July) when young of the year are independent but still distinguishable by plumage. The poorest times of the year to survey are late winter, when jays are most likely to fly far for food, and late spring when the young are quiet and the adults are occupied with molt and feeding fledglings.

Transects may be driven or walked. If driven, step out or stand atop the vehicle at each playback station. Broadcast the calls at each station for at least 1 minute in all four directions around the playback station, emphasizing any direction in which low-growing oak scrub is the predominant vegetation. On the vegetation map, plot the locations and indicate group size of all Florida scrub-jays where they are first seen or heard. Distinguish adult-plumaged jays from juvenile-plumaged jays whenever possible.

At localities with car trails, large areas of scrub can be surveyed with a vehicle in one day. On foot, the process is more laborious because of the relatively large size of territories (often 10 to 40 acres). Once a group is located, stop broadcasting at that station. Remaining at this station briefly should result in the assembly of the entire group. This allows one to estimate group size and, if done during the midsummer, to distinguish young of the year from adults.

Sometimes two or more groups will be attracted to one station, usually from different directions. Observers should be careful, therefore, to plot each group where it was first spotted or heard, not at the site to which the jays were attracted. In rare circumstances, especially at sites where numerous groups congregate at artificial food or water sources, it may be difficult to differentiate groups. This is especially true where jays have become habituated and tame to human approach. Again, in such cases careful observation is extremely important. Studies of such congregations using color-marked jays have confirmed that almost always they consist of members of different family groups. Often they may have crossed several territory boundaries to reach the neutral feeding or drinking areas. The result gives a false impression of extremely high jay density.

It is essential that the subject area be surveyed as often as necessary (for a minimum of 5 days) to establish an accurate count of jay groups and territorial boundaries. If more than 8 to 10 jays are encountered at a single playback station during a fall or spring survey period, the jays at this site should be monitored carefully over several visits and different times of day. Numbers will shift as groups arrive and depart. Often it is possible to watch where the jays come from or return to as a means of determining how many groups are represented. For determining territorial boundaries, it is essential that the surveyor be familiar with different types of behavior exhibited by scrub-jays. Territorial boundaries may be most accurately predicted through a combination of observing scrub-jays and listening for territorial behavior (in the case

where several families of scrub-jays exist in contiguous habitat) or by including habitat suitable for occupation by scrub-jays within a territorial boundary (in the case where a family of scrub-jays is somewhat isolated from other groups). If a question exists as to how many groups of scrub-jays are onsite, or where to draw territorial boundaries, it is strongly recommended that the U.S. Fish and Wildlife Service receive permission from the land owner to conduct an independent survey onsite.

The key end products of this procedure are: (1) a complete count of all jay groups onsite and (2) an approximate territory map or home range center for each group. Provide the U.S. Fish and Wildlife Service with a final report that includes the following, as applicable:

A. An information sheet including:

- Dates and starting and ending times of all surveys conducted.
- Weather conditions during all surveys, including average temperature, wind speed and direction, visibility, and precipitation.
- Total number of jay groups found, number of jays in each group and number of juvenile-plumaged jays in each of these groups.

B. An aerial photograph or vegetation map depicting:

- The entire area of interest.
- Transect lines and playback stations.
- Locations of all jays seen or heard while conducting the survey or at any other time, including flight direction.
- Approximate suspected territory boundaries between jay groups or suspected home range centers for each group.

Mail Scrub-jay survey reports to:

North Florida Counties

Scrub-Jay Survey
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville , FL 32256-7517

South Florida Counties

Scrub-Jay Survey
U.S. Fish and Wildlife Service
1339 20 th St.
Vero Beach, FL 32960-3559

Scrub-Jay Surveyed Areas

Survey Days: Sunday May 7, 2016 - Thursday May 11, 2016

Time: 6:30am – noon each day.

Area 1 is near the conservation area with reported current Jay population, we are looking for birds in number, nesting, feeding and flying. These birds maybe banded, if so we need to try to get band numbers so I can report this active back to the county and include in the site visit daily reports.

Area 2 is totally cleared and last monitored no birds on the site, just doing this as a formality so that we have it documented that this area is not active.

We did not enter the AOA during these visits as both locations are outside the fence.

Area 1



Area 2



Observation Points for Area 1

FLORIDA SCRUB JAY SURVEY

SEBASTIAN MUNICIPAL AIRPORT – WEST STUDY AREA 5/8/2017

Approximate Range Limits identified per surveys 5/7/2017 and 5/8/2017.

Degrees-Minutes.Minutes

Ops. Pt. 1- S.E. 27° 49.107'N, 80° 30.112' W. South along the AOA fence.

Ops. Pt. 2- N.E. 27° 49.182'N, 80° 30.092' W. North along the AOA fence north of Gate.

Ops. Pt. 3- N.E. 27° 49.155'N, 80° 30.173' W. West along Airport Road- south side.

Ops. Pt. 4- N.E. 27° 49.127'N, 80° 30.127' W. West side of Airport Road north of Mulch Gate.



APPROXIMATE RANGE FOR POSSIBLE SINGLE FLORIDA SCRUB JAY COLONY

Data Sheets for Area 1

Area 1

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: GE/DG/KA

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
1	5/7/17	6:30 Am	12:00pm	52° at 6:30Am 75° at noon	5mph	W	Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
1	1	0	FY / PG	photos	GPS 27°49.154°N 80°30.127°W
1	1		Responding to Calls	photos	PG on Dahoon Holly then Back East

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

GE = Gary Ekner
DG = Danielle Gernert
KA = Kristie Anderson

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: GE/DG/KA

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
1	5/8/17	6:30AM	12:00pm	57° 6:30am 73° noon	4mph	W	Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
1	2	0	FY / PG / PG	photos	PG on Pine till 8Am Response to calls
1	Same	0	multiple visits	photos	numerous responses to the calls

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: GE/DG/KA

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
1	5/9/17	6:30AM	12:00pm	63° 74°	1mph	NE	Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
1	2	0	FY/FG/PG	photos	paired on perch 6:30AM-7:00AM
Heard in the area - all activity stopped					

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: GE/DG/KA

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
1	5/10/17	6:30AM	12:00pm	63° 74°	4mph	W	Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
1	1	0	FY/PG	photos	Foraged several times starting @ 7:30 AM

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: GE/DG/KA

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
1	5/11/17	6:30AM	12:00pm	46° 52°	3mph	WSW	Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
1	2	0	Pair FY/~~FG~~	photos	Pair in photos
					Male responded to calls till 8:22am

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

Areas 1 is part of the current incidental take permit and is able to be developed in the future. This area is home to gopher tortoise populations (medium to high). During the planning phase of development, a plan needs to be in place as to how and where these animals will be removed and relocated. Permits will be required.

No Observation Points for Area 2

Data Sheets for Area 2

Area 2

Sebastian Airport Scrub Jay Survey
Sunday, May 8, 2017 - Thursday, May 11, 2017

Initials of Observer: DG/ms

Site Location	Date	Start Time	End Time	Average Temp.	Wind Speed	Wind Direction	Visibility	Precipitation
2	5/7/17 - 5/11/17	6:30am	12:00pm				Clear	0

Total Number of Jay Groups	Number of Jays in Each Group	Number of Juvenile Plumaged Jays in Each Group	Jay Activity	Jay Band Number	Additional Information
no	activity in the area				
no	response to calls in this area				
Jays observed north of Area 2 on the County property. All activity stayed in the wooded area.					

Activity: Flying - FY, Feeding - FG, Nesting - NG, Perching - PG

DG = Danielle Grenert
MS = Michelle Stromberg

Areas 2, is able to be developed in the future. However, this area has the potential to become habitat for gopher tortoise, during the planning phase of development a plan needs to be developed as to how and where these animals will be relocated (if needed). If development is not going to occur within 6 months of this report, a new survey will need performed to insure that gopher tortoise have not inhabit in this area. Permits will be required.

Photos During Daily Site Visits (Area 1)







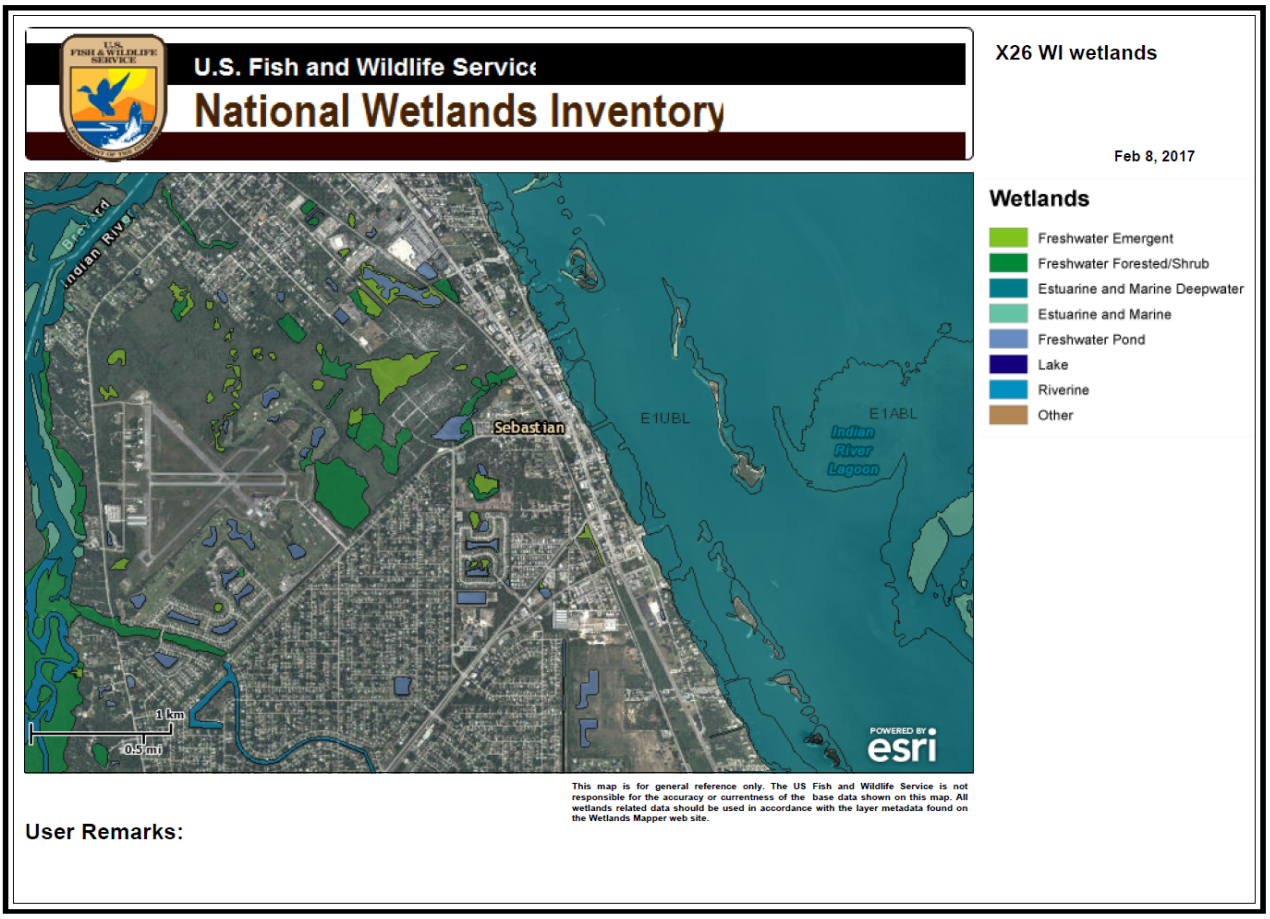






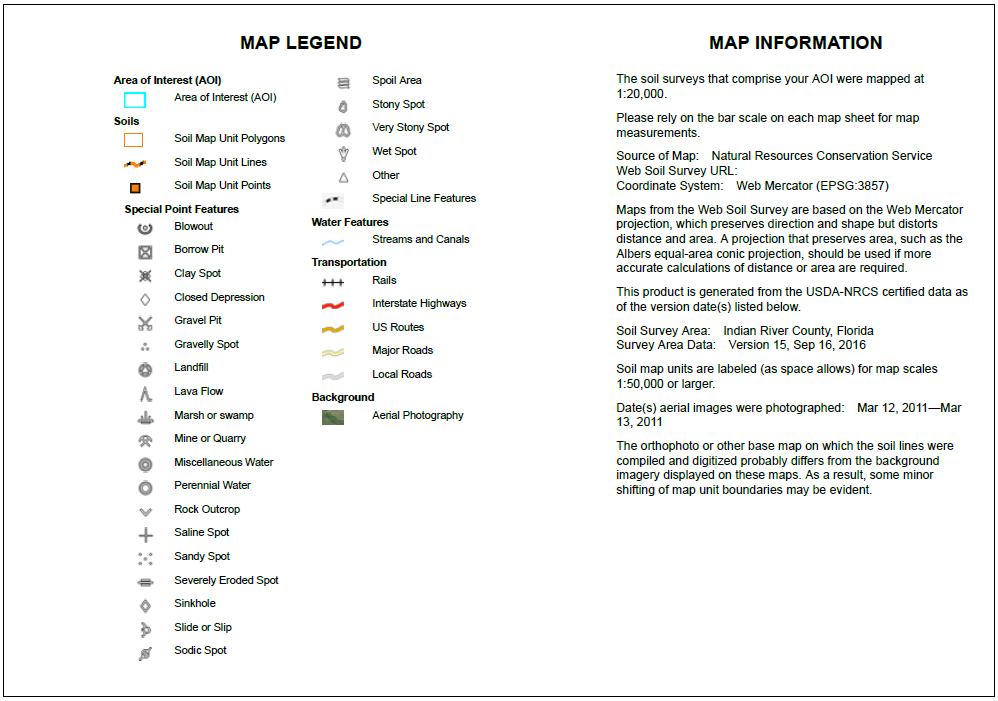
Wetland Delineations and Recommendations

The TKDA team along with Gary Exner (Advantage Consulting) conducted a wetland delineation site survey. Site survey was completed August 30, 2017 – September 1, 2017. The team using the map from the U.S. Fish and Wildlife Services (USFWS) National Wetlands Database to identify potential wetland locations and determine if in fact a wetland existed as noted by USFWS. A total of 7 potential wetlands were identified and investigated, below are the areas in question and determinations of the finds at each location. All guidelines from The Florida Wetland Delineation Manual were followed as each site was surveyed.




Soil Map—Indian River County, Florida
(Sebastian Airport NRCS Soils 1)
128th St
130th St
Roseland Rd
Royal Palm St
Herndon St
Maple St
Toledo St
Thomas St
512
1
Map Scale: 1:19,000 if printed on A portrait (8.5" x 11") sheet.
Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84
Natural Resources Conservation Service
Web Soil Survey
National Cooperative Soil Survey
2/8/2017
Page 1 of 3

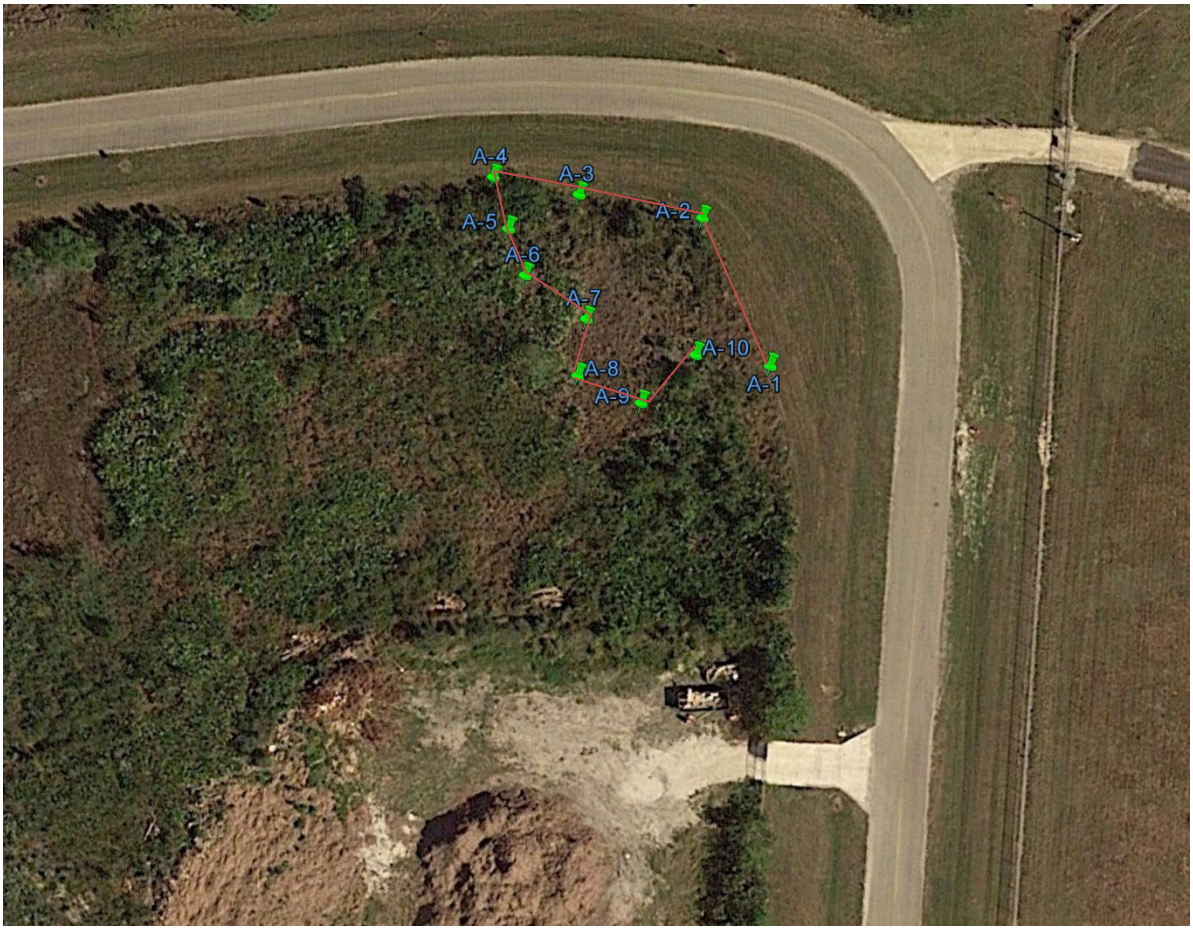
Soil Map—Indian River County, Florida
(Sebastian Airport NRCS Soils 1)



Map Unit Legend

Indian River County, Florida (FL061)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
4	Immokalee fine sand	619.9	56.9%
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	61.8	5.7%
21	Pomello sand, 0 to 5 percent slopes	17.1	1.6%
22	Urban land	109.1	10.0%
23	Arents, 0 to 5 percent slopes	138.5	12.7%
34	Satellite fine sand	56.6	5.2%
45	Myakka fine sand, frequently ponded, 0 to 1 percent slopes	43.1	4.0%
46	Orsino fine sand, 0 to 5 percent slopes	27.0	2.5%
49	Pompano fine sand, 0 to 2 percent slopes	5.3	0.5%
99	Water	11.1	1.0%
Totals for Area of Interest		**1,089.3**	**100.0%**

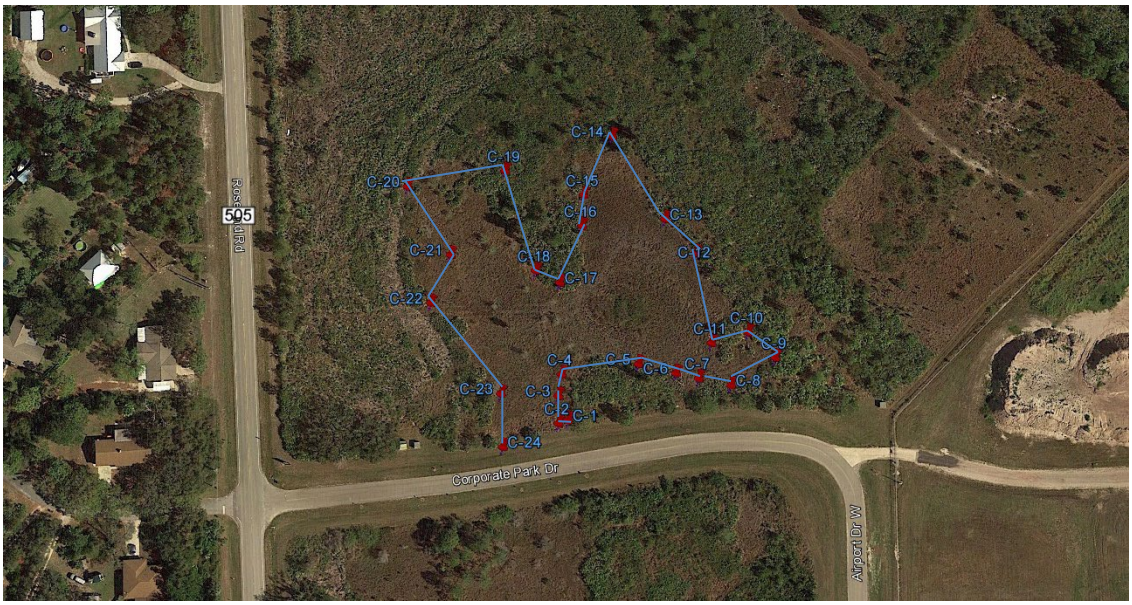
Site A:



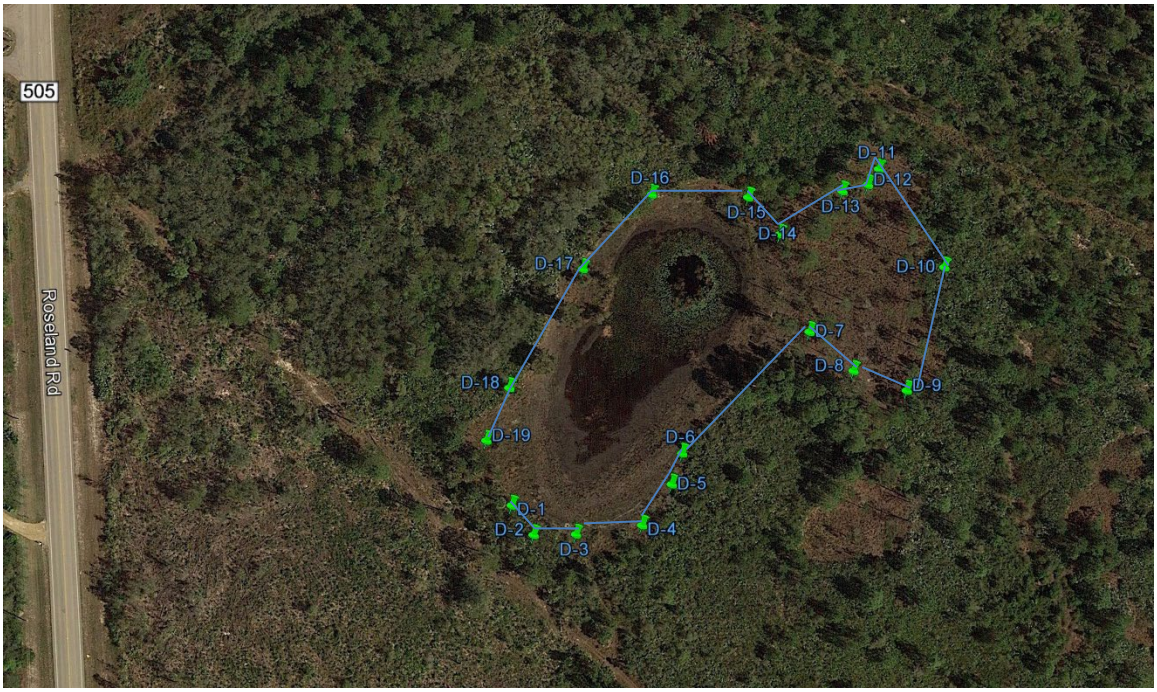
Site B:


Corporate Park Dr
505
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15

Site C:


505
Corporate Park Dr
Airport Dr W
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
C-12
C-13
C-14
C-15
C-16
C-17
C-18
C-19
C-20
C-21
C-22
C-23
C-24

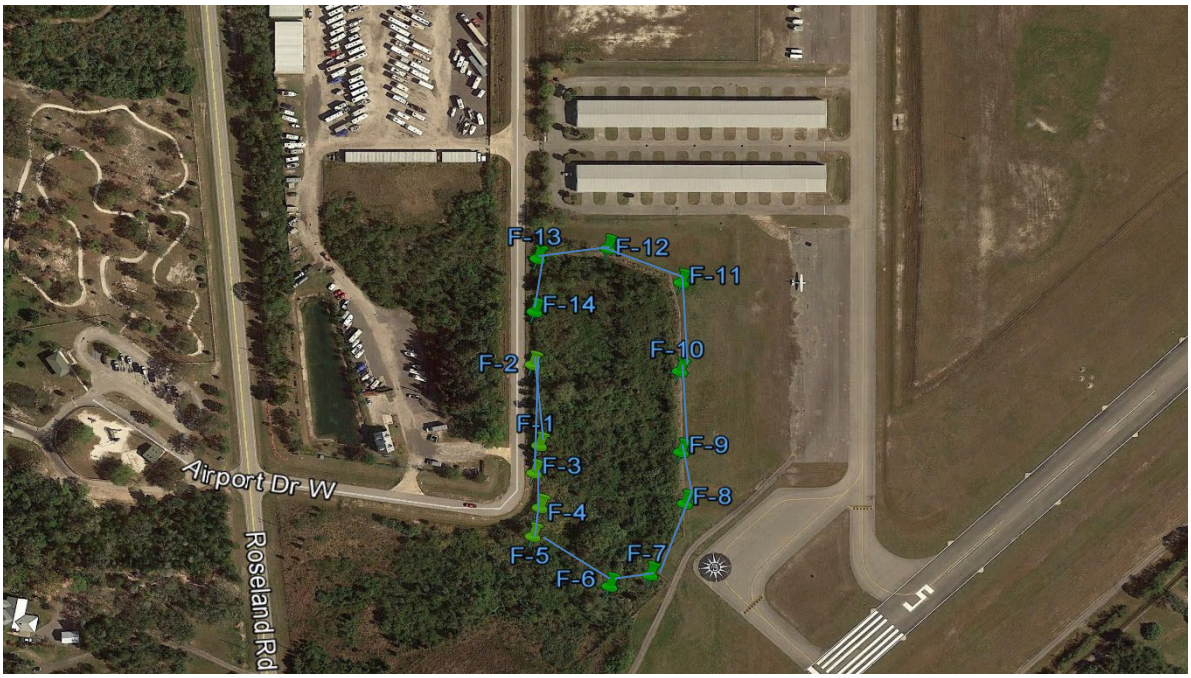
Site D:


505
Roseland Rd
D-16
D-11
D-12
D-15
D-13
D-14
D-17
D-10
D-7
D-8
D-18
D-9
D-19
D-6
D-5
D-1
D-2
D-4
D-3

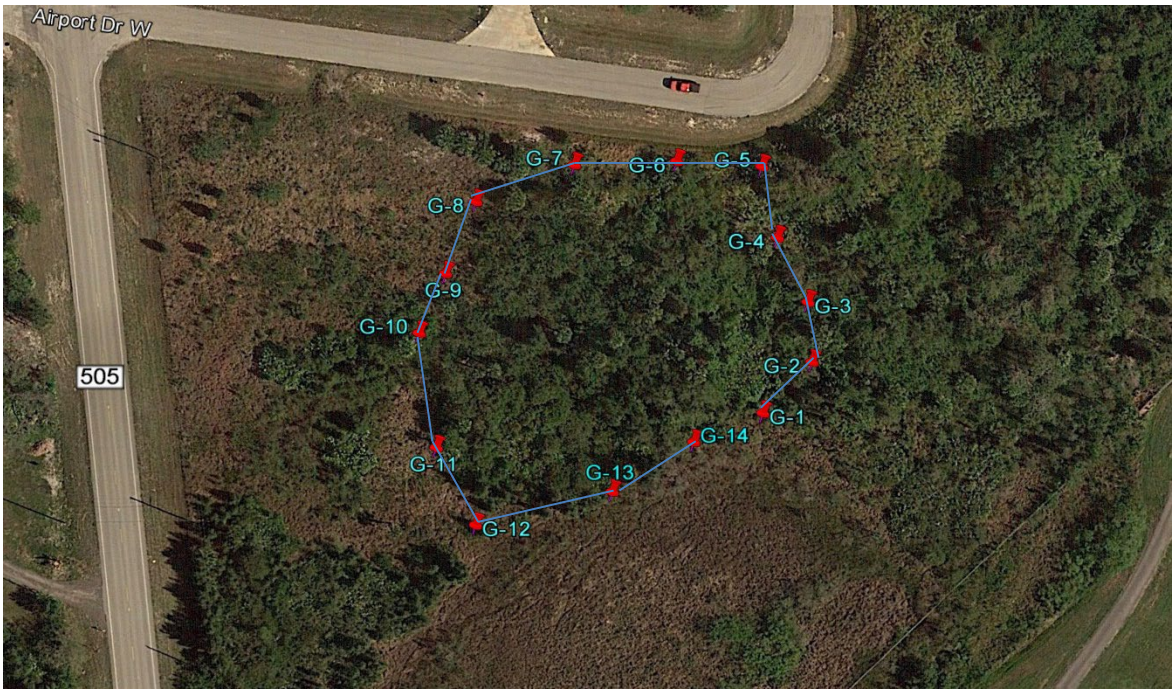
Site E:


E-3
E-2
E-4
E-5
E-1
E-6

Site F:


F-13
F-12
F-11
F-14
F-10
F-2
F-1
F-9
F-3
F-8
F-4
F-5
F-7
F-6
Airport Dr W
Roseland Rd
5

Site G:


Airport Dr W
G-7
G-6
G-5
G-8
G-4
G-9
G-3
G-10
505
G-2
G-1
G-14
G-11
G-13
G-12

Wetland Map Legend

WETLANDS

A	Size: 662 SY	B	Size: 3,112 SY	C	Size: 8,805 SY	D	Size: 9,608 SY	E	Size: 897 SY	F	Size: 17,641 SY	G	Size: 4,979 SY
1.	27.8192 -80.5022	1.	27.8192 -80.5033	1.	27.8193 -80.5031	1.	27.8218 -80.5031	1.	27.8161 -80.4953	1.	27.8099 -80.5019		27.8090 -80.5019
2.	27.8192 -80.5025	2.	27.8190 -80.5033	2.	27.8194 -80.5031	2.	27.8218 -80.5031	2.	27.8164 -80.4953	2.	27.8100 -80.5035	1.	27.8092 -80.5019
3.	27.81926 -80.5024	3.	27.81891 -80.50344	3.	27.8195 -80.5031	3.	27.8217 -80.5029	3.	27.8164 -80.4953	3.	27.8098 -80.5019	2.	27.8093 -80.50202
4.	27.81926 -80.5025	4.	27.81895 -80.50354	4.	27.8195 -80.5031	4.	27.8217 -80.5027	4.	27.8162 -80.4953	4.	27.8098 -80.5019	3.	27.8094 -80.50202
5.	27.8192 -80.5025	5.	27.81900 -80.50354	5.	27.8196 -80.5028	5.	27.8217 -80.5027	5.	27.8162 -80.4951	5.	27.8095 -80.5019	4.	27.809510 -80.50208
6.	27.81916 -80.50248	6.	27.8090 -80.5039	6.	27.8196 -80.5028	6.	27.8217 -80.5027	6.	27.8161 -80.4952	6.	27.80920 -80.5015	5.	27.809510 -80.50225
7.	27.8191 -80.50248	7.	27.8190 -80.5039	7.	27.8196 -80.5028	7.	27.8223 -80.5022			7.	27.80920 -80.5013	6.	27.809510 -80.50245
8.	27.81905 -80.5024	8.	27.8188 -80.5038	8.	27.8196 -80.5028	8.	27.8223 -80.5022			8.	27.80955 -80.5011	7.	27.809510 -80.50260
9.	27.81902 -80.50232	9.	27.8187 -80.5038	9.	27.8196 -80.5026	9.	27.8223 -80.5022			9.	27.80990 -80.5011	8.	27.80930 -80.50270
10.	27.81908 -80.50226	10.	27.8188 -80.5034	10.	27.8196 -80.5026	10.	27.8227 -80.5020			10.	27.8103 -80.5011	9.	27.80900 -80.50270
		11.	27.8187 -80.5032	11.	27.8196 -80.5026	11	27.8224 -80.5018			11	27.8108 -80.5011	10.	27.80900 -80.50270
		12.	27.81883 80.50305	12.	27.8201 -80.5027	12.	27.8227 -50.5020			12.	27.8110 -80.5015	11	27.80885 -80.50265
		13.	27.8190 -80.5030	13.	27.8201 -80.5027	13.	27.8227 -50.5020			13.	27.8110 -80.5019	12.	27.80892 -80.50235
		14.	27.8191 -80.5030	14.	27.8204 -80.5029	14.	27.8925 -80.5023			14.	27.8107 -80.5019	13.	27.80900 -80.502220
		15.	27.81915 -80.50308	15.	27.8202 -80.5030	15.	27.8226 -80.5024						
				16.	27.8202 -80.5030	16.	27.8226 -80.5027						
				17.	27.8199 -80.5031	17.	27.8224 -80.5029						
				18.	27.8199 -80.5031	18.	27.8218 -80.5028						
				19.	27.8203 -80.5033	19.	27.8219 -80.5032						
				20.	27.8202 -80.5037								
				21.	27.8200 -80.5035								
				22.	27.8198 -80.5036								
				23.	27.8195 -80.5033								
				24.	27.8193 -80.5033								

Wetland Identification and Recommendations

Area A: This area is currently .14 acres, less than a ¼ acre. Since this area is less than ¼ acre, mitigation is very unlikely. However, coordination at the time of development is suggested. **Recommendation:** Area can be developed, however, this area is home to gopher tortoise, during the planning phase of development a plan needs to be developed as to how and where these animals will be relocated. Permits will be required.

Area B: This area is currently .64 acres, over a ½ acre. Since this area is large than ¼ acre, mitigation will need to be done a time of development. **Recommendation:** Design development around the wetland. This area is home to gopher tortoise, during the planning phase of development a plan needs to be developed as to how and where these animals will be relocated. Permits will be required.

Area C: This area is currently 1.82 acres. Since this area is large than ¼ acre, mitigation will need to be done a time of development. **Recommendation:** Due to the size and nature of the site, development in this area will be extensive and expensive. This area is currently a habitat for Florida Scrub-Jays, however, this area is part of the City's Incidental Take Permit.

Area D: This area is currently 1.99 acres. Since this area is large than ¼ acre, mitigation will need to be done a time of development. **Recommendation:** Due to the size and nature of the site, development in this area will be extensive and expensive. This area is currently a habitat for Florida Scrub-Jays, however, this area is part of the City's Incidental Take Permit.

Area E: This area is currently .19 acres, less than over ¼ acre. This area is not a wetland due to the plant base and lack of water. **Recommendation:** No action needed for future development. This area is home to gopher tortoise, during the planning phase of development a plan needs to be developed as to how and where these animals will be relocated. Permits will be required.

Area F: This area is currently 3.64 acres. Since this area is large than ¼ acre, mitigation will need to be done a time of development. **Recommendation:** Due to the size and nature of the site, development in this area could be extensive and expensive.

Area G: This area is currently 1.03 acres. Since this area is large than ¼ acre, mitigation will need to be done a time of development. **Recommendation:** Due to the size and nature of the site, development in this area could be extensive and expensive.

General Environmental Assessment

The TKDA team was asked to perform a General Environmental Assessment of the Airport and the areas for future development. In the Airport's proposed Master Plan and Layout Plan (ALP)

future development is shown for the next 20-years. As the TKDA team started to develop the ALP we looked at potential environmental impacts to each area of proposed development. Currently the City and Airport have Incidental Take Permit in place for the taking of Florida Scrub-Jay Habitat for development on Airport property. The permit allows for 88 acres to be taken if need for future development. The City and Airport are extremely proactive in only taking habitat that is crucial for the continuing sustainability of the Airport. Throughout this chapter we have noted several types of surveys/studies that the TKDA performed as part of the overall environmental assessment and we have also made recommendations.

Habitat Conservation Plan (HCP) Review and Agency Coordination

The TKDA team was asked to review the current HCP and Incidental Take Permit. As part of our review we met with U.S. Fish and Wildlife Services (USFWS) and Indian River County Staff to discuss the ongoing master plan and layout plan for future development of the Airport. We are still currently working with USFWS and Indian River County to make updates to the HCP if needed. As of right now the current permits in place allow for the future development proposed in this master plan update. We anticipate all coordination with USFWS and the County to be complete by the final approval issued by Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT). We have provided the notes from our meeting with USFWS and Indian River County Staff.

Meeting Notes with USFWS and Indian River County Staff

TKDA
800 20th Place, Suite 1
Vero Beach, FL 32960
772.217.9521
tkda.com

Memorandum

To:	Project File	**Reference:**	Meeting with USFWS and IRC Staff
Copies To:	File		Sebastian Airport Conservation
	Scott Baker– Sebastian Airport		Areas
		Project No.:	0016256.001
From:	Danielle Gernert	**Routing:**	
Date:	6/2/17		

On June 2, 2017, a meeting was held at the USFWS Office in regards to the conservation areas at the Sebastian Airport.

- Attendees: Danielle Gernert (TKDA), Kristie Anderson (TKDA), Beth Powell (IRC), Wendy Swindell (IRC), and Ashleigh Blackford (USFWS)

Points of Interest and Discussion

- Explained to the County and USFWS that the Airport is not a wildlife sanctuary and the federal government has rules for how the land is used. The Airport cannot contain a conversation easement per the Airport governing bylaw's and grant assurances. They are understood in the meeting that the land is not protected for future development and if the land is needed for Aviation use the Airport and City will come back to the Service and the County to work out mitigation of the land to be used.
- 88 Acres under the current Take Permit – was not defined in the HCP so the Services stated that the Airport needs to identify the Areas of Take.
    - Area for the City's Public Works Compound cleared of Scrub Jays and is considered under the Take Permit. Acreage needs to be determined as part of the 88 Acres in question. Other environmental issues to deal with in that area include Gopher Tortoise and Wetlands. Number of tortoise in the areas yet to be determined and Wetland Survey will be conducted over the next few months.
- Areas inside the AOA fence to be excluded from conservations monitoring, to include the dirt pile. However, the dirt pile needs to be removed and surrounding areas cleaned up as this is causing other environmental hazards for the Airport and the public. However, may have to note this area as part of the 88 acres under the Take Permit, need to determine the acreage).
- The 100' buffer on the north side of Airport that backs up to the Counties conservation to be removed if the Airport will agree to help maintain the property lines that separated the Airport Property and the County Conservation Land.
- Main entrance to the Airport is clear of environmental hazards and can be developed at any time. Note: this area is not part of the 88 acres in question under the Take Permit.

TKDA will continue working with the County and USFWS to complete the HCP and clearly identify areas of conservation and conservation management.

An employee-owned company promoting affirmative action and equal opportunity.

CHAPTER SEVEN
Airport Sustainability and Solid Waste Management

Chapter Overview and Introduction

As noted in Chapter One of this report, airport sustainability is important to support airport longevity. As a result, the Florida Department of Transportation (FDOT), Federal Aviation Administration (FAA), as well as a number of airport groups and organizations have provided guidance regarding instituting sustainability initiatives and procedures at airports nationwide.

The FAA in conjunction with other programs has and continues to support the sustainability planning as part of the master plan process or as a supplemental document to the master plan depending upon the airport size and types of operations and activity. The FAA has and continues to provide Airport Improvement Program (AIP) funding to support airport sustainability efforts at all NPIAS airports. Airport sustainability, as highlighted by FAA, consists of four equal prongs: community, economy, environment and operations as illustrated in **Figure 7-1**.

The FDOT also supports airport sustainability, and recently published the 2017 Airport Sustainability Guidebook (http://www.fdot.gov/aviation/sustainability.shtm). Initially because of the economies to scale benefits, sustainability efforts primarily focused on large and medium sized commercial hubs. However, as the FDOT noted, as these larger commercial and GA airports continue to see growth, capacity constraints will require some operations to shift to nearby non-hub commercial and GA airports. By implementing sustainability guidance, especially during the planning process, these airports can better address forecast traffic needs, community concerns, as well as have an effective economic plan in place to address demand. The FDOT also stated that "GA airports may actually be at an advantage…the lower number of

departments and staff can make it easier to obtain internal buy in, communicate information and coordinate initiatives."[1]

FIGURE 7-1
AIRPORT SUSTAINABILITY



Source: FAA, Environmental Program, Airport Sustainability (https://www.faa.gov/airports/environmental/sustainability/)

Therefore, the FDOT like the FAA is providing funding to support for the implementation of sustainability initiatives and monitoring at airports throughout the state. Further, both FAA and FDOT grant assurances are tied to airport sustainability including those that reference the goal of Airport Self Sufficiency. Again, both the FAA and FDOT seek to increase the "efficacy of their financial investments" in order to support airport longevity through "financial self-sufficiency, operational efficiency, social responsibility, and environmental awareness."[2]

The City of Sebastian itself does not have a sustainability program in place, but Indian River County was certified in 2009 as a Florida Green Local Government. This means that the county

[1] "Why Sustainability is Important to Florida Airports." Airport Sustainability Guidebook 2017, Florida Department of Transportation, Page 3.
[2] Ibid, pg. 4.

government incorporates multiple environmental, ecological and sustainable features throughout various county functions. Thus, several county recommendations and functions were considered regarding their applications to the Sebastian Municipal Airport in addition to other initiatives and programs being implemented at similarly sized airports and communities around the country.

The Sebastian Master Plan as part of the project scoping included evaluating and implementing sustainability options on an ad hoc basis meaning that although considered throughout the master plan process, the recommendations and findings were consolidated into a single chapter along with the solid waste management evaluation and recommendations. The ad hoc approach is beneficial to airports with limited resources, but are still interested in integrating some level of sustainability into their daily management and operations. Having a stand along chapter allows both city and airport management the ability to quickly identify options and initiatives with a high likelihood of success. As the airport developments, additional sustainability actions may be initiated.

Using the recent FDOT Airport Sustainability Report as a guide, the sustainability analysis at Sebastian Municipal Airport included: Phase 1. Setting the Stage, Phase 2. Baseline Assessment, Phase 3. Plan Development, and Phase 4. Implementation and Monitoring recommendations. A full in-depth sustainable plan with cost benefit evaluations and performance recording were not performed as part of this preliminary sustainability analysis based upon the sponsor's priorities. However, recommendations moving forward are provided and incorporated into the proposed capital improvement plan and financial analysis.

The second portion of this chapter will focus on evaluating current solid waste management and recycling efforts and providing recommendations in conjunction with proposed development. In 2012, Congress passed the FAA Modernization and Reform Act which requires all NPIAS airports as part of ongoing airport planning to address the feasibility of solid waste recycling at the airport. This includes a waste audit, evaluating the feasibility of solid waste recycling at the airport, identifying ways to minimize the generation of solid waste, identifying operational and maintenance requirements, reviewing ongoing waste management contracts, and identifying the potential for cost savings or the generation of alternative revenue streams. This effort is a requirement of the master planning process as it relates to airport grant assurances as well as being part of the FAA's continued concentration on airport sustainability and compliance.

Airport Sustainability Planning

Setting the Stage

Based upon discussions during the initial project meeting with the Technical Advisory Committee, a draft airport mission statement was created to drive future development at the Airport.

> *To maintain and improve the Airport to serve the needs of the Sebastian community and Treasure Coast Region, promote economic growth in the region, while managing and developing the airport in an economically, socially compatible and environmentally sustainable manner that conserves natural resources, protects the environment, promotes airport safety and economic self-sufficiency and compatibility with the local community.*

From this, several planning and sustainability goals were identified including:

- Focus on initiatives that achieve objectives with low implementation costs.
- Develop simple tools to support implementation and monitoring of sustainability objectives.
- Prioritize airport economic sustainability and resource conservation
- Plan for initiatives that can be incorporated as airports expand
- Encourage sustainable solutions for project design and construction, including recycling and solid waste management
- Encourage airport tenant and user participation
- Provide users general guidance and contact information for implementing sustainability initiatives, etc.
- Identify and weigh sustainability targets based upon local priorities, environmental criteria, and stakeholder input, etc.

Airport sustainability guidance will be provided throughout this master plan process while using the Airport's mission statement to craft recommended development. As part of the airport facilities analysis, a simple sustainability baseline assessment will be performed, sustainability goals, targets and strategies will be evaluated as part of the master plan alternatives analysis, and recommended implementation strategies and cost savings will be included in the airport implementation plan and recommended twenty-year capital improvement plan (CIP). As technology continues to change, other opportunities for resource and economic sustainability

will be available to the airport. The plans outlined in this document were designed to provide the City and airport management flexibility to incorporate these opportunities.

Baseline Assessment

The baseline assessment consists of data collection of sustainability related metrics related to airport economic and financial status, community involvement, environmental and operational overviews. This baseline data was used to identify existing concerns and needs while providing a starting point for sustainable plan performance monitoring.

Economy/Financial Status

The Sebastian Municipal Airport is a department that is governed by City of Sebastian Management and City Council. Capital improvements at the Airport are funded through a combination of federal, state and local funds. The City Council and City Management must approve planned development to determine if local funds are available before applying for FAA and FDOT funding. Historically, City Council and Management have supported continued maintenance and growth of the Airport. The local airport funding share may be provided if available and with approval by City Council through the City's general capital improvement fund. The City has also loaned money to the Airport as part of their local share for corporate hangar development based upon a 10-year repayment period and zero interest.

Discussions with the Director of Finance for the City is working with the City Manager, Airport Manager and members of the City Council to potentially forgive one outstanding hangar loan to allow Airport Management to use the repayment funds for continued airport growth and revenue expansion and diversification.

Although use of the general fund historically was used to fulfill the airport's local share of capital improvement funding requirements, it was recommended that participation from general fund not be considered when evaluating short and long-term capital project funding needs. Therefore, as part of the financial pro forma evaluation, the local share was considered to be obtained from airport revenues minus airport expenses only. As additional leaseholds are developed on the Airport property, it is anticipated that use of the City general fund will be limited to only high dollar airport projects.

Table 7-1 illustrates historical airport financials and funding sources associated with past capital improvement projects at the Airport.

TABLE 7-1 HISTORICAL AIRPORT FINANCIALS BUDGET SUMMARY					
DESCRIPTION	**2011/2012**	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**
Operating Expenses	$195,866.00	$235,291.00	$219,697.00	$173,283.00	$174,190.00
Capital Outlay	$0.00	$0.00	$928.00	$2,078.00	$195,809.00
Debt Service	$16,575.00	$16,575.00	$19,425.00	$19,401.00	$70,025.00
Non-Operating	$0.00	$0.00	$0.00	$0.00	$0.00
Contingency	$0.00	$15,552.00	$93,608.00	$0.00	$0.00
Total	**$420,885.00**	**$422,070.00**	**$415,148.00**	**$311,886.00**	**$564,720.00**
Source: City of Sebastian Airport Financial Records, 2011-2016 and TKDA 2016/2017					

Operations

The City of Sebastian and Sebastian Municipal Airport are uninterested in expanding their facilities to support larger corporate jet traffic or heavy industrialized development. Because the airport is located between environmentally sensitive lands and residential development, the Sponsor intends to continue to develop the airport as a specialized recreational airport or "boutique" airport. Approximately 12 miles south of Sebastian Airport is Vero Beach Regional Airport (VRB) and approximately 19 miles northwest is Melbourne International Airport (MLB). Both of these airports provide facilities that more than adequately support corporate jet traffic and heavy aircraft demands.

As a result of the long-term vision of the Sponsor and users, the following forecasts were established as illustrated in **Table 7-2**.

TABLE 7-2 OPERATIONAL DEMAND SUMMARY					
	2018	**2022**	**2027**	**2032**	**2037**
Itinerant Operations	16,555	16,966	17,159	17,179	16,991
Local Operations	28,758	32,017	36,157	40,780	45,939
TOTAL OPERATIONS	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**
Fleet Mix					
Single-Engine Piston	34,308	36,673	39,919	43,408	47,149

Multi-Engine Piston	2,372	2,463	2,550	2,636	2,722
Turboprop	3,366	3,939	4,733	5,680	6,809
Jet	0	14	16	19	23
Civil Helicopter (CH)	27	33	42	53	67
Light Sport Aircraft	2,217	3,182	3,877	4,344	4,769
Other (Gliders, UAVs, Ultralights, etc.)	3,023	2,679	2,178	1,818	1,391
TOTAL OPERATIONAL FLEET MIX	**45,313**	**48,983**	**53,316**	**57,959**	**62,930**
Sources: Airport historical records, tenant data, on-site inventory and TKDA 2017					

There will be some growth in corporate demand as a result of available facilities on the airport. However, the main use of the airport will remain recreational and light, sport aircraft manufacturing for the foreseeable future. Forecast growth of both light sport and turbine engine aircraft will drive the need for on-site Jet A fuel facilities as well as future bio-fuel facilities. Airport management is already in discussions with the current FBO Pilot's Paradise about expanding their existing fuel facilities to support Jet A demand as well as looking at other sites for a potential second Fixed Based Operator and consolidation of fuel facilities within the east quadrant of the Airport property near the existing terminal facilities. Anticipated fuel demand is summarized in **Table 7-3**.

TABLE 7-3 ESTIMATED FUEL DEMAND					
ANNUAL DEMAND	**2018**	**2022**	**2027**	**2032**	**2037**
Jet A (Gallons)	163,259.09	201,454.11	257,522.64	328,755.03	419,257.64
Jet A Sales (Dollars)	$688,953.38	$850,136.33	$1,086,745.52	$1,387,346.23	$1,769,267.24
100LL (Gallons)	57,276.00	49,770.34	53,707.25	57,812.25	62,086.23
100LL Sales (Dollars)	$240,559.21	$209,035.43	$225,570.45	$242,811.46	$260,762.17
November 2017 Jet A Dollars per Gallon					$4.22
November 2017 100LL Dollars per Gallon					$4.20
Sources: Historical Demand, Vero Beach Regional Airport Average Jet A fuel cost per gallon, Sebastian Municipal Airport Average 100LL fuel cost per gallon, and TKDA 2017					

Community

The City and the Airport actively work with the local community and have a reputation as a "good neighbor." Airport management provides numerous opportunities to engage with interested community members and works to keep potential environmental impacts associate with airport operations to a minimum. Airport management has implemented a variety of noise abatement procedures as illustrated in **Figure 7-2**, as well as does not allow flight training on Sundays or after dark. The Airport property is also home to the Sebastian Municipal Golf Course and the local restaurant, Eagle's Nest. The Airport Manager is working with the local community on addressing tree impacts to the existing runway approaches while looking at landscaping options to mitigate impacts associated with tree clearing.

FIGURE 7-2
VOLUNTARY NOISE ABATEMENT PROCEDURES
Source: TKDA 2017



As part of this master plan process, the community and airport stakeholders were engaged throughout the planning effort. Recommended development is a compilation of recommendations and goals obtained from the community, stakeholders and Airport/City Management. As part of the sustainability airport planning efforts, engagement with the local community and users is key to promoting the longevity and safety of airport operations.

Environment

As discussed in **Chapter 6**, Airport Environment, of this report, the Sponsor engaged in four separate environmental studies in tandem with this master plan: Florida Scrub Jay Survey; Wetland Delineation and Mitigation Assistance; Full Airport Environmental Assessment; and Habitat Conservation Plan.

The previous master plan and Airport Layout Plan designated portions of the Airport property as conservation primarily due to potential Scrub Jay habitats. However, according FAA Grant

Assurances and Land Use Guidance, conservation is not an approved or recommended on-airport land use.

Since Sebastian is a smaller GA, recreational airport, environmental impacts related to noise, air quality impacts, water quality impacts, fuel usage and waste management is fairly minimal. The Airport is located near conservation and residential properties, as shown in **Figure 7-2**; therefore the Airport has already implemented and enforces voluntary noise abatement procedures. All fuel farms are equipped with spill prevention facilities, and both the FBO and City have up to date spill prevention control and countermeasure (SPCC) plans.

The State of Florida continues to take measures and provide funding for projects to maintain and support Florida's resources. The City of Sebastian in 2015 was recently awarded $175,000 by the Florida Department of Environmental Protection for stormwater improvements which will reduce nutrients from entering Indian River Lagoon and St. Sebastian River. The City is actively working with various state and local agencies in addition to community organizations to identify opportunities to integrate sustainable practices within the City and County as well as at the Airport. Looking at "best practices" for similar communities throughout the state as well as nationally, sustainability options and objectives which could be implemented at the Airport will be further refined based upon anticipated operations, facility requirements, community support, financial feasibility as well as potential environmental concerns and opportunities.

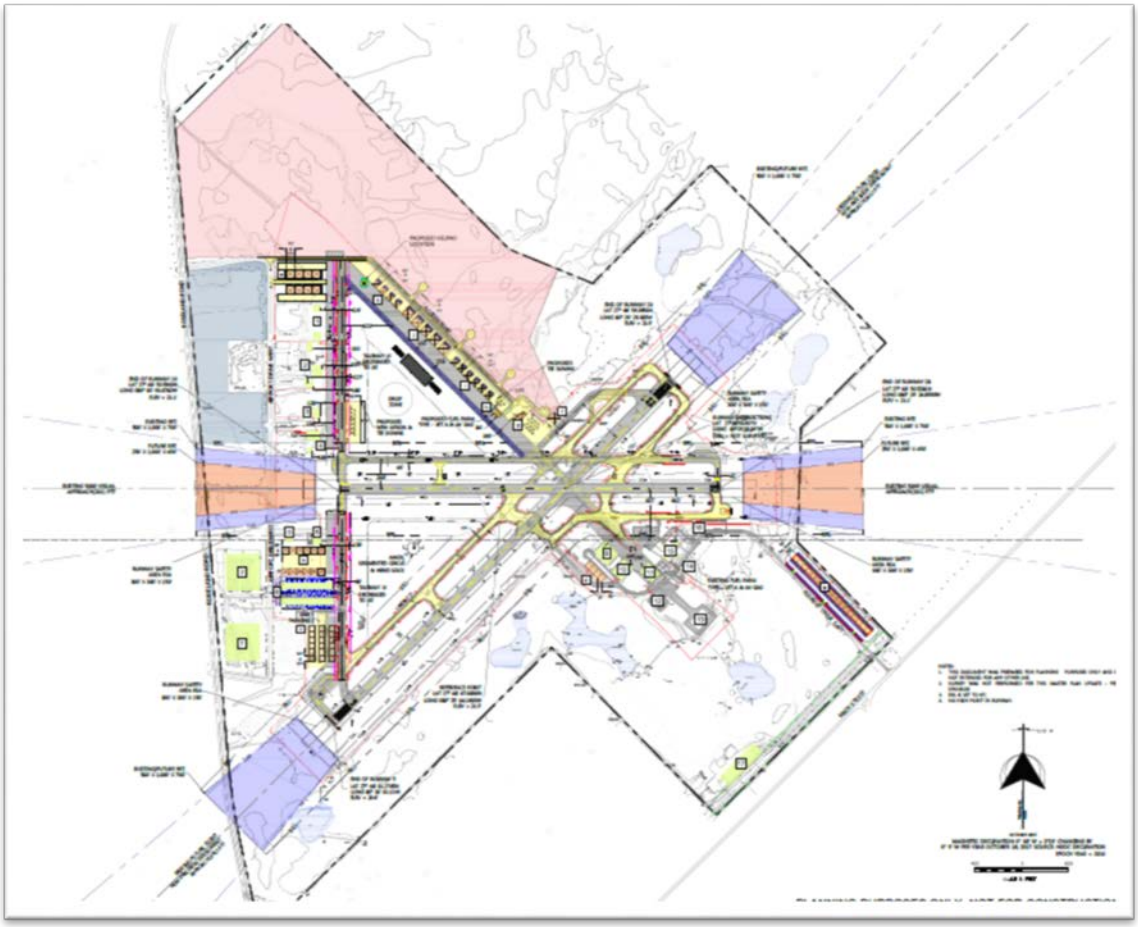
Plan Development

Using the baseline data, goals and long-term vision established by the Sponsor, sustainability initiatives that are most appropriate and beneficial to the airport were identified. These initiatives included identifying who would be responsible for initiating and monitoring the sustainability initiatives, potential timeline for implementation and return on investment as well as providing recommendations for a simple comprehensive plan to monitor and track initiatives.

Recommended Development

With input from the Sponsor, TAC and Public, recommended development was established as illustrated in **Figure 7-3.**

FIGURE 7-3
PLANNED AIRPORT DEVELOPMENT
Source: TKDA 2017



Initiatives

Low Cost Sustainable Development Options

Other sustainable opportunities that the Sponsor and its users may want to consider include obtained from the Sustainability Aviation Guidance Alliance Search Engine (http://www.airportsustainability.org/sustainable-practices#). The majority of recommendations provided are considered low cost to implement:

- **Energy and Climate:**

- ✓ Plug all electronical equipment into surge protector and power strips. Turn off when not in use
- ✓ Purchase and use printers and fax machines that have a power-down or "sleep" option
- ✓ Unplug any unnecessary devices when not in use
- ✓ Develop and implement an environmental/sustainability tracking process

➢ **Ground Transportation**
- ✓ Encourage transit authority to provide bicycle friendly buses and trains
- ✓ Provide safe pedestrian and bicycle lanes
- ✓ Provide employees bus passes or encourage car pooling
- ✓ Provide bicycle storage and shower facilities for employees and tenants

➢ **Economic Performance**
- ✓ Purchase high content post-consumer recycled paper
- ✓ Limit printed materials
- ✓ Integrate sustainable language and requirements into contracts
- ✓ Use local/regionally sourced materials

➢ **Design and Materials**
- ✓ Use zero or low volatile organic compound paint and coatings
- ✓ Use zero or low volatile organic compound cleaning products
- ✓ Reuse existing structure and building components
- ✓ Reuse existing runway pavement

➢ **Community Engagement and Leadership**
- ✓ Donate surplus goods to charities and other community organizations
- ✓ Purchase used furniture and other equipment
- ✓ Hold training and other community events at the airport
- ✓ Clearly define sustainability goals
- ✓ Include sustainable training requirements in all bid documents

➢ **Water and Waste**
- ✓ Recycle non-potable water for landscaping
- ✓ Install waterless urinals and composting toilets
- ✓ Implement and enforce construction waste management plan and tracking system
- ✓ Use clean-cut or trenchless technology when installing utilities

➢ **Natural Resources**
- ✓ Develop and implement sustainable landscaping guide

- ✓ All vegetation removed composted on-sight for mulch
- ✓ Install a non-reflective solar panel roof on buildings or use reflective coating or roof materials on buildings that will not impact aircraft operations

➢ **Human Well-Being**

- ✓ Provide safe bicycle and walking paths, but not within airport safety areas.
- ✓ Provide preferred parking
- ✓ Post no-idling signs
- ✓ Install motion sensors and timers on building lighting

Aviation and Non-Aviation Land Use

As part of the federal government's sustainability initiatives and existing airport grant assurances, airport sponsors need to evaluate and implement plans to become and remain financially self-sustaining. This is often extremely difficult for small GA airports which have limited resources. Therefore, options to utilize airport property for both aviation and compatible non-aviation development may be allowed with support by the FAA and FDOT.

Airport land, first and foremost, is to be used for aviation use. However, there may be pockets of available land that cannot efficiently support aviation activity. However, these 'land pockets' may be suitable for aviation support or non-aviation use. It is important to note that alternative uses of aviation land must be based upon fair market value, must include short-term lease terms, and be compatible with aviation activity. All revenue obtained from these sources must be directed back into the airport fund for on-going maintenance and improvements.

Compatibility criteria for non-traditional airport land use includes:

- ✈ Does not exceed height standards
- ✈ Does not attract large concentrations of people
- ✈ Does not create wildlife attractant(s)
- ✈ Does not cause a source of smoke or plumes
- ✈ Does not cause electrical interference
- ✈ Meets compatible day-night average sound levels (DNL)
- ✈ Does not impact airport safety and security
- ✈ Other requirements include, but are not limited to, the following:
- ✈ No through the fence operations are allowed
- ✈ Property/Lease must be based upon fair market value

- Requires shorter lease terms (typically 10 years)
- Requires FAA and local DOT coordination and approval
- Complies with FAA Grant Assurance requirements
- Complies with FDOT Land Use and Grant Criteria
- Revenue must be used to support airport only
- Airport has the option to either maintain or sell property outright, but will require approval of FAA and FDOT.

Compatible non-traditional land use options may include:

- Aviation support facilities
- Wholesale and retail facilities
- Building materials
- Hardware
- Farm equipment, etc.
- Agricultural and forestry
- Commercial development and land use:
- Manufacturing (dependent upon type)
- Warehousing
- Freight forwarding
- Cell phone antenna (in combination with airport beacon)
- Industrial park development
- On-airport concessions
- Airport Concessions:
- Rental cares
- Restaurants
- Hotels
- Long and short-term parking
- Advertising programs
- Multi-modal facilities:
- Bus stations
- Light rail stations
- New technology
- Mineral rights and resources
- Foreign trade zones, etc.

All proposed development, including aviation and non-aviation use, must consider existing and long-term demand and must balance operational and safety needs with revenue. Further, the Sponsor should consider if proposed development would be coordinated through the airport or via third party development. There are costs and opportunities associated with each option which should be considered carefully before agreeing to development. Lastly, it is recommended that all non-traditional leases include language that the Sponsor/Airport has the right end a lease if the property is needed for aviation use.

Action Plan Development

Using the objectives outlined in the previous sections combined with the vision and objectives of the sponsor, users and community, sustainability monitoring metrics were created as outlined in **Table 7-4** using the recommended sustainability tracker outlined in the FDOT's Airport Sustainability Handbook.

Table 7-4
Sample Sustainability Tracker

Resource Category	Goals	Objectives	Metrics	Current Level	Target Level	Initiatives	Action Steps
OPERATIONAL EFFICIENCY	Incorporate sustainability principles into long-range business strategy and day-to-day operations. Also develop standard operating procedures and incorporate into existing airport procedures.						
Office Resources	Implement processes to more efficiently use resources and limit costs		TBD	TBD	TBD		Monitor office resource use; look at ways to cut paper and ink use
Energy Use	Become more energy efficient		TBD	TBD	TBD		Monitor utility information
Airside Management	Improve access and egress, and eliminate any "hot spots"		TBD	TBD	TBD		
Landside Management	Improve overall airport access to different portions of the airfield, and minimize auto use of airfield		TBD	TBD	TBD		
WATER MANAGEMENT	Minimize water consumption, use gray water for landscaping, protect existing watersheds and address stormwater management and treatment						

Table 7-4
Sample Sustainability Tracker

Resource Category	Goals	Objectives	Metrics	Current Level	Target Level	Initiatives	Action Steps
Stormwater Management	Minimize stormwater impacts associated with new development		TBD	TBD	TBD	Analyze stormwater management options for new projects	Maximize pervious surfaces
Stormwater	Reduce sediment in stormwater drainage ditches					Evaluate maintenance efforts to limit sedimentation and clean out needs	Explore options to capture and reuse stormwater
Landscaping	Minimize water use and plant Florida native landscaping		TBD	TBD	TBD		Establish active management of landscape contracts to install drought tolerant native plants and weed growth prevention
Solid Waste Management and Recycling	Minimize generation of solid waste and reuse and recycle collected waste to maximum extent possible.						

Table 7-4
Sample Sustainability Tracker

Resource Category	Goals	Objectives	Metrics	Current Level	Target Level	Initiatives	Action Steps
Construction Waste	Maximize use of construction waste on airport		TBD	TBD	TBD		Implement and enforce construction waste management plan and tracking system
Offer recycling facilities on airport to users and tenants	Minimize solid waste creation	Encourage users and tenants to recycle and limit solid waste generation	TBD	TBD	TBD		Develop and implement on-airport and office solid waste program
Landscape Waste	Minimize landscape waste creation and disposal in landfills		TBD	TBD	TBD	Install native and low growth landscaping	Reuse landscape waste as mulch both on and off the airport
COMMUNITY OUTREACH	Enhance communication with, and in support of airport and local community						

Table 7-4
Sample Sustainability Tracker

Resource Category	Goals	Objectives	Metrics	Current Level	Target Level	Initiatives	Action Steps
	Maintain "Good Neighbor" Airport Image			9	10		Develop internal and external communication plan concerning sustainability performance
Noise	Reduce noise impacts related to aircraft operations		DNL Noise Data	TBD	TBD	Voluntary Noise Abatement Procedures	• Publish voluntary noise abatement procedures on websites • Work with tenants and flight schools to consistently fly recommended procedures • Work with the community to identify hotspot areas and explain improvements, etc.

Table 7-4
Sample Sustainability Tracker

Resource Category	Goals	Objectives	Metrics	Current Level	Target Level	Initiatives	Action Steps
CONTRACT AND LEASE MANAGEMENT	Integrate sustainable practices into internal policies, business processes and written agreements						
Bid and Lease documents	Implement sustainability initiatives as part of capital improvement and airport maintenance		TBD	TBD	TBD		Include sustainable training requirements in all bid documents

Notes: TBD = To Be Determined
Sources: Sustainability Tracker Sample, Table 10, FDOT Airport Sustainability Handbook, 2017, FAA Sustainability Guidance, TRB Airport Sustainability Guidance, Port Authority of New York and New Jersey Sustainability Plan, 2016, and City of Sebastian Staff, Tenant and Community Meetings and TKDA 2016-2017.

Implementation and Performance Monitoring

As recommended by FDOT, proposed initiatives are evaluated based upon suitability, timeline and costs of implementation. As part of the sustainability process, a monitoring plan will be created using recommendations provided by FDOT, FAA, Transportation Research Board and other local resources to create an effective and accurate process to evaluate airport sustainability goals, objectives and the proposed effectiveness of each initiative.

It is also recommended that the Airport and Sponsor regularly communicate progress with regard to sustainability improvements to City Council, tenants and community as a whole. This supports the Airport and City's efforts to remain a "good neighbor" to the local community as well as to support tenant on-airport growth. This information should also be regularly reported to the FAA and FDOT to assist with future funding requests for sustainable improvements at the Airport.

Implementation Strategies

Successful implementation of sustainability initiatives all hinge on coordination with airport and city management and staff as well as encouraging the Airport Staff and Tenants to have a say in airport sustainability process. No matter the size of the airport, it is recommended that one individual or department oversee the implementation and monitoring of sustainability goals, objectives and financing. This person/department should also work with local organizations, experts and academia to provide outreach and stakeholder involvement.

Further, it is not recommended that GA airports with limited staff try to initiate a large number of sustainability initiatives at one time. Rather, a more effective strategy is to address one or two high impact areas first, such as energy use, noise and/or construction requirements. This allows the Airport Staff and users not to become overwhelmed while allowing for continued engagement.

Performance Monitoring and Plan Evaluation

Airport sustainability planning is not a "one time and done" project, but rather consists of ongoing and living document. The Airport Sustainability plan should be referred to consistently to determine what options and initiatives are currently supporting planned airport development while considering new opportunities. The Airport and Sponsor should evaluate the airport's goals and objectives while assessing and reassessing performance metrics. Thus allowing the Sponsor and Airport the flexibility to make changes that best support Airport

longevity and community needs. **Figure 7-4** provides a graphical representation of the Airport Sustainability Planning.

FIGURE 7-4
AIRPORT SUSTAINABILITY PLANNING
Source: FDOT Airport Sustainability Guidebook 2017



Using the Sample Sustainability Tracker, provided in Table 7-4, the City and Airport can develop a monthly monitoring plan to track utility use, recyclables, capital project costs, landscaping, etc. This monitoring system can be as simple as an excel spreadsheet that can be used to track sustainability goals and actions against baseline data.

Next Steps

Sustainable initiatives related to proposed capital improvements were incorporated into the estimated costs of development. Independent sustainability initiatives were identified in both the Airport's capital improvement program and pro forma financial analysis in order to track likely costs and return on investments. This information should be included in the airport

sustainability monitoring plan to determine if proposed sustainability recommendations need to be changed or discontinued.

Since staff availability to implement and monitor proposed sustainability recommendations, at least initially, may be limited, it is recommended that the City and Airport initiate simple, low cost improvements first. This will allow the Airport to create a fairly simple electronic monitoring program that can be expanded as opportunities become available. Further, it is also recommended that the City and Airport include some sustainability language and requirements in their planning, design and building projects, especially those that include federal and state funding, thus shifting the burden to the consultants and contractors.

Airport Solid Waste Management

waste audit, evaluating the feasibility of solid waste recycling at the airport, identifying ways to minimize the generation of solid waste, identifying operational and maintenance requirements, reviewing ongoing waste management contracts, and identifying the potential for cost savings or the generation of alternative revenue streams.

To support the City of Sebastian sustainability efforts, the methodologies used and recommendations were obtained from a combination of Stakeholder and community goals, FDOT Airport Sustainability guidance, Indian River County Green Program Initiatives, the FAA Synthesis Document: *Recycling, Reuse and Waste Reduction Plans at Airports, FAA Guidance on Airport Recycling, Reuse and Waste Reduction*, ACRP Report 80: *Guidebook for Incorporating Sustainability into Traditional Airport Projects*, in addition to other international, national and regional guidance.

Baseline Waste Audit

Waste Management services, according to Ordinance No. O-03-12, adopted June 2003, was granted exclusively to Waste Management Inc. Waste Management Inc. would provide both solid waste collection and recycling services to the residential and commercial incorporated communities within the City of Sebastian. Another ordinance was adopted in June 2013, which continued to grant Waste Management, Inc. of Florida an exclusive contract, which also includes an automatic five year renewal unless either party notifies the other in writing. Solid waste and recycling products are brought the Indian River Solid Waste District for disposal and recycling. Solid waste and recyclables produced by the airport with the exception of green waste is taken by Waste Management Inc. for disposal at the Indian River Solid Waste District.

Baseline Solid Waste and Recycling Audit

Overall, minimal waste is created at X26 due to its small size. Waste management services is provided through a contract with Waste Management Inc. The City currently has a five-year contract with the company for waste management and recycling services for both residential and commercial services. Their contract is set to expire in 2023.

In the terminal area, recycling is primarily associated with paper products which are collected weekly. There are no vending machines or other food preparation areas located in the terminal building. Discussions with tenants during initial interviews also showed that the City contract with Waste Management Inc. is part of their lease agreements. Garbage and recycling receptacles are located in and near the tenant's leaseholds. Several trash and recycling containers are located in and around Skydive Sebastian facilities including their on-site restaurant and Tiki Bar. There are also waste receptacles found near the Skydive Sebastian camping area and in the shower and changing building.

Waste Disposal

Solid waste including vegetative waste as of January 2, 2017 is now sent to the Indian River County Solid Waste Disposal District located at 1325 74th Ave SW, Vero Beach, FL 32968. The County works with commercial haulers to bring commercial related wastes to the Indian River County Landfill and Disposal District. Further, to encourage business recycling, Indian River secured a competitive rate with Waste Management Inc., Sebastian commercial hauler, to provide a single stream recycling rate that is less than the current solid waste collection rate. Both the County and the City of Sebastian is encouraging residents and commercial entities to participate in the recycling programs.

Maintenance Waste

Another source of waste is green waste related to on-site airport maintenance, mowing and tree trimming. The Public Works Division provides all public works maintenance for the Sebastian Municipal Airport. Typically green waste is created year round; however, spikes typically occur during the rainy season in late spring, summer and early fall. Tree limbs and other usable debris are recycled to provide mulch around plants and on-airport equipment.

Construction Waste

Construction waste is the responsibility of the Contractor for each specific project. Design for construction of Taxiways C, D and E is currently in process. Construction is anticipated to begin

in late 2017 and will require the removal of old portions of taxiways to allow for realignment adjacent to Runway 32 as well as the taxilane on the southeast quadrant of the airport. The contractor will have the option to recycle the asphalt to be used in future recycled asphalt pavement projects or use for other construction activities.

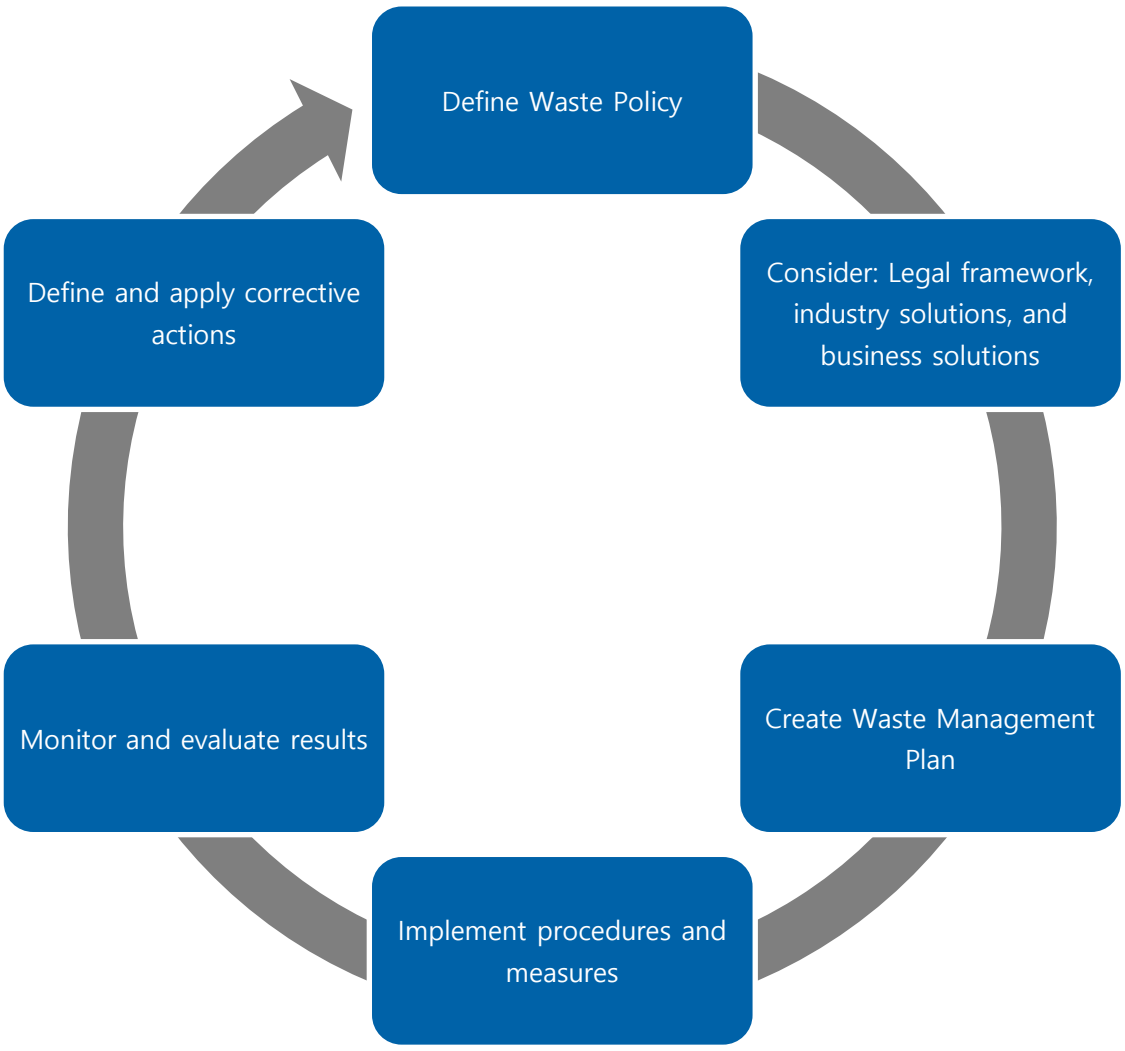
As part of the sustainability initiatives at the airport, reuse of old pavement and facilities was considered as part of future infrastructure recommendations. For example, development of the northeast quadrant could allow the consultant to reuse pavement from the north closed runway as a subbase for future taxiways and parking areas.

Viability of Solid Waste Recycling - Why Implement an Airport Waste Management Plan

Other than federal and state regulatory guidance, why should an airport implement a waste management plan? Airports are small cities supporting a variety of operations each producing continuous and various qualities of waste such as paper, waste water, food waste, oil and aircraft fuel, etc. Some of this waste may be hazardous to humans as well as the local ecosystem, and, therefore, disposal must be factored as a relevant operational cost factor. FAA's support for encouraging development of an airport solid waste management program was to assist sponsor in gathering data regarding potential environmental impacts, develop mitigation and implement environmentally friendly substitutes ultimately to provide the sponsor and airport tenants mitigation and cost saving options.

A successful waste management plan requires constant review and evaluation of various measures. A sample waste management approach is provided in **Figure 7-5.**

FIGURE 7-5
SAMPLE WASTE MANAGEMENT APPROACH



Source: Zurich Airport Waste Management Presentation, 7/12/2010

Recycling Feasibility

Smaller municipal general aviation airports provide little in the way of solid waste creation with the exception of "green" municipal solid waste and construction-demolition waste. Sebastian Municipal Airport is an example of one of these small airports. Recycling with the exception of

industrial or construction waste is not currently financially feasible since they don't produce enough waste to justify the overall costs.

However, green waste related to on-airport landscaping can be easily recycled and reused onsite thereby decreasing the airport's overall environmental footprint. The City's recycling efforts along with several sustainable initiatives such as decrease use of paper, consumer product recycling (e.g. paper, cans, bottles, ink cartridges, etc. and the purchase of energy saving equipment has had a positive benefit on not only the City but the Airport's financial bottom line.

The Airport also obtains cost savings since it is owned and operated by the City of Sebastian. Therefore, it is not necessary to have a separate agreement with local waste management companies, and the Sponsor also receives a reduced rate. All of these efforts in addition to the Sponsor's overall sustainability initiatives have and continue to save the Sponsor money. Even with the possible initiation of commercial passenger services and expansion of corporate and cargo operations, the Sponsor has an effective baseline plan in place to support continued growth.

Operation and Maintenance (O&M) Requirements

According to FAA guidance,[3] a successful waste management plan is the result of "careful planning, precise execution and continual testing and improvement."[4] Therefore, to effectively initiate and execute such a plan, various logistical and management initiatives must be implemented and monitored. To facilitate use of onsite recycling and waste containers, the airport should create a waste collection infrastructure that includes clear signage and labeling for collection and separation of materials. Depending upon the market, local commodity values, and types of haulers, there are at a minimum three waste collection systems.

The most efficient is the Separate stream recycling system, which requires separation of materials at the point of origin while ensuring material collection maintains a high level of quality. If done correctly, the separate stream system depending upon volume provides the highest return for most materials.

[3] *Recycling, Reuse and Waste Reduction at Airports, A Synthesis Document*. Prepared for the Office of Airports, Federal Aviation Administration. April 24, 2013. 1-46, pp. 7
[4] Ibid

The commingled system allows all materials to be placed in the same bin to be recycled later. Again depending upon the type and volume of materials, this could lead to lower return compared to the previous system.

Mixed Waste Processing involves post-collection separation of all materials. This system has airport travelers and tenants dispose of recyclables and trash all in the same receptacle. This system is labor intensive, causes increased contamination and likely comes with a higher cost.

Implementing a single stream system as part of program development will allow for little system disruption as operations and waste increase and also maximizes returns while minimizing overall costs.

Management commitment, according to both the FAA and EPA, was identified as the key to establishing an effective airport recycling and waste minimization program. It is recommended that an airport have a program director to oversee the recycling and waste minimization program, and to work with tenants and upper management to encourage participation and implementation. The program manager should establish procurement agreements that include reusable packaging, bins, buy back or recycling options. The program director will also oversee and control all disposal contracts, will establish and monitor various data capturing tools to determine the amount and type of waste produced and by whom. In addition, it is recommended that the management plan include reporting mechanisms for users, tenants, airport management, etc. thereby allowing for successful oversight and demonstration of airport successes to both management and the community.

Construction and Demolition Waste

Any on-airport construction requires some environmental analysis of potential impacts. Therefore, any proposed construction plans must include procedures to handle construction waste in an appropriate manner. Construction of the airport and supporting infrastructure are considered together since there will be permanent effects to the airport environment. The waste management plan will provide set targets for the recycling of construction and operations waste as well as the potential to incorporate recycled materials into construction. These targets shall be monitored and revised throughout the contract period.

The Contractor, as part of the design, will create a framework to minimize the amount of waste produced and to maximize the segregation, re-use and recycling of materials. It is recommended that the Contractor put in place measures to reduce the production of waste at

the source via the project design and management plan or through a waste separation process appropriate to the facilities available and outlined in the Airport waste management plan guidance.

Initiatives and Recommendations to Minimize Waste Generation

The City of Sebastian and its major tenants do not currently have a data collection and analyses system in place to track the type and tonnage of solid waste produced at the Airport. Therefore, to effectively perform a cost benefit analysis of potential budgetary savings, both the type and pounds of waste produced would need to be known. Environmental Protection Agency practice strategies for waste reduction include:

- ✓ **Source Reduction** – designing products to reduce the amount of waste that will need to be disposed of and to make the resulting waste less toxic.
- ✓ **Recycling** – recovery of useful materials to make new products and reduce need for virgin materials. The average cost to purchase large recycling bins was approximately $250 each, and each bin had an average lifespan of 10 years.
- ✓ **Composting** – collecting organic waste including food scraps and yard trimming and store under conditions to allow product to break down for ultimate use as a natural fertilizer.

Other options which are more useful at larger airports with several food concessionaires include food recovery, which involves donating food to area food banks, which will reduce their impact on the total waste stream while also saving money. At large passenger service airports such as Seattle Tacoma, Ft Lauderdale, and Dulles International Airports, there is an average saving of approximately $0.10 per pound of waste.

Using information provided by the EPA, FAA, local data, and general estimates of cost per pound of disposal as well as bin costs from other airports around the country, a sample annual cost vs benefit analysis was created.

TABLE 7-5 SAMPLE ANNUAL COST V. BENEFIT ANALYSIS				
OPTION STRATEGIES	**OPERATING COSTS**	**EST. POUNDS OF WASTE**	**COST/(SAVINGS) FOR DISPOSAL**	**COST/(SAVINGS) PER POUND**
Source Separation & Recycling Coordinator[1]	$5,000[2] + $60,000	150,000	($15,000)	($0.10)[3]
Food Recovery	$0.00	10,000	($1,000)	($0.10)
Total Annual Cost/ (Savings)	$65,000	160,000	($16,000)	$0.31[4]
Notes: *[1]Recycling coordinator salary estimated at $60,000* *[2]Assume purchase of 20 bins at $250 per bin* *[3]Average cost per pound of disposal is $0.10.* *[4]Cost per pound determined by: ($65,000-$16,000)/160,000*				
Sources: EPA MSW Generation Rates, 1960-2013, Broward County FLL Solid Waste Plan, Seattle-Tacoma International Airport Solid Waste Plan, Municipal Solid Waste Basic Facts, US Environmental Protection Agency, TKDA 2017				

Plans to Minimize Solid Waste Generation

The EPA has ranked the most environmentally sound strategies for Municipal Solid Waste: Source reduction (including reuse) is the most preferred method, followed by recycling, and lastly, disposal in combustion facilities and landfills.[5] Reuse and recycling opportunities exist at Sebastian Municipal for special wastes such as wooden pallets, which can be reused numerous times, and clean plastic wrap that can be recycled.

Studies have shown that the key to long-term success for any program which is implemented is planning and education.[6] This can be achieved by increasing public awareness through the postage of signs within the terminal area and/or the placement of decals on trash bins indicating that all the waste is being sent to the offsite recycling or waste management facilities. Greater visibility and increased awareness of the recycling that is being done would promote Airport and City's sensitivity to recycling as well as encourage users to use the garbage cans for their waste disposal.

[5] http://www.epa.gov/epaoswer/non-hw/payt/intro.htm
[6] "Decision Maker's Guide to Solid Waste Management", Volume II, (EPA 530-R-95-023), 1995.

Recommended strategies to minimize solid waste generation are outlined in **Table 7-6**

TABLE 7-6 WASTE MANAGEMENT STRATEGIES SYSTEM SUGGESTIONS	RECOMMENDATIONS
Optimize waste management to reduce disposal costs	• Determine factors and overall market values for recyclables and solid waste disposal • Identify areas where waste may be minimized or donated to reduce waste stream
Establish strategies to prevent origination of waste	• Reuse packaging materials • Policies on printing and copying • Reduction in wrapping etc.
Minimize waste	• Separation at point of origin • Compacting options
Implement waste treatment options:	• Recycling • Incineration (heat production) • Decontamination
Disposal Chain:	• Separation at source (most economical): ▪ Public areas ▪ Non-public areas • Should not be mixed again • Waste type and volume/weight known before leaving airport • Treatment clarified, accepted and contracted in advance
Disposal Chain:	• Separation at source (most economical): ▪ Public areas ▪ Non-public areas • Should not be mixed again • Waste type and volume/weight known before leaving airport • Treatment clarified, accepted and contracted in advance
Process Control:	• Train and encourage staff ▪ Special campaigns ▪ Posters, leaflets ▪ Explanations possibly in multiple languages ▪ Incentive programs • Obtain regular progress reports and meaningful data management ▪ Who, how much and type ▪ Who pays for how much and what ▪ How are the waste streams developed • Have tasks, authority and responsibilities defined

Sources: Zurich Airport Waste Management Presentation, July 12, 2010; Recycling, Reuse and Waste Reduction at Airports, A Synthesis Document. Prepared for the Office of Airports, Federal Aviation Administration. April 24, 2013; Guidance on Airport Recycling, Reuse and Waste Reduction Plans Memo, Federal Aviation Administration, September 30, 2014; and EPA website

Summary and Next Steps

The remainder of the master plan, **Chapters 8**, *Airport Layout Plan*, and **9**, *Implementation and Financial Plans*, focus on development identified to likely occur within the next twenty years. The Airport Layout Plan provides a graphical representation of existing and future development at Sebastian Municipal Airport as well as existing and future land use and encumbered property. This data will be used the Sponsor as part of the project' justification process to maximize federal and state funding opportunities. Project phasing and cost estimates were based upon the current Sponsor's vision, regulatory requirements and anticipated demand. Opportunities may arise during the planning period, which may alter demand or development; therefore, the implementation and financial plans were designed to provide the Sponsor flexibility to prioritize projects to address specific needs and available funding.

CHAPTER EIGHT
Airport Layout Plan Summary

Chapter Overview

The Airport layout Plan (ALP) is a graphical representation of the findings and development decisions made in the Master Plan. Capital improvements must be illustrated on the ALP in order to be eligible for Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funding. The ALP is the primary tool which will be used by the Sponsor, airport management, FAA, and FDOT to guide growth at Sebastian Municipal Airport during the 20-year planning period. The ALP and support drawings depict short, mid and long-term developed as justified in this narrative report.

As required by FAA, this narrative report and the ALP were prepared in conformance with FAA Advisory Circulars, Orders and other guidance including Standard Operating Procedure 2.00, *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)*, and 3.00, *Standard Procedure for FAA Review of Exhibit 'A' Airport Property Inventory Maps*. Copies of the completed checklists are provided in **Appendix G**.

The ALP set includes the following sheets:

- Title Sheet (Sheet 1)
- Airport Data Sheet (Sheet 2)
- Airport Layout Plan Drawing (Sheet 3)
- Airport Airspace Drawing – Existing/Future (Sheet 4)
- Inner Portion of the Approach Surface Drawing – Runway 5/23 (Sheet 5)
- Inner Portion of the Approach Surface Drawing – Runway 10/28 (Sheet 6)
- Runway Departure Surface Drawing – Runway 5/23 (Sheet 7)
- Terminal Area Drawing – (Sheet 8)
- Land Use Drawing – (Sheet 9)
- Exhibit 'A' Airport Property Inventory Map (Sheet 10)

These drawings were developed using AutoCAD 2016 and existing aerial imagery. Ground and aerial survey as well as new airport imagery were not included in this

master plan update at the request of the Sponsor and by the approval of the FAA Airport District Office and Florida Department of Transportation Aviation and Space Division (FDOT). Reduced reproductions of the drawings are included in this chapter for illustration purposes only. A full-size set (22" by 34" format) of the drawings were submitted to the FAA for approval.

Title Sheet (Sheet 1)

The Title Sheet serves as the ALP drawing set cover and provides basic information required by SOP 2.00. It includes the airport name, vicinity map, location map, a state county map highlighting Indian River County, an index of the sheets in the ALP, and includes space for approval signatures for the City, State, and FAA. Also included is the project name, federal and state grant numbers, sponsor name and logo, and revision table.

Airport Data Sheet (Sheet 2)

To ensure clarity, a separate airport data sheet was created documenting information graphically presented on the Airport Layout Plan sheet (sheet 3). The airport data sheet includes the following existing and future airport data information:

- Wind Roses (All Weather, IFR and VFR) and coverage tables
- Airport Data Table
- Runway Data Table
- Taxiway Data Table
- Modifications to Standard Table
- Declared Distances Table
- Summary of Notes Table
- And Revisions Table

Airport Layout Plan Drawing (Sheet 3)

The Airport Layout Plan Drawing sheet depicts existing facilities and proposed capital improvements, to scale, during the 20-year planning period. The Airport Layout Plan (ALP) drawing sheet illustrates all existing and future airfield development and associated safety and clearance zones as well as aviation and non-aviation landside improvements. The ALP was designed in accordance with FAA SOP 2.0. Some key changes from the previous ALP set include: changing Runway 10-28 to a utility runway

only allowing several runway safety and clearance zones to be decreased; redevelopment of the north sector of the airfield for aviation development; removal of conservation areas on the airport property; relocation of proposed hangar development as well as construction of new airport access roads and non-aviation land use. Additional changes include segregating larger corporate development near the existing terminal facilities adjacent to the new Taxiway D and to the north quadrant of the airfield as well as adding additional small hangar storage in the form of box and shade hangars. Any additional on or off airport property changes which may impact navigable airspace or airport operability are also reflected on the ALP sheet.

Airport Airspace Drawing (Sheet 4)

Federal Aviation Regulations (FAR) Part 77, Object Affecting Navigable Airspace, defines airspace standards, thus establishing a criteria for evaluating navigable airspace surrounding the airport. Part 77 was adopted to enhance the safe operations of aircraft in the airspace surrounding the airport by establishing imaginary surfaces which no object natural or manmade should penetrate. These 'imaginary surfaces' are established based upon airfield geometry, runway category, and approach types.

It is important to note that ground or aerial survey was not included as part of this Master Plan/ALP update. The last field survey was performed by McMillan Surveying on July 8, 2005. The FDOT performed an on-site inspection of the airport in January 2017, and submitted a report identifying several deficiencies and runway approach limitations. A copy of this report is provided in **Appendix H**.

Issues identified included trees located within the 7:1 runway transitional surface and within the 500 foot primary surface of Runway 5 in addition to trees located within the approach surface to Runway 23. Runway 5-23, the primary runway, is designed to support non-precision instrument approaches. However, due to current cost constraints, the Airport Director opted to eliminate the straight in approach to Runway 5/23 and revert to circling approaches only. This raises the approach minimums from 380-1 mile to 520-1 mile. A NOTAM (notice to airmen) was activated on February 28, 2017 showing that the published LP and LNAV approaches are no longer authorized.

Although the Airport Inspection Record states that this is a permanent change, discussions with City and Airport management and users have identified this as a

temporary measure only until funding may become available. Since the loss of the LP and LNAV approaches is considered temporary, the airspace and inner approach sheets all illustrate non-precision approaches to Runway 5 and 23.

The Airport Airspace Drawing depicts the most demanding existing and future airspace surfaces based upon anticipated demand, and it is used to assist communities with zoning and land use planning decisions. The Airport Airspace Drawing presents the airspace contours at X26 based upon future runway lengths with 50-foot elevation contours shown on all sloping surfaces. The drawing also shows physical features on and contiguous to the airport in order to identify potential obstructions to the Airport Part 77 surfaces. An obstruction data table catalogs the most recent survey data (2005), preliminary on-site review and data provided by airport management including the FDOT Airport Inspection Record (January 2017) to determine obstructions to existing and ultimate Part 77 surfaces including location, object elevation, affected surface elevation, and surface penetration.

The imaginary surfaces to be protected from obstructions include:

Horizontal Surface – A horizontal plane 150 feet above the established airport elevation (highest point of all the runways at the airport). The perimeter of the horizontal surface is created by swinging arcs from the end of the primary surface of a radius of either 5,000 feet or 10,000 feet based on runway classification and approach type. The swinging arcs from the ends of all the runways are connected by lines tangent to the arcs of the nearest runway end.

Conical Surface – A surface extending outward and upward from the periphery of the horizontal surface at a 20:1 slope for a horizontal distance of 4,000 feet.

Primary Surface – A surface longitudinally centered on a runway whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. For paved surfaces, this surface extends 200 feet beyond each runway end and the width is determined by the most precise approach to either runway end. According to FDOT, Runways 5/23 and 10/28 support aircraft less than or equal to 12,500 lbs. However, since Runway 5/23 has a pavement strength of 20,000 SW and is forecast to support heavier turboprop aircraft, the existing and future primary surface is 500 feet x 200 feet.

Although the previous ALP suggested upgrading Runway 10/28 from a visual only to non-precision instrument runway, current and forecast demand does not support this recommendation. Further, since the runway pavement strength is not published, it was assumed based upon existing FAA and FDOT data that the runway pavement was designed to support 12,500 lbs. SW or less. Therefore, the primary surface for Runways 10/28 was decreased from 500 x 200 feet to 250 x 200 feet.

Approach Surface – A surface longitudinally centered on the extended runway centerline and extending outward and upward from the end of the primary surface. The approach surface slope, length, and outward expansion are determined by the preciseness of the runway approach and runway classification.

Transitional Surface – Surfaces extending outward and upward at right angles to the runway centerline and extended runway centerline at a slope of 7 to 1 from the sides of the primary surface and the approach surface. For the portions of the transitional surface of a precision approach which project through and beyond the conical surface, they extend a distance of 5,000 feet horizontally from the edge of the approach surface and at right angles to the extended runway centerline.

Finally, the Airport Airspace Drawing is transposed on the digital quadrangle base map to provide a reference for the airspace coverage.

Inner Portion of the Approach Surface Drawings (Sheets 5 and 6)

The Inner Portion of the Approach Surface Drawing depicts both the plan view (top down) and profile view for each runway. These sheets provide a detailed view of Part 77 surfaces, approach and departure surfaces as well as the existing and ultimate runway and ground profiles including terrain features such as roadways, railroads, and waterways along the extended runway centerline.

Objects affecting these surfaces are documented in an obstruction table and depicted in both the plan view and profile view. This allows both a map location and a visual vertical representation of the object and how much it projects through the navigable surfaces.

Runway Departure Surface Drawing – Runway 5/25 (Sheet 7)

The Runway Departure Surface Drawing depicts both the plan view (top down) and profile view for each runway. These sheets provide a detailed view of Part 77 departure surfaces, as well as the existing and ultimate runway and ground profiles including terrain features such as roadways, railroads, and waterways along the extended runway centerline.

Objects affecting these surfaces are documented in an obstruction table and depicted in both the plan view and profile view. This allows both a map location and a visual vertical representation of the object and how much it projects through the navigable surfaces.

Terminal Area Drawing (Sheet 8)

The Terminal Area Drawing presents an enlarged portion of the Airport Layout Plan Drawing depicting the short and long-term developments at X26. Illustrated development includes existing and proposed hangars, maintenance buildings, fuel facilities, parachute drop zone, and proposed aviation and non-aviation development. At X26, this is concentrated in three locations: the existing terminal area/ South Airport Quadrant, Southwest Airport Quadrant and Northwest Airport Quadrant. Development on the Northeast Airport Quadrant is identified for ultimate long-term (2029 +) development.

The development of these three areas is based on facilities identified as a need within the 20-year planning period in **Chapter 4**, *Facility Requirements*. These needs include: apron parking facilities, aircraft storage, surface access, support facilities, and land use. FAA dimensional criteria such as the Building Restriction Line (BRL), Taxiway/Taxilane Object Free Area (TOFA), Taxiway/Taxilane Safety Area (TSA), Runway Object Free Area (ROFA), Runway Safety Area (RSA), and Runway Visibility Zone (RVZ).

Land Use Drawing (Sheet 9)

The Land Use Drawing depicts existing and recommended land use within and surrounding the airport property boundary. Existing land use was provided by the Airport Sponsor and future, recommended land use is shown on this sheet. The goal of the Master Plan was to maximize the utilization of airport property for aeronautical use, and, where applicable, property available for use by non-aeronautical enterprises to

support airport self-sufficiency. Surrounding land use was acquired from the City of Sebastian and Indian River County including zoning ordinances from both.

Recommended zoning and land use improvements related to planned development are illustrated within the land use drawing. Noise contours were also not prepared as part of this master plan update based upon funding limitations and historical data showing that noise contours remain within the airport boundary. Further, the City of Sebastian have voluntary noise abatement procedures in place to limit impacts to surrounding residential and other noise sensitive lands contiguous to the airport. The suggested ultimate zoning will be depicted on the Land Use Drawing to demonstrate where the future safety zones will be located to assist in the development of a new zoning ordinance as needed.

Airport Property Map / Exhibit A (Sheet 10)

The Airport Property Map/Exhibit A defines the existing airport boundary for Sebastian Municipal Airport, identifies historical property obtained with federal funds, and recommended future property acquisition (fee simple and easement). The sheet depicts the graphical representation of the existing airport property including the parcels which originally formed the airport. Tables associated with the list available information about the parcels including original owner, type of acquisition, acreage, date of acquisition, etc. If any property included encumbrances, these were also listed. Metes and bounds, monuments, easements and other features are also depicted based upon existing land records provided by the City of Sebastian. Future land acquisition or easements needed to support planned long-term development and safety areas are also identified.

Summary

The Airport Layout Plan set is a graphical illustration of existing and future conditions and capital improvements at Sebastian Municipal Airport. 11 x 17 inch copies of the ALP set are included in this chapter. The ALP set and narrative report were presented to Airport Management, Technical Advisory Committee (TAC), and the Sebastian City Council for review and approval. This data was incorporated into the airport plan set to reflect City approved airport development for the 20-year planning period.

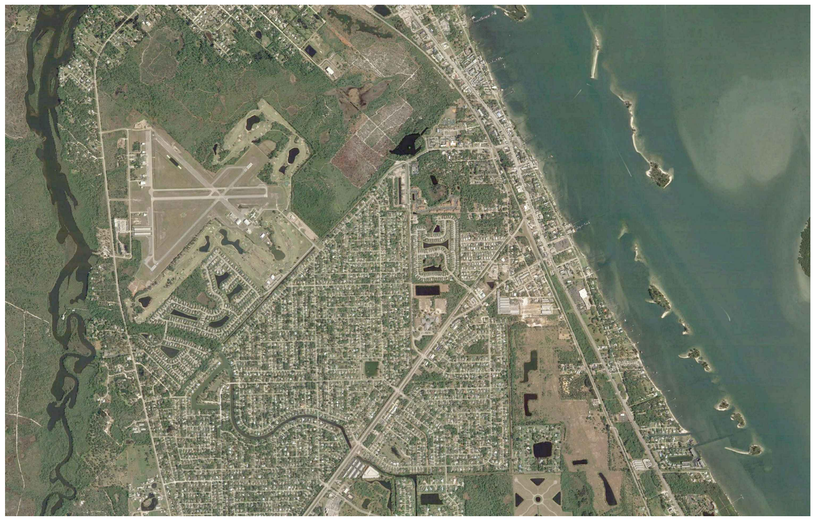
This Page was Intentionally Left Blank

SEBASTIAN MUNICIPAL AIRPORT (X26)

SEBASTIAN, FLORIDA

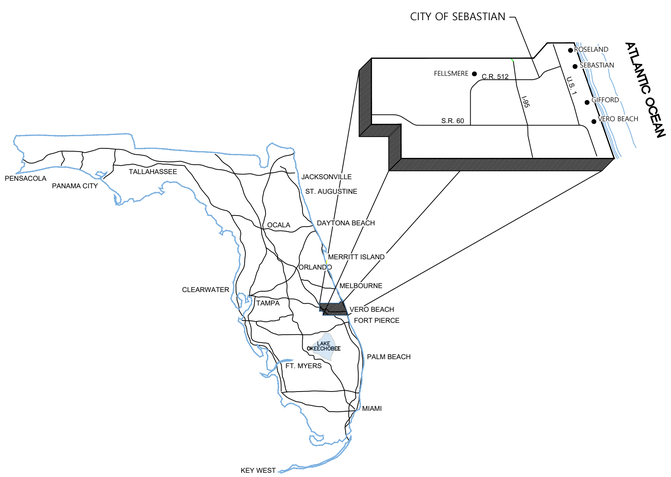
Airport Layout Plan - October 2018

FAA APPROVAL LETTER

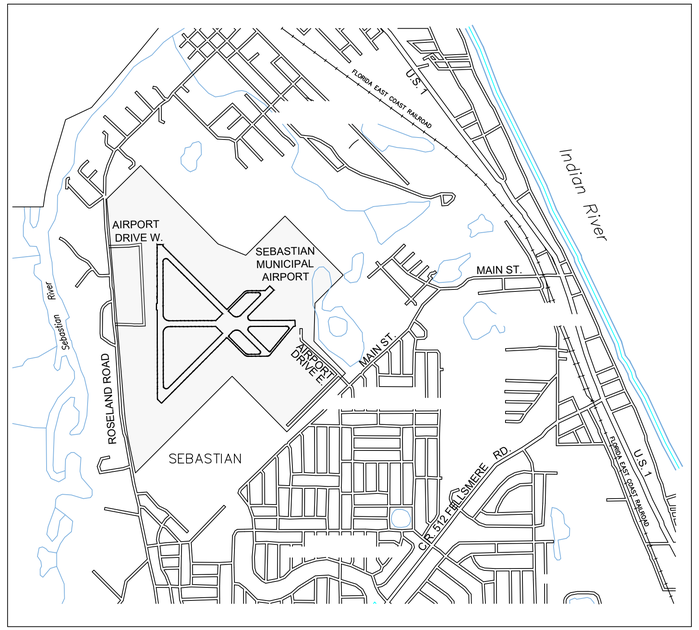


VICINITY MAP (NOT TO SCALE)

SHEET INDEX		
		REVISION
1	TITLE SHEET	
2	AIRPORT DATA SHEET	
3	AIRPORT LAYOUT PLAN - EXISTING/FUTURE	
4	AIRPORT AIRSPACE DRAWING - EXISTING/FUTURE	
5	INNER PORTION OF THE APPROACH SURFACE - RUNWAY 5-23	
6	INNER PORTION OF THE APPROACH SURFACE - RUNWAY 10-28	
7	INNER PORTION OF THE DEPARTURE SURFACE - RUNWAY 5-23	
8	TERMINAL AREA DRAWING	
9	LAND USE DRAWING	
10	AIRPORT PROPERTY MAP EXHIBIT 'A'	



INDIAN RIVER COUNTY, FLORIDA



(SOURCE - INDIAN RIVER COUNTY PROPERTY APPRAISER)

LOCATION MAP (NOT TO SCALE)

FAA APPROVAL STAMP

FDOT APPROVAL STAMP

CITY OF SEBASTIAN
RECOMMENDED
FOR APPROVAL _____ NAME _____ TITLE _____ DATE

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

SEBASTIAN MUNICIPAL AIRPORT

COVER SHEET

OCTOBER 2018

PROJ. NO. 16256 X26

SHEET 1 OF 10

RUNWAY DATA

	RUNWAY 5/23				RUNWAY 10/28			
	EXISTING		FUTURE		EXISTING		FUTURE	
RUNWAY IDENTIFICATION	5	23	5	23	10	28	10	28
FDOT CATEGORY	Utility		SAME		Utility		Utility	
CRITICAL DESIGN AIRCRAFT	King Air 200		King Air 350I		DH6-300/B200		King Air B-200	
RUNWAY DESIGN CODE (RDC)	B-II		B-II		B-II		B-II Small	
RUNWAY REFERENCE CODE (RRC)	B-II-5000		B-II-5000		B-II-Visual		B-II-Visual	
RUNWAY PAVEMENT TYPE	Asphalt		SAME		Asphalt		SAME	
RUNWAY PAVEMENT STRENGTH (IN 1,000 LBS)	22 SW		SAME		Unpublished (~12.5 SW)		SAME	
RUNWAY PAVEMENT STRENGTH (PCN)	4/F/B/Y/U		Est. 6/F/B/Y/U		4/F/C/X/U		Est. 6/F/C/X/U	
RUNWAY SURFACE TREATMENT	NONE		SAME		NONE		SAME	
RUNWAY EFFECTIVE GRADIENT	0.07% UP	0.07% DOWN	SAME	SAME	Unpublished (~0.0%)	Unpublished (~0.0%)	Unpublished (~0.0%)	Unpublished (~0.0%)
RUNWAY WIND COVERAGE (13 Knot)	94.74%		SAME		96.88%		SAME	
RUNWAY DIMENSIONS (LENGTH x WIDTH)	4023' x 75'		SAME		3199' x 75'		SAME	
DISPLACED THRESHOLD COORDINATES:								
LATITUDE	NONE	NONE	SAME	SAME	NONE	NONE	SAME	SAME
LONGITUDE	NONE	NONE	SAME	SAME	NONE	NONE	SAME	SAME
DISPLACED THRESHOLD ELEVATION	NA	NA	SAME	SAME	NA	NA	SAME	SAME
RUNWAY END COORDINATES:								
LATITUDE	27° 48' 31.2745 N	27° 48' 59.3954 N	SAME	SAME	27° 48' 50.5900N	27° 48' 50.5281N	SAME	SAME
LONGITUDE	80° 30' 01.11 W	80° 29' 29.385 W	SAME	SAME	080° 30' 00.4782W	080° 29' 24.8560W	SAME	SAME
SLOPE	2° 17' 26" (25:1)	2° 51' 44" (20:1)	SAME	SAME	2° 17' 26" (25:1)	2° 51' 44" (20:1)	SAME	SAME
RUNWAY END ELEVATION (AMSL)	18.4'	21.5'	SAME	SAME	18.3'	20.8'	SAME	SAME
TOUCHDOWN ZONE ELEVATION (TDZE) (AMSL)	20.6'	21.5'	SAME	SAME	21.1'	21.1'	SAME	SAME
RUNWAY HIGH/LOW POINTS ELEVATION: (AMSL)								
HIGH	Unavailable/Unpublished		Unknown (Recommend Survey)		Unavailable/Unpublished		Unknown (Recommend Survey)	
LOW	Unavailable/Unpublished		Unknown (Recommend Survey)		Unavailable/Unpublished		Unknown (Recommend Survey)	
RUNWAY TRUE BEARING	225.15° OR 45.15°		SAME		89.88° OR 269.88°		SAME	
RUNWAY TRUE ALIGNMENT	45°	225°	SAME	SAME	90°	270°	SAME	SAME
RUNWAY LIGHTING TYPE	LIRL		SAME		NONE		SAME	
RUNWAY MARKING TYPE	NON-PRECISION INSTRUMENT (NPI)		SAME		BASIC		SAME	
VISUAL SLOPE INDICATOR	2-LIGHT PAPI ON LE	2-LIGHT PAPI ON L	SAME	SAME	2-LIGHT PAPI ON LEF	2-LIGHT PAPI ON LEF	SAME	SAME
APPROACH TYPE	NPI	NPI	SAME	SAME	VISUAL	VISUAL	SAME	SAME
PART 77 APPROACH CATEGORY	NPI(B)	NPI(B)	SAME	SAME	B(V)	B(V)	A(V)	A(V)
PART 77 APPROACH SLOPE	34:1	34:1	SAME	SAME	20:1	20:1	SAME	SAME
VISIBILITY MINIMUMS (Statute Miles)	1-Mile	1-Mile	SAME	SAME	>1mile	>1mile	SAME	SAME
TYPE OF AERONAUTICAL SURVEY REQUIRED	Vertically Guided		SAME		Non-Vertically Guided	Non-Vertically Guided	SAME	SAME
RUNWAY DEPARTURE SURFACE	Yes		SAME		No	No	SAME	SAME
THRESHOLD SITING SURFACE (Table 3-2, AC 150/5	Rows 3 & 4		Rows 3, 4 & 8		Row 2	Row 2	SAME	SAME
VISUAL & INSTRUMENTAL NAVAIDS	RNAV (LP/LNAV), PAPI-2		RNAV (LP/LNAV), PAPI-2 & REILs		PAPI-2	PAPI-2	SAME	SAME
VERTICAL/HORIZONTAL DATUM	NAD 88/83		SAME		NAD 88/83	NAD 88/83	SAME	SAME
RUNWAY SAFETY AREA (RSA)								
WIDTH	150'	150'	150'	150'	150'	150'	150'	150'
LENGTH BEYOND DEPARTURE END	300'	300'	300'	300'	300'	300'	300'	300'
LENGTH PRIOR TO THRESHOLD	300'	300'	300'	300'	300'	300'	300'	300'
RUNWAY OBJECT FREE AREA (ROFA)								
WIDTH	500'	500'	500'	500'	500'	500'	500'	500'
LENGTH BEYOND RUNWAY END	300'	300'	300'	300'	300'	300'	300'	300'
LENGTH PRIOR TO THRESHOLD	300'	300'	300'	300'	300'	300'	300'	300'
RUNWAY OBSTACLE FREE ZONE (ROFZ)								
LENGTH BEYOND RUNWAY END	200'	200'	200'	200'	200'	200'	200'	200'
WIDTH	400'	400'	400'	400'	400'	400'	250'	250'
PRECISION OBSTACLE FREE ZONE (POFZ)								
LENGTH	NA	NA	NA	NA	NA	NA	NA	NA
WIDTH	NA	NA	NA	NA	NA	NA	NA	NA
APPROACH RUNWAY PROTECTION ZONE (ARPZ)								
APPROACH VISIBILITY MINIMA	1-Mile	1-Mile	1-Mile	1-Mile	>1 mile (VIS)	>1 mile (VIS)	>1 mile (VIS)	>1 mile (VIS)
LENGTH (FT.)	1000'	1000'	1000'	1000'	1000'	1000'	1000'	1000'
INNER WIDTH (FT.)	500'	500'	500'	500'	500'	500'	250'	250'
OUTER WIDTH (FT.)	700'	700'	700'	700'	700'	700'	450'	450'
ACREAGE	13.77	13.77	13.77	13.77	13.77	13.77	8.035	8.035
DEPARTURE RUNWAY PROTECTION ZONE (DRPZ)								
LENGTH (FT.)	1000'	1000'	1000'	1000'	1000'	1000'	1000'	1000'
INNER WIDTH (FT.)	500'	500'	500'	500'	500'	500'	250'	250'
OUTER WIDTH (FT.)	700'	700'	700'	700'	700'	700'	450'	450'
ACREAGE	13.77	13.77	13.77	13.77	13.77	13.77	8.035	8.035
RUNWAY SEPERATION								
CENTERLINE TO								
PARALLEL RUNWAY CENTERLINE	NA		700 (VFR ONLY)		NA		700 (VFR ONLY)	
HOLDING POSITION	200'		200'		200'		125'	
PARALLEL TAXIWAY/TAXILANE CENTERLINE	240'		240'		240'		240'	
AIRCRAFT PARKING AREA	250'		250'		250'		250'	
HELICOPTER TOUCHDOWN PA	NA		700'		NA		700'	

SOURCES: Airport Historical Data, FAA and FDOT Airport Databases, FAA AC 150/5300-13A, 2010 ALP LPA Group, and TKDA 2017

AIRPORT DATA TABLE

	EXISTING	FUTURE
AIRPORT IDENTIFIER	X26	SEB*
AIRPORT REFERENCE CODE	B-II	B-II
CRITICAL AIRCRAFT	King Air 200	King Air 350i
MEAN MAX. TEMPERATURE (HOTTEST MONTH	90° F	SAME
AIRPORT ELEVATION (AMSL) NAVD 88	21.5	SAME
RUNWAY INTERSECTION ELEVATION (ft)	20.5	SAME
AIRPORT INSTRUMENT NAVAIDS	Airport Beacons, PAPI-2s	Airport Beacons, PAPI-2s, and REILs (5/23 only)
AIRPORT NAVAIDS	Threshold Lighting and LIRL (Rwy 5/23 only), Lighted Wind Cone, Segmented Circle, Compass Rose, Pavement edge reflectors	SAME
MISCELLANEOUS FACILITIES	AWOS-3, Skydive Drop Zone, Swoop Pond	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83		
Latitude	27-48-47.7000N ESTIMATED	SAME
Longitude	080-29-44.1000W	SAME
EXISTING MAGNETIC VARIATION	6° 48 feet west ± 0° 19 Feet	Change 0° 5 feet west annually
NPIAS SERVICE LEVEL	General Aviation - Local	SAME
FDOT SERVICE LEVEL	General Aviation	SAME

DECLARED DISTANCES

	RUNWAY 5/23		RUNWAY 10/28	
	EXISTING	FUTURE	EXISTING	FUTURE
TAKEOFF RUN AVAILABLE (TORA)	4023 ft.	4023 ft.	3199 ft.	3199 ft.
TAKEOFF DISTANCE AVAILABLE (TODA)	4023 ft.	4023 ft.	3199 ft.	3199 ft.
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA	4023 ft.	4023 ft.	3199 ft.	3199 ft.
LANDING DISTANCE AVAILABLE (LDA)	4023 ft.	4023 ft.	3199 ft.	3199 ft.

TAXIWAY/TAXILANE DATA TABLE

	Runway 5/23		Runway 10/28	
	Existing*	Future[1]	Existing*	Future[1]
Taxiway Design Group	2	2	1A	1A
Taxiway Width (ft)	35	35	32 -50	25
Taxiway Safety Area Width (TSA) (ft)	79	79	49	49
Taxiway Object Free Area (TOFA) (ft)	131	131	89	89
Taxiway Edge Safety Margin (ft)	7.5	7.5	6.5-7.5	5
Taxiway Shoulder Width (ft)	15	15	13-15	10
Taxiway Centerline to Fixed or Movable Object (ft	105	105	54	64
Taxilane Design Group*	1A/1B	2	1A	1A
Taxilane Width (ft)	25	35	18-25	25
Taxilane Safety Area Width (TSA) (ft)	49	79	35-49	49
Taxilane Object Free Area (TOFA) (ft)	79	115	57-79	79
Taxilane Edge Safety Margin (ft)	5	7.5	2-5	5
Taxilane Shoulder Width (ft)	10	15	4-10	10
Taxilane Centerline to Fixed or Movable Object (f	39.5	57.5	33-40	39.5
*Dimensions vary based upon critical aircraft use				
[1]Future Use based upon runway critical aircraft				

MODIFICATION TO STANDARDS

NO.	DESCRIPTION	APPROVAL DATE
1	NONE	N/A

NAVAID/FACILITIES OWNERSHIP TABLE

OWNER	NAVAIDS
City of Sebastian	AWOS-3, Airport Beacons, Runway
FDOT	None
FAA	None

SOURCE: FAA and FDOT Databases and City of Sebastian Airport Records, 2017

WIND COVERAGE

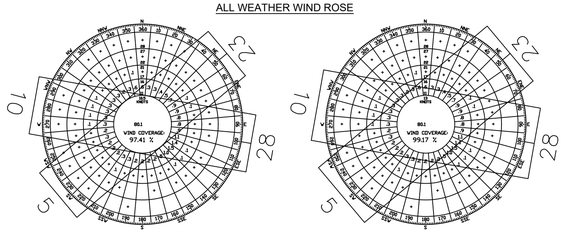
	RWY	10.5 Knots	13 Knots
All Weather	5/23	90.07%	94.74%
	10/28	93.74%	96.88%
IFR	5/23	90.34%	94.41%
	10/28	NA	NA
Combined	5/23 and 10/28	97.41%	99.17%

SOURCE: NCDC/NOAA Data 747930 Vero Beach Municipal Airport Annual Wind Information from 2010-2016

NOTES

NO.	DESCRIPTION
1	RUNWAY 10-28 ENDPOINTS COORDINATES, ELEVATIONS, AND EFFECTIVE GRADIENT HAVE BEEN ESTIMATED.
2	RUNWAY SURVEY TYPE CODES DEFINED IN FAA ADVISORY CIRCULAR 150/5300-13, CHANGE 6, APPENDIX 16.
3	BUILDING RESTRICTION LINE BASED UPON 55 FOOT BUILDING ELEVATION ABOVE GROUND LEVEL
4	AIRPORT FIELD SURVEY NOT INCLUDED IN MASTER PLAN PER SPONSOR REQUEST
5	HISTORICAL FIELD SURVEY PERFORMED BY McMILLAN SURVEYING ON 7/8/2005
6	ALL AIRFIELD LIGHTING INCANDESCENT NOT LED

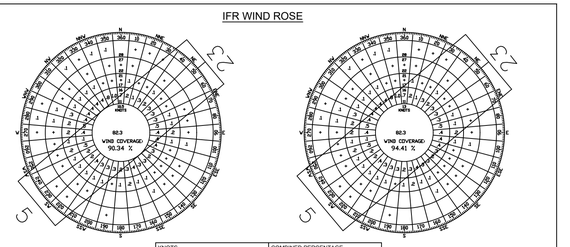
ALL WEATHER WIND ROSE



KNOTS	COMBINED PERCENTAGE
10.5	97.41%
13	99.17%

SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

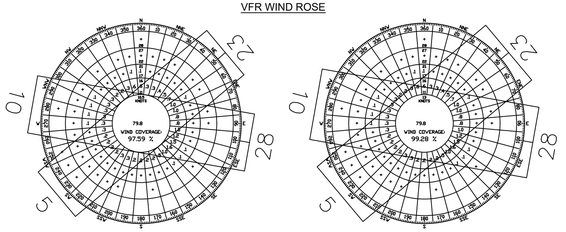
IFR WIND ROSE



KNOTS	COMBINED PERCENTAGE
10.5	90.34%
13	94.41%

SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

VFR WIND ROSE



KNOTS	COMBINED PERCENTAGE
10.5	97.59%
13	99.28%

SOURCE:
WIND DATA OBTAINED FROM THE VERO BEACH MUNICIPAL AIRPORT FOR THE YEARS 2007 TO 2017, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

SEBASTIAN MUNICIPAL AIRPORT

AIRPORT DATA SHEET

OCTOBER 2018

PROJ. NO. 16256 X26

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		N/A
EASEMENT		N/A
COMMERCIAL DEVELOPMENT	N/A	
AIRPORT SECURITY FENCE		
AIRPORT BUILDINGS		
BUILDING REMOVAL	N/A	N/A
AIRPORT PAVEMENT		
PAVEMENT REMOVAL	N/A	N/A
AUTOMOBILE PARKING		
BUILDING RESTRICTION LINE (BRL)		N/A
PUBLIC WORKS DEVELOPMENT	N/A	
RUNWAY PROTECTION ZONE (RPZ)	RPZ	RPZ
TAXIWAY CENTERLINE		
TAXIWAY SAFETY AREA (TSA)	TSA TSA TSA	TSA
RUNWAY SAFETY AREA (RSA)	RSA RSA RSA	N/A
RUNWAY OBJECT FREE AREA (ROFA)	OFA OFA OFA	N/A
RUNWAY OBJECT FREE ZONE (ROFZ)	OFZ OFZ OFZ	N/A
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA TOFA TOFA	TOFA TOFA TOFA
PAPI		N/A
TIE DOWNS		
AIRPORT REFERENCE POINT		N/A
HELIPAD		N/A
WIND CONE		
CONTOUR LINES	20	N/A
SURFACE ELEVATION	X 20.0	N/A
THRESHOLD LIGHTS		N/A

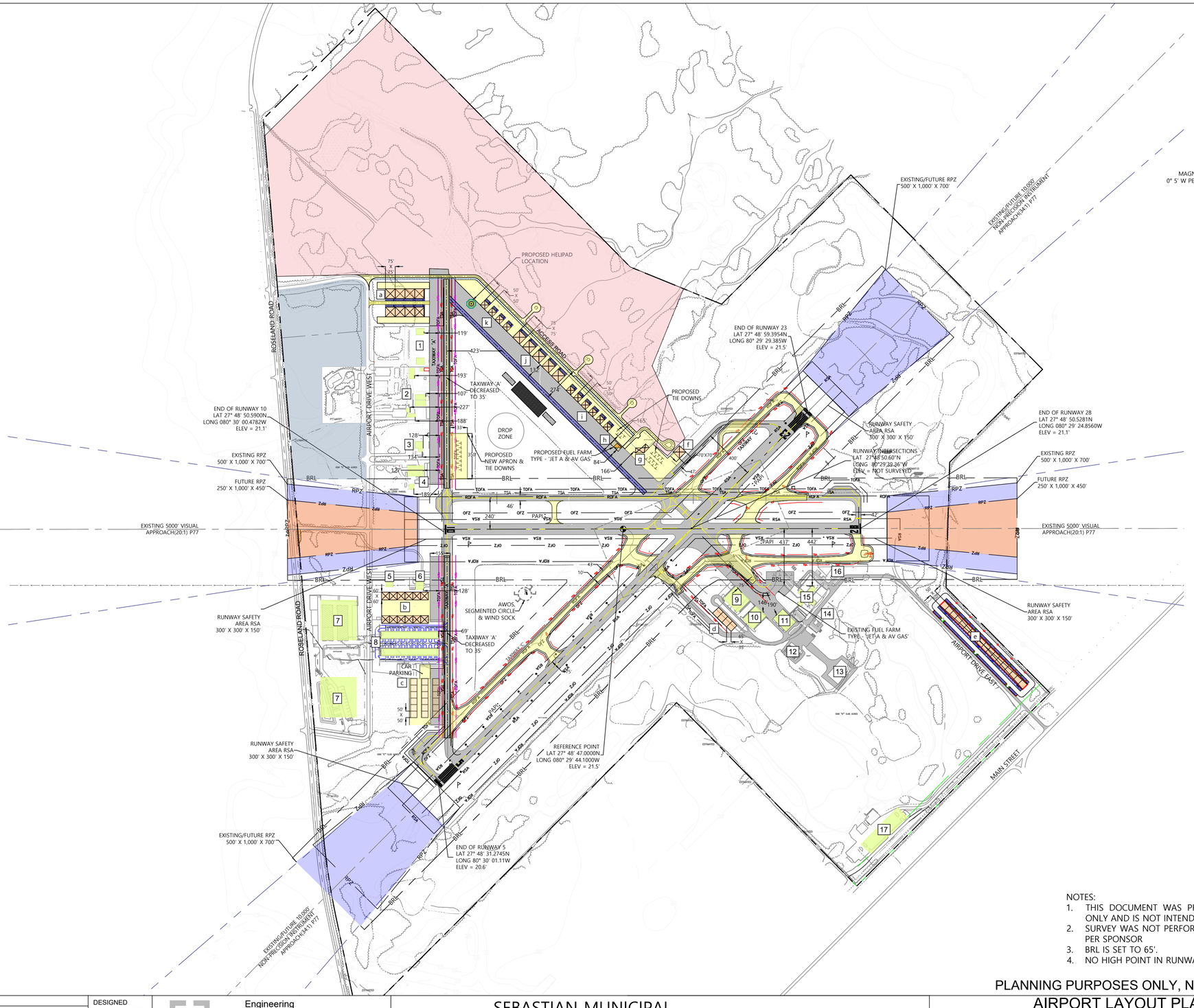
BUILDING DATA TABLE - EXISTING

ID	DESCRIPTION
1	HANGARS - (KENNETH MISHLER)
2	HANGARS/BUILDINGS/OFFICE SPACE - (SKYDIVE SEBASTIAN)
3	HANGAR/OFFICE SPACE - (PILOTS PARADISE)
4	HANGAR/OFFICE SPACE - (VELOCITY)
5	AIRPORT POLICE - (CITY OF SEBASTIAN)
6	HANGAR - (VELOCITY)
7	STORAGE UNITS - (ABOUT STORAGE)
8	T-HANGARS - (SHELTAIR SEBASTIAN, LLC)
9	HANGAR C - (CRUISER AIRCRAFT, INC. & CZECH SPORT AIRCRAFT)
10	HANGAR B - (VELOCITY)
11	HANGAR A - (LOPRESTI)
12	MAINTENANCE BUILDING - (CITY OF SEBASTIAN)
13	MAINTENANCE BUILDING - (CITY OF SEBASTIAN)
14	POLICE COMPOUND - (CITY OF SEBASTIAN)
15	ARRIVAL/DEPARTURE/ADMINSTRATIVE BUILDING
16	VAULT
17	GOLF COURSE BUILDING/RESTUBANT - (CITY OF SEBASTIAN)

BUILDING DATA TABLE - FUTURE

ID	DESCRIPTION
a	75' X 75' HANGAR
b	60' X 60' HANGAR
c	50' X 50' SHADE HANGAR
d	35' X 60' HANGAR
e	50' X 50' BAY - STORE FRONT
f	70' X 70' BOX HANGAR
g	FBO
h	FUEL FARM
i	50' X 50' HANGAR
j	75' X 75' HANGAR
k	50' X 50' HANGAR

FAA APPROVAL STAMP



NOTES:
1. THIS DOCUMENT WAS PREPARED FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR ANY OTHER USE.
2. SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR
3. BRL IS SET TO 65'.
4. NO HIGH POINT IN RUNWAY.

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

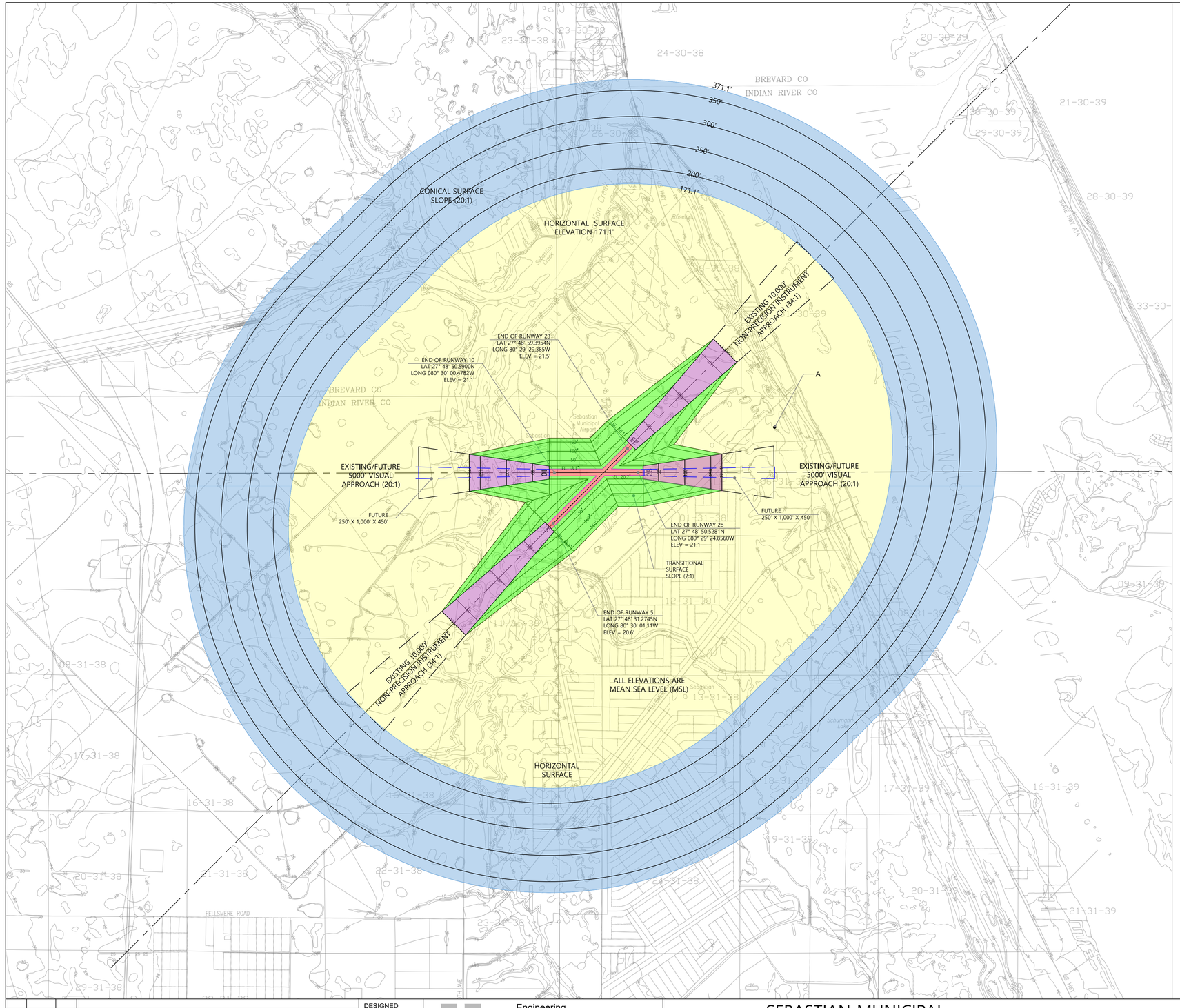
SEBASTIAN MUNICIPAL AIRPORT

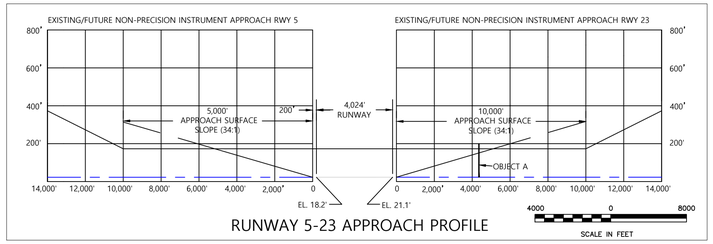
AIRPORT LAYOUT PLAN
EXISTING/FUTURE

PROJ. NO. 16256 | X26

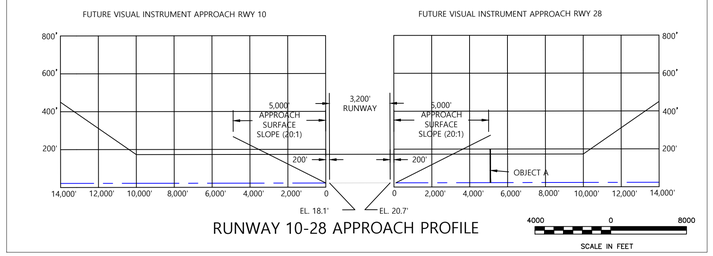
OCTOBER 2018

SHEET 3 OF 10





RUNWAY 5-23 APPROACH PROFILE



RUNWAY 10-28 APPROACH PROFILE

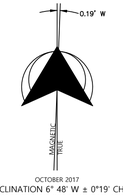
OBSTRUCTION DATA

OBJECT	DESCRIPTION	ELEVATION TOP	EFFECTED PART 77 SURFACE	HEIGHT ABOVE CONTROLLING SURFACE	PROPOSED MITIGATION
A	LIGHTED TOWER	198'	HORIZONTAL	26.9'	NONE

NOTE:
SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER MANAGEMENT.

DRAWING LEGEND

	APPROACH SURFACE
	CONICAL SURFACE
	HORIZONTAL SURFACE
	PRIMARY SURFACE
	TRANSITIONAL SURFACE
	PROPOSED RWY 10-28 - DECREASED RPZ 250' X 1,000' X 450'



OCTOBER 2017
MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY
0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010

2000 0 4000
SCALE IN FEET

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

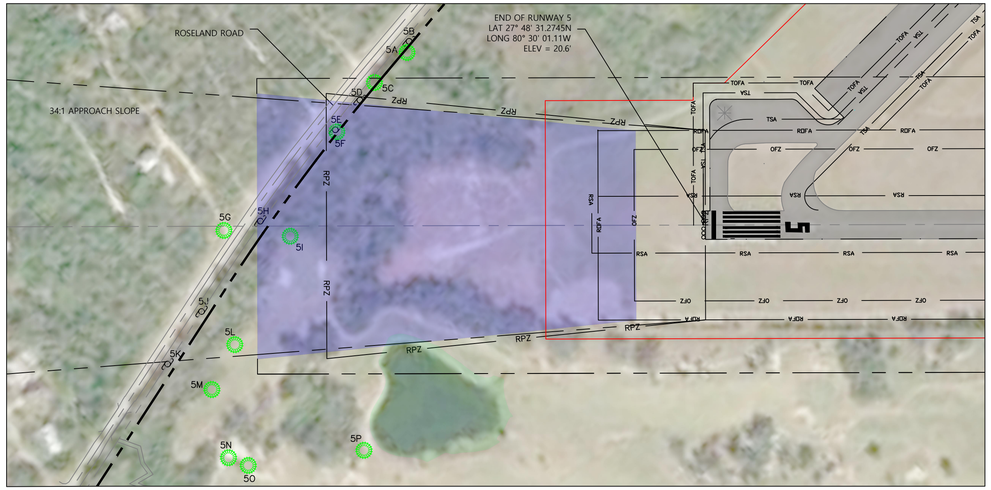
SEBASTIAN MUNICIPAL AIRPORT

AIRPORT AIRSPACE DRAWING - EXISTING/FUTURE

OCTOBER 2018

PROJ. NO. 16256 | X26

SHEET 4 OF 10



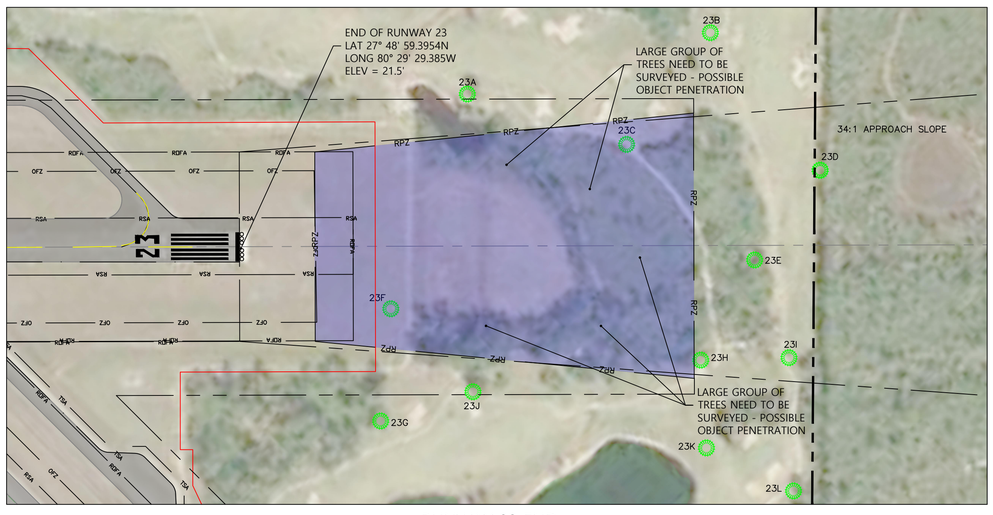
RUNWAY 5 END

RUNWAY 5 END OBSTRUCTION TABLE

OBJECT	DESCRIPTION	ELEVATION (TOP)	HEIGHT ABOVE 34:1 APPROACH SURFACE	PROPOSED MITIGATION
5A	PINE TREE	37'±	3'±	CUT
5B	UTILITY POLE	47'±	13'±	REMOVE
5C	PINE TREE	45'±	8'±	CUT
5D	UTILITY POLE	51'±	13'±	REMOVE
5E	UTILITY POLE	51'±	11'±	REMOVE
5F	PINE TREE	42'±	3'±	CUT
5G	PINE TREE	38'±	17'±	CUT
5H	UTILITY POLE	49'±	3'±	REMOVE
5I	PINE TREE	42'±	BELOW	NONE
5J	UTILITY POLE	48'±	BELOW	NONE
5K	UTILITY POLE	48'±	BELOW	NONE
5L	PINE TREE	59'±	11'±	CUT
5M	PINE TREE	49'±	BELOW	NONE
5N	PINE TREE	60'±	12'±	CUT
5O	PINE TREE	68'±	22'±	CUT
5P	PINE TREE	43'±	5'±	CUT

GENERAL NOTES:

1. A FIELD SURVEY WAS PERFORMED AS PART OF THIS MASTER PLAN.
2. THE LAST SURVEY PERFORMED WAS IN SEPTEMBER OF 2000.
3. OBSTACLE LOCATIONS AND THEIR RESPECTIVE ELEVATIONS WERE OBTAINED BY FIELD OBSERVATIONS.
4. ALL LOCATIONS AND ELEVATIONS ARE "PLUS OR MINUS" AND ARE REPRESENTATIVE OF AVERAGE SITUATIONS ONLY.
5. NUMEROUS SPECIES OF TREES EXIST WITHIN THE RPZ's AND APPROACH SURFACES.
6. THOSE TREES SHOWN HEREON REPRESENT THE AVERAGE OF A GROUP OF SPECIFIC TREES. NOT ALL TREES WERE LOCATED THAT MIGHT IMPACT THE RPZ's OR APPROACH SURFACES, RATHER JUST A FEW WERE VERIFIED DUE TO BUDGET.
7. ELEVATIONS WERE ESTABLISHED AT THE END OF THE ASPHALT SURFACE FOR EACH RUNWAY AND ARE ACCURATE TO 1/10TH OF A FOOT.
8. THESE ESTABLISHED ELEVATIONS WERE UTILIZED TO CALCULATE THE HEIGHT ABOVE THRESHOLD ELEVATION FOR EACH OBJECT IDENTIFIED.
9. A SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR.
10. ELEVATIONS AS INDICATED IN THE TABLES ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND DISPLAYED IN U.S. FEET.
11. HEIGHT ABOVE THE SLOPE AS INDICATED IN THE TABLES ARE DISPLAYED IN FEET AS CALCULATED ABOVE THE THRESHOLD HEIGHT AND ARE ONLY APPROXIMATE.



RUNWAY 23 END

RUNWAY 23 END OBSTRUCTION TABLE

OBJECT	DESCRIPTION	ELEVATION (TOP)	HEIGHT ABOVE 34:1 APPROACH SURFACE	PROPOSED MITIGATION
23A	PINE TREE	37'±	16'±	CUT
23B	PINE TREE	53'±	23'±	CUT
23C	PINE TREE	45'±	BELOW	NONE
23D	PINE TREE	70'±	12'±	CUT
23E	PINE TREE	55'±	2'±	CUT
23F	PINE TREE	40±	15'±	CUT
23G	PINE TREE	56'±	32'±	CUT
23H	PINE TREE	57'±	8'±	CUT
23I	PINE TREE	52'±	6'±	CUT
23J	PINE TREE	68'±	36'±	CUT
23K	PINE TREE	58'±	9'±	CUT
23L	PINE TREE	53'±	BELOW	NONE



OCTOBER 2017
MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY 0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010

200 0 400
SCALE IN FEET

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		N/A
PINE TREE		N/A
WOOD UTILITY POLE		N/A
FENCE LINE		N/A
RUNWAY CENTER LINE		N/A
BUILDING RESTRICTION LINE (BRL)		N/A
RUNWAY PROTECTION ZONE (RPZ)	RPZ	N/A
RUNWAY SAFETY AREA (RSA)	RSA	N/A
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	N/A
RUNWAY OBJECT FREE ZONE (ROFZ)	OFZ	N/A
TAXIWAY SAFETY AREA (TSA)	TSA	N/A
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	N/A
THRESHOLD LIGHTS		

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

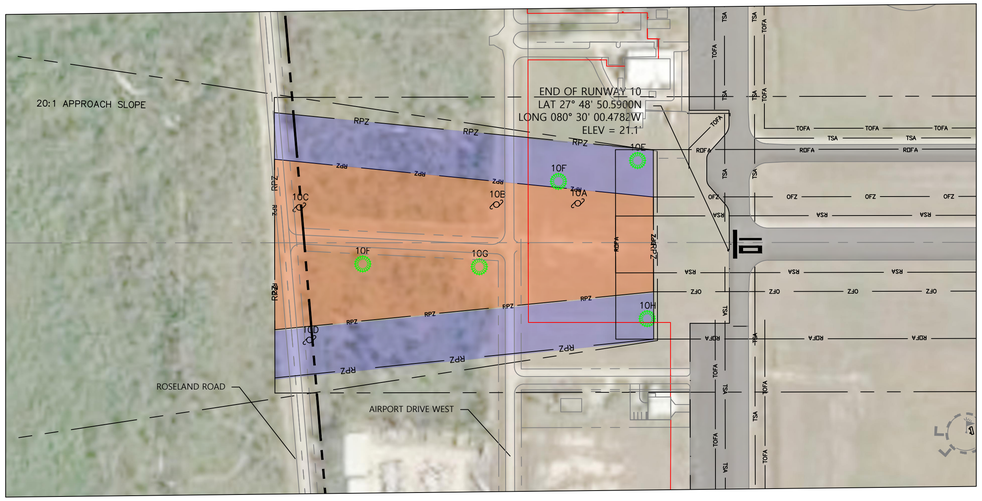
SEBASTIAN MUNICIPAL AIRPORT

INNER PORTION OF THE APPROACH SURFACE - RUNWAY 5-23

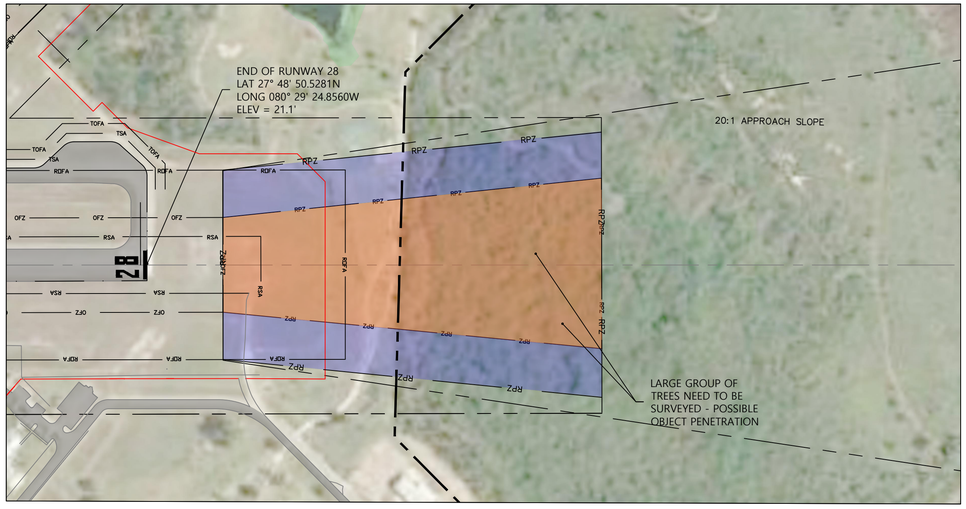
PROJ. NO. 16256 X26

OCTOBER 2018

SHEET 5 OF 10



RUNWAY 10 END



RUNWAY 28 END

RUNWAY 10 END OBSTRUCTION TABLE

OBJECT	DESCRIPTION	ELEVATION (TOP)	HEIGHT ABOVE 20:1 APPROACH SURFACE	PROPOSED MITIGATION
10A	UTILITY POLE	50'±	19'±	REMOVE
10B	UTILITY POLE	50'±	10'±	REMOVE
10C	UTILITY POLE	50'±	BELOW	NONE
10D	UTILITY POLE	47'±	BELOW	NONE
10E	PINE TREE	60'±	39'±	CUT
10F	PINE TREE	57'±	2'±	CUT
10G	PINE TREE	47'±	7'±	CUT
10H	PINE TREE	57'±	39'±	CUT

GENERAL NOTES:

1. A FIELD SURVEY WAS PERFORMED AS PART OF THIS MASTER PLAN.
2. THE LAST SURVEY PERFORMED WAS IN SEPTEMBER OF 2000.
3. OBSTACLE LOCATIONS AND THEIR RESPECTIVE ELEVATIONS WERE OBTAINED BY FIELD OBSERVATIONS.
4. ALL LOCATIONS AND ELEVATIONS ARE "PLUS OR MINUS" AND ARE REPRESENTATIVE OF AVERAGE SITUATIONS ONLY.
5. NUMEROUS SPECIES OF TREES EXIST WITHIN THE RPZ's AND APPROACH SURFACES.
6. THOSE TREES SHOWN HEREON REPRESENT THE AVERAGE OF A GROUP OF SPECIFIC TREES. NOT ALL TREES WERE LOCATED THAT MIGHT IMPACT THE RPZ's OR APPROACH SURFACES, RATHER JUST A FEW WERE VERIFIED DUE TO BUDGET.
7. ELEVATIONS WERE ESTABLISHED AT THE END OF THE ASPHALT SURFACE FOR EACH RUNWAY AND ARE ACCURATE TO 1/10TH OF A FOOT.
8. THESE ESTABLISHED ELEVATIONS WERE UTILIZED TO CALCULATE THE HEIGHT ABOVE THRESHOLD ELEVATION FOR EACH OBJECT IDENTIFIED.
9. A SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR.
10. ELEVATIONS AS INDICATED IN THE TABLES ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND DISPLAYED IN U.S. FEET.
11. HEIGHT ABOVE THE SLOPE AS INDICATED IN THE TABLES ARE DISPLAYED IN FEET AS CALCULATED ABOVE THE THRESHOLD HEIGHT AND ARE ONLY APPROXIMATE.



OCTOBER 2017
MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY
0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010

200 0 400
SCALE IN FEET

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		N/A
PINE TREE		N/A
WOOD UTILITY POLE		N/A
FENCE LINE		N/A
RUNWAY CENTER LINE		N/A
BUILDING RESTRICTION LINE (BRL)		N/A
RUNWAY PROTECTION ZONE (RPZ)	RPZ	N/A
RUNWAY SAFETY AREA (RSA)	RSA	N/A
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	N/A
RUNWAY OBJECT FREE ZONE (ROFZ)	OFZ	N/A
TAXIWAY SAFETY AREA (TSA)	TSA	N/A
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	N/A

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

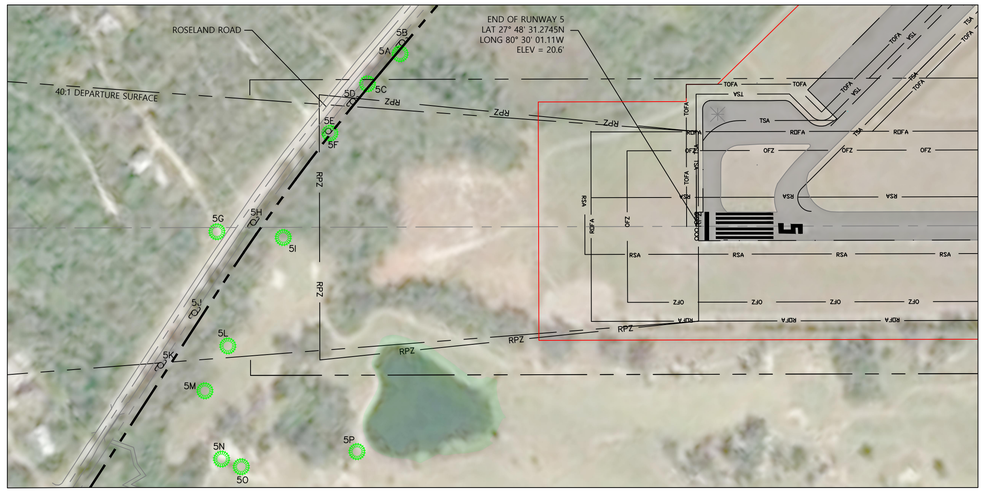
SEBASTIAN MUNICIPAL AIRPORT

INNER PORTION OF THE APPROACH SURFACE - RUNWAY 10-28

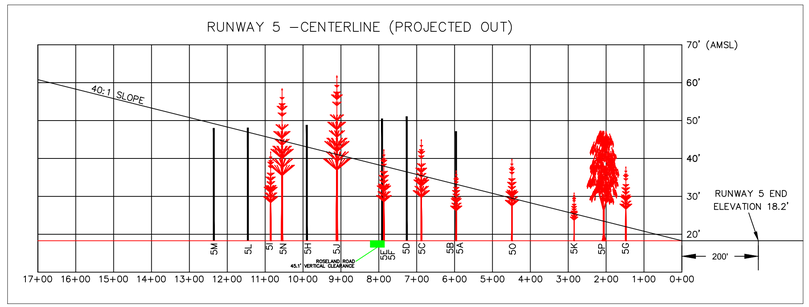
OCTOBER 2018

PROJ. NO. 16256 X26

SHEET 6 OF 10

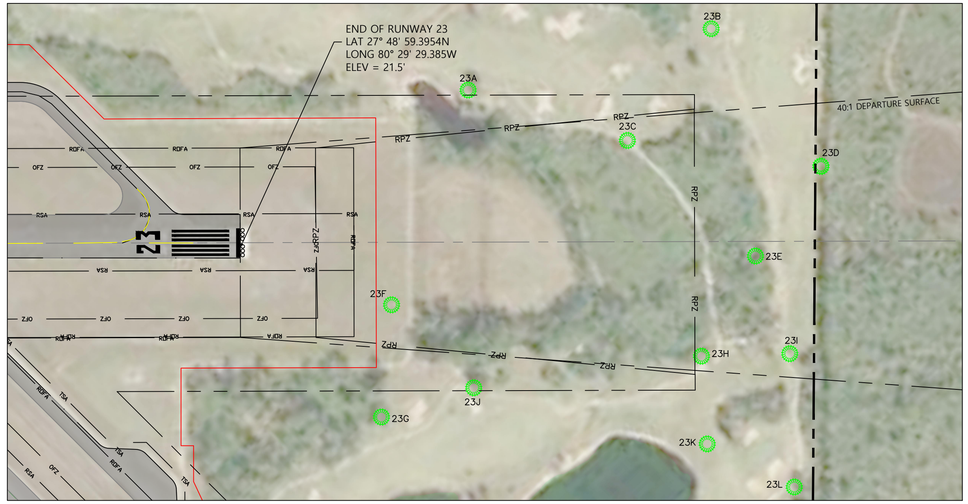


RUNWAY 5 END

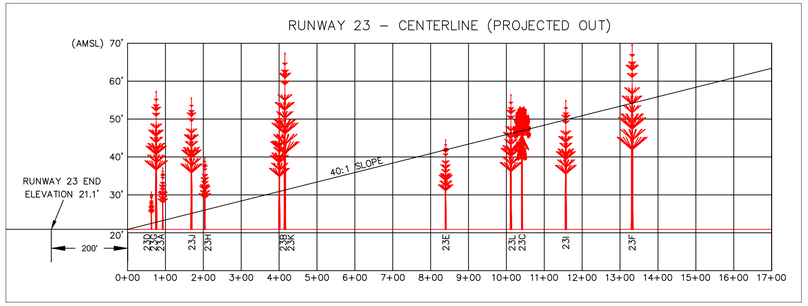


RUNWAY 5 END OBSTRUCTION TABLE

OBJECT	DESCRIPTION	ELEVATION (TOP)	40:1 DEPARTURE SURFACE	PROPOSED MITIGATION
5A	PINE TREE	37'±	3'±	CUT
5B	UTILITY POLE	47'±	13'±	REMOVE
5C	PINE TREE	45'±	8'±	CUT
5D	UTILITY POLE	51'±	13'±	REMOVE
5E	UTILITY POLE	51'±	11'±	REMOVE
5F	PINE TREE	42'±	3'±	CUT
5G	PINE TREE	38'±	17'±	CUT
5H	UTILITY POLE	49'±	3'±	REMOVE
5I	PINE TREE	42'±	BELOW	NONE
5J	UTILITY POLE	48'±	BELOW	NONE
5K	UTILITY POLE	48'±	BELOW	NONE
5L	PINE TREE	59'±	11'±	CUT
5M	PINE TREE	49'±	BELOW	NONE
5N	PINE TREE	60'±	12'±	CUT
5O	PINE TREE	68'±	22'±	CUT
5P	PINE TREE	43'±	5'±	CUT



RUNWAY 23 END



RUNWAY 23 END OBSTRUCTION TABLE

OBJECT	DESCRIPTION	ELEVATION (TOP)	40:1 DEPARTURE SURFACE	PROPOSED MITIGATION
23A	PINE TREE	37'±	16'±	CUT
23B	PINE TREE	53'±	23'±	CUT
23C	PINE TREE	45'±	BELOW	NONE
23D	PINE TREE	70'±	12'±	CUT
23E	PINE TREE	55'±	2'±	CUT
23F	PINE TREE	40±	15'±	CUT
23G	PINE TREE	56'±	32'±	CUT
23H	PINE TREE	57'±	8'±	CUT
23I	PINE TREE	52'±	6'±	CUT
23J	PINE TREE	68'±	36'±	CUT
23K	PINE TREE	58'±	9'±	CUT
23L	PINE TREE	53'±	BELOW	NONE



OCTOBER 2017
MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY
0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010



GENERAL NOTES:

1. A FIELD SURVEY WAS PERFORMED AS PART OF THIS MASTER PLAN.
2. THE LAST SURVEY PERFORMED WAS IN SEPTEMBER OF 2000.
3. OBSTACLE LOCATIONS AND THEIR RESPECTIVE ELEVATIONS WERE OBTAINED BY FIELD OBSERVATIONS.
4. ALL LOCATIONS AND ELEVATIONS ARE "PLUS OR MINUS" AND ARE REPRESENTATIVE OF AVERAGE SITUATIONS ONLY.
5. NUMEROUS SPECIES OF TREES EXIST WITHIN THE RPZ's AND DEPARTURE SURFACES.
6. THOSE TREES SHOWN HEREON REPRESENT THE AVERAGE OF A GROUP OF SPECIFIC TREES. NOT ALL TREES WERE LOCATED THAT MIGHT IMPACT THE RPZ's OR APPROACH SURFACES, RATHER JUST A FEW WERE VERIFIED DUE TO BUDGET.
7. ELEVATIONS WERE ESTABLISHED AT THE END OF THE ASPHALT SURFACE FOR EACH RUNWAY AND ARE ACCURATE TO 1/10TH OF A FOOT.
8. THESE ESTABLISHED ELEVATIONS WERE UTILIZED TO CALCULATE THE HEIGHT ABOVE THRESHOLD ELEVATION FOR EACH OBJECT IDENTIFIED.
9. A SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR.
10. ELEVATIONS AS INDICATED IN THE TABLES ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND DISPLAYED IN U.S. FEET.
11. HEIGHT ABOVE THE SLOPE AS INDICATED IN THE TABLES ARE DISPLAYED IN FEET AS CALCULATED ABOVE THE THRESHOLD HEIGHT AND ARE ONLY APPROXIMATE.

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		N/A
PINE TREE		N/A
WOOD UTILITY POLE		N/A
FENCE LINE		N/A
RUNWAY CENTER LINE		N/A
BUILDING RESTRICTION LINE (BRL)		N/A
RUNWAY PROTECTION ZONE (RPZ)	RPZ	N/A
RUNWAY SAFETY AREA (RSA)	RSA	N/A
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	N/A
RUNWAY OBJECT FREE ZONE (ROFZ)	OFZ	N/A
TAXIWAY SAFETY AREA (TSA)	TSA	N/A
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	N/A
THRESHOLD LIGHTS		

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

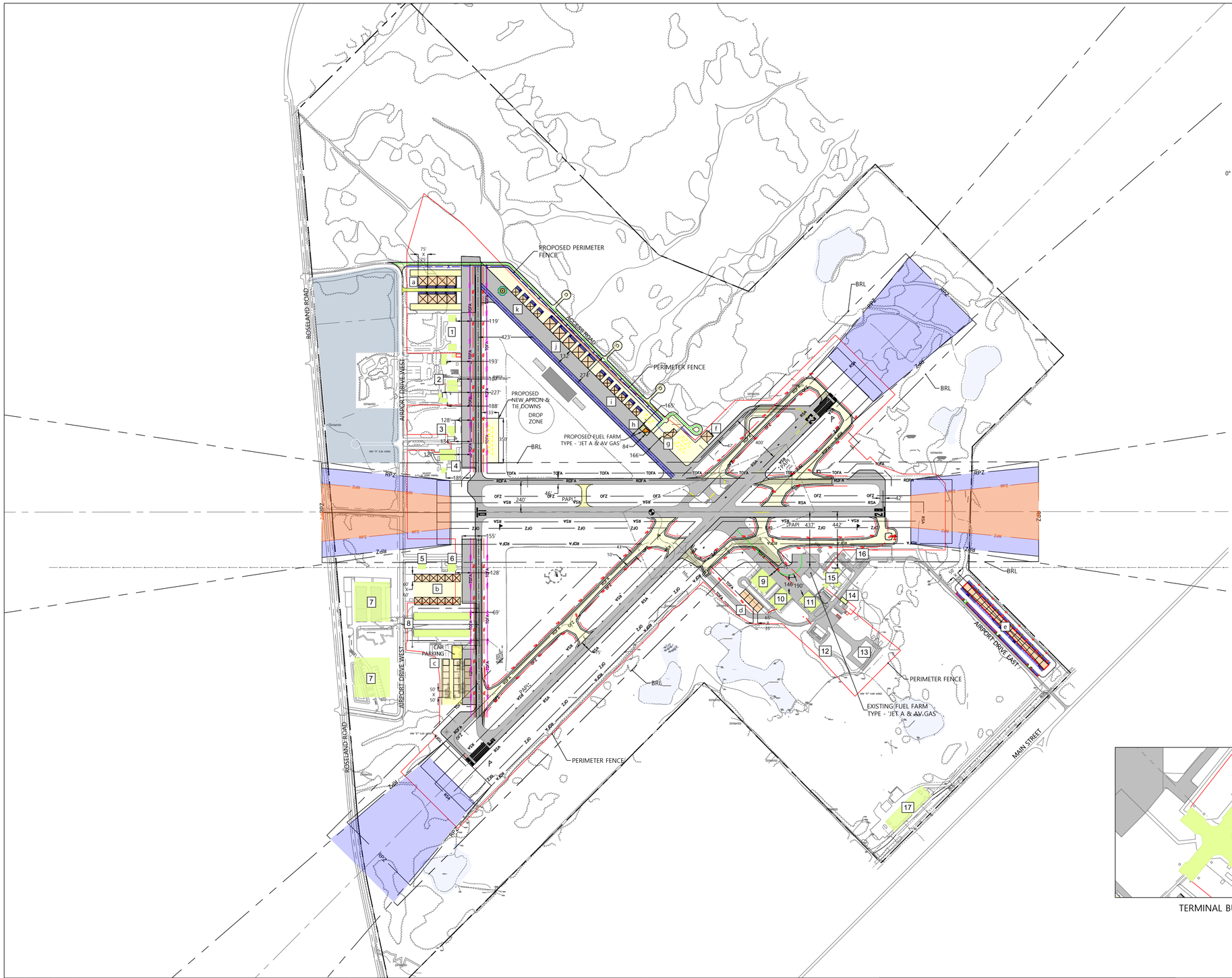
SEBASTIAN MUNICIPAL AIRPORT

RUNWAY DEPARTURE SURFACE DRAWING - RUNWAY 5-23

PROJ. NO. 16256 X26

OCTOBER 2018

SHEET 7 OF 10



0.19° W

MAGNETIC TRUE

OCTOBER 2017
MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY 0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010

400 0 800
SCALE IN FEET

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		N/A
EASEMENT		N/A
COMMERCIAL DEVELOPMENT	N/A	
AIRPORT SECURITY FENCE		
AIRPORT BUILDINGS		
BUILDING REMOVAL	N/A	N/A
AIRPORT PAVEMENT		
PAVEMENT REMOVAL	N/A	N/A
AUTOMOBILE PARKING		
BUILDING RESTRICTION LINE (BRL)		N/A
PUBLIC WORKS DEVELOPMENT	N/A	
RUNWAY PROTECTION ZONE (RPZ)	RPZ	RPZ
TAXIWAY CENTERLINE		
TAXIWAY SAFETY AREA (TSA)	TSA TSA TSA	TSA
RUNWAY SAFETY AREA (RSA)	RSA RSA RSA	N/A
RUNWAY OBJECT FREE AREA (ROFA)	OFA OFA OFA	N/A
RUNWAY OBJECT FREE ZONE (ROFZ)	OFZ OFZ OFZ	N/A
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA TOFA TOFA	TOFA TOFA TOFA
PAPI		N/A
TIE DOWNS		
AIRPORT REFERENCE POINT		N/A
HELIPAD		N/A
WIND CONE		
CONTOUR LINES		N/A
SURFACE ELEVATION	X 20.0	N/A
THRESHOLD LIGHTS		N/A

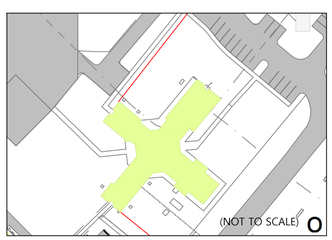
BUILDING DATA TABLE - EXISTING

ID	DESCRIPTION
1	HANGARS - (KENNETH MISHLER)
2	HANGARS/BUILDINGS/OFFICE SPACE - (SKYDIVE SEBASTIAN)
3	HANGAR/OFFICE SPACE - (PILOTS PARADISE)
4	HANGAR/OFFICE SPACE - (VELOCITY)
5	AIRPORT POLICE - (CITY OF SEBASTIAN)
6	HANGAR - (VELOCITY)
7	STORAGE UNITS - (ABOUT STORAGE)
8	T-HANGARS - (SHELTAIR SEBASTIAN, LLC)
9	HANGAR C - (CRUISER AIRCRAFT, INC. & CZECH SPORT AIRCRAFT)
10	HANGAR B - (VELOCITY)
11	HANGAR A - (LOPRESTI)
12	MAINTENANCE BUILDING - (CITY OF SEBASTIAN)
13	MAINTENANCE BUILDING - (CITY OF SEBASTIAN)
14	POLICE COMPOUND - (CITY OF SEBASTIAN)
15	ARRIVAL/DEPARTURE/ADMINSTRATIVE BUILDING
16	VAULT
17	GOLF COURSE BUILDING/RESTURANT - (CITY OF SEBASTIAN)

BUILDING DATA TABLE - FUTURE

ID	DESCRIPTION
a	75' X 75' HANGAR
b	60' X 60' HANGAR
c	50' X 50' SHADE HANGAR
d	35' X 60' HANGAR
e	50' X 50' BAY - STORE FRONT
f	70' X 70' BOX HANGAR
g	FBO
h	FUEL FARM
i	50' X 50' HANGAR
j	75' X 75' HANGAR
k	50' X 50' HANGAR

EXISTING TERMINAL - BUILDING TENANTS	
15-a	NATIONAL APERTURE, INC.
15-b	CITY OF SEBASTIAN
15-c	LOPRESTI AVIATION
15-d	PILOTS PARADISE
15-e	NATIONAL APERTURE, INC.



TERMINAL BUILDING

NOTES:
1. THIS DOCUMENT WAS PREPARED FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR ANY OTHER USE.
2. SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR
3. BRL IS SET TO 65'.
4. NO HIGH POINT IN RUNWAY.

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

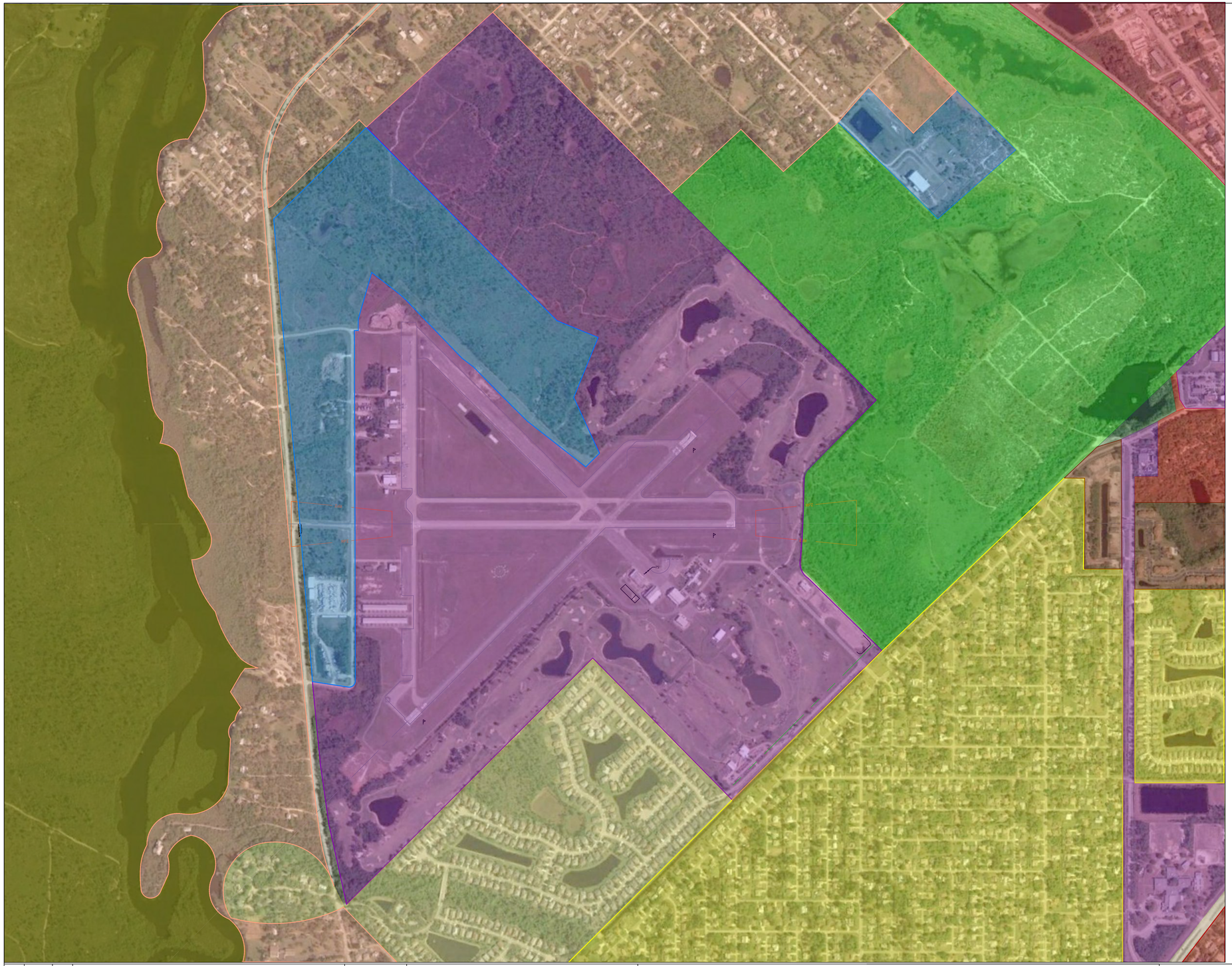
SEBASTIAN MUNICIPAL AIRPORT

TERMINAL AREA DRAWING

OCTOBER 2018

PROJ. NO. 16256 X26

SHEET 8 OF 10



0.19° W

MAGNETIC NORTH

OCTOBER 2017

MAGNETIC DECLINATION 6° 48' W ± 0°19' CHANGING BY
0° 5' W PER YEAR OCTOBER 18, 2017 SOURCE: NGDC DECLINATION
EPOCH YEAR = 2010

500 0 1000

SCALE IN FEET

LAND USE LEGEND	
CITY OF SEBASTIAN	
	CONSERVATION
	INDUSTRIAL
	RIVER FRONT MIXED USE
	INSTITUTIONAL
	MEDIUM DENSITY RESIDENTIAL
	LOW DENSITY RESIDENTIAL
	VERY LOW DENSITY RESIDENTIAL
	COMMERCIAL GENERAL
INDIAN RIVER COUNTY, FLORIDA	
	COUNTY RESIDENTIAL
	COUNTY CONSERVATION

NOTES:
1. THIS DOCUMENT WAS PREPARED FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR ANY OTHER USE.
2. SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER SPONSOR
3. BRL IS SET TO 65'.
4. NO HIGH POINT IN RUNWAY.

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

SEBASTIAN MUNICIPAL AIRPORT

LAND USE DRAWING

OCTOBER 2018

PROJ. NO. 16256 X26

SHEET 9 OF 10

	LEASEE	PARCEL	ADDRESS	PROP ID	ACRES
1.	Kenneth Mishler	30382200001000000006.0	500 W. Airport Drive, Sebastian, Florida 32958	10793	3.00
2.	Skydive Sebastian	30382200001000000005.0	400 W. Airport Drive, Sebastian, Florida 32958	10792	3.97
2.	Skydive Sebastian	30382200001000000007.0	400 W. Airport Drive, Sebastian, Florida 32958	10794	2.46
3.	Pilots Paradise - Formerly Sebastian Aero	30382200001000000001.0	300 Airport Drive West, Sebastian, Fl 32958	10788	3.00
4.	B & S Investments Velocity	30382200001000000008.1	80 W. Airport Drive, Sebastian, Fl 32958	10796	0.36
5.	Airport Police	30382200001000000008.0	78 W. Airport Drive, Sebastian, Fl 32958	10795	1.33
6.	Velocity	30382200001000000002.0	200 W. Airport Drive, Sebastian, Fl 32958	10789	3.00
7.	Phillip Stevenson - About Storage	30382200001000000011.0	25 W. Airport Drive, Sebastian, Fl 32958	10799	9.45
8.	Sheltair Sebastian LLC	30382200001000000010.0	60 Airport Drive West. Sebastian, Fl 32958	10798	4.74
9.	Cruiser Aircraft, Inc. & Czech Sport Aircraft - Hangar C	30382200001000000000.1	200 Airport Drive East, Sebastian, Fl 32958	10787	N/A
10.	Velocity - Hangar B	30382200001000000000.1	200 Airport Drive East, Sebastian, Fl 32958	10787	N/A
11.	LoPresti - Hangar A	30382200001000000000.1	210 Airport Drive East, Sebastian, Florida 32958	10787	N/A
12.	Maintenance Building - City of Sebastian	30382200001000000000.1	202 Airport Drive East, Sebastian, Florida 32958	10787	N/A
13.	Maintenance Building - City of Sebastian	30382200001000000000.1	202 Airport Drive East, Sebastian, Florida 32958	10787	N/A
14.	Police Compound - City of Sebastian	30382200001000000000.1	202 Airport Drive East, Sebastian, Florida 32958	10787	N/A
15.	Arival/Departure/Administrative Building	30382200001000000000.1	202 Airport Drive East, Sebastian, Florida 32958	10787	N/A
16.	Vault	30382200001000000000.1	202 Airport Drive East, Sebastian, Florida 32958	10787	N/A
17.	Sebastian Municipal Golf Course	30382200001000000000.1	100 Brush Foot Drive, Sebastian, Fl 32958	10787	N/A

DESCRIPTION:

A PARCEL OF LAND LYING AND BEING IN THE COUNTY OF INDIAN RIVER, STATE OF FLORIDA, BEING A PORTION OF THE FLEMING GRANT IN TOWNSHIP 31 SOUTH, RANGE 38 EAST, TALLAHASSEE MERIDIAN, FLORIDA, AS SHOWN ON THE SUBDIVISION PLAT OF SAID GRANT RECORDED AT PAGES 72 AND 73 IN PLAT BOOK NO. 1 IN THE PUBLIC RECORDS OF THE COUNTY OF BREVARD, STATE OF FLORIDA, SAID LAND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS, TO-WIT:

"FROM THE NORTH CORNER OF SECTION 29, FLEMING GRANT, RUN SOUTH 44°25'58" EAST A DISTANCE OF 1501.86 FEET TO A CONCRETE MONUMENT FOR A POINT OF BEGINNING; THENCE SOUTH 44°25'58" EAST, 2100.00 FEET; THENCE SOUTH 45°09'04" WEST, 1009.32 FEET; THENCE SOUTH 01°54'57" WEST, 963.48 FEET; THENCE SOUTH 44°25'58" EAST, 1137.55 FEET; THENCE SOUTH 45°09'04" WEST, 2100.00 FEET; THENCE NORTH 44°21'28" WEST, 1977.50 FEET; THENCE SOUTH 45°09'04" WEST, 3497.85 FEET; THENCE NORTH 44°21'28" WEST, 46.36 FEET; THENCE NORTH 11°47'58" WEST, 1159.63 FEET; THENCE NORTH 04°37'30" WEST, 5750.60 FEET; THENCE NORTH 45°54'02" EAST, 1258.33 FEET; THENCE SOUTH 44°25'58" EAST, 2804.92 FEET; THENCE SOUTH 67°39'58" EAST, 759.38 FEET; THENCE NORTH 45°09'04" EAST, 1406.13 FEET TO POINT OF BEGINNING; SUBJECT TO A 33 FOOT RIGHT- OF-WAY FOR ROSELAND ROAD; AND, ALSO, SUBJECT TO THREE EASEMENTS FOR ROADWAY PURPOSES, AS FOLLOWS, TO-WIT:

AN EASEMENT IN, ON, OVER AND ACROSS A STRIP OF LAND DESCRIBED AS, COMMENCING AT THE EAST CORNER OF SECTION 29 OF THE FLEMING GRANT, RUN SOUTH 45°09'04" WEST ALONG THE SOUTHEAST LINE OF SECTION 29 FOR A DISTANCE OF 3806.27 FEET TO A POINT; THENCE NORTH 44°21'28" WEST FOR A DISTANCE OF 1977.5 FEET TO A POINT; THENCE SOUTH 45°09'04" WEST FOR A DISTANCE OF 3147.85 FEET TO THE POINT OF BEGINNING OF THE EASEMENT HEREBY DESCRIBED; THENCE CONTINUE SOUTH 45°09'04" WEST FOR A DISTANCE OF 340.53 FEET TO A POINT ON THE EAST RIGHT- OF-WAY OF ROSELAND ROAD; THENCE NORTH 11° 47'58" WEST ALONG SAID RIGHT-OF-WAY LINE FOR A DISTANCE OF 339.74 FEET TO A POINT; BEING ON A MEANDER LINE OF COLLIER CREEK; THENCE RUN NORTH 64°48'04" EAST ALONG SAID MEANDER LINE FOR A DISTANCE OF 56.74 FEET TO A POINT; THENCE SOUTH 57°42'56" EAST ALONG SAID MEANDER LINE FOR A DISTANCE OF 40.55 FEET TO A POINT; THENCE SOUTH 80°58'56" EAST ALONG MEANDER LINE FOR A DISTANCE OF 30.43 FEET TO A POINT; THENCE SOUTH 14°51'04" WEST ALONG MEANDER LINE FOR A DISTANCE OF 55.20 FEET TO A POINT; THENCE NORTH 66°18'04" EAST ALONG MEANDER LINE FOR A DISTANCE OF 63.40 FEET TO A POINT; THENCE SOUTH 03°06'04" WEST ALONG MEANDER LINE FOR A DISTANCE OF 73.50 FEET TO A POINT; THENCE NORTH 49°29'04" EAST ALONG MEANDER LINE FOR A DISTANCE OF 43.80 FEET TO A POINT; THENCE NORTH 20°55'04" EAST ALONG MEANDER LINE FOR A DISTANCE OF 44.25 FEET TO A POINT; THENCE SOUTH 59°39'56" ALONG SAID MEANDER LINE FOR A DISTANCE OF 114.0 FEET TO THE END OF MEANDER LINE AT THE POINT OF BEGINNING, PLUS THE LAND APPROXIMATELY 10 FEET NORTH OF AND PARALLEL TO SAID MEANDER LINE, BEING 1/2 OF THE PRESENT WIDTH OF COLLIER CREEK. COMPRISING 1.29 ACRES.

AN EASEMENT IN, ON, OVER AND ACROSS A STRIP OF LAND DESCRIBED AS, COMMENCING AT THE NORTH CORNER OF SECTION 29, FLEMING GRANT, RUN NORTH 44° 25'58" WEST ALONG NORTHEAST LINE OF SECTION 22 FOR A DISTANCE OF 1980.0 FEET TO A POINT; THENCE SOUTH 45°54'02" WEST FOR A DISTANCE OF 1706.10 FEET TO A CONCRETE MONUMENT BEING THE POINT OF BEGINNING OF THE EASEMENT HEREBY DESCRIBED, THENCE SOUTH 44°25'58" EAST FOR A DISTANCE OF 100.00 FEET TO A POINT; THENCE SOUTH 45°54'02" WEST FOR A DISTANCE OF 1340.68 FEET TO THE CENTERLINE OF ROSELAND ROAD; THENCE NORTH 04°37'30" WEST FOR 129.66 FEET TO A POINT; THENCE NORTH 45°54'02" EAST FOR A DISTANCE OF 1258.33 FEET TO THE POINT OF BEGINNING. COMPRISING 2.961 ACRES, LESS HOWEVER, 33.0 FEET FOR ROSELAND ROAD RIGHT-OF-WAY.

AN EASEMENT IN, ON, OVER AND ACROSS A STRIP OF LAND DESCRIBED AS, COMMENCING AT THE EAST CORNER OF SECTION 29 FLEMING GRANT AND RUN SOUTH 45°09'04" WEST ALONG FLEMING GRANT LINE FOR A DISTANCE OF 1706.27 FEET TO A CONCRETE MONUMENT, BEING THE POINT OF BEGINNING OF THE EASEMENT HEREBY DESCRIBED, THENCE CONTINUE SOUTH 45°09'04" WEST ALONG SAID GRANT LINE FOR A DISTANCE OF 2100.0 FEET TO A POINT; THENCE NORTH 44°21'28" WEST FOR A DISTANCE OF 100.0 FEET; THENCE NORTH 45°09'04" EAST 2100.0 FEET TO A POINT; THENCE SOUTH 44°25'58" EAST FOR 100.0 FEET TO POINT OF BEGINNING. COMPRISING 4.82 ACRES.

AND, SUBJECT, ALSO, TO AN EASEMENT FOR THE CONSTRUCTION, USE, MAINTENANCE, OPERATION AND REPAIR OF A DRAINAGE DITCH, SAID EASEMENT BEING CONFINED TO THE FOLLOWING DESCRIBED LAND, TO-WIT; RUNNING ALONG THE SOUTHEASTERLY LINE OF ROSELAND SATELLITE FIELD IN INDIAN RIVER COUNTY, FLORIDA, COMPRISING THAT PART OF THE SOUTHEASTERLY 40 FEET OF SECTIONS 28 AND 29 OF THE FLEMING GRANT, COMMENCING AT THE EAST CORNER OF ROSELAND SATELLITE FIELD AND THENCE RUNNING SOUTHWESTERLY A DISTANCE OF 6300 FEET, MORE OR LESS, TO THE COLLIER CREEK; SAID EASEMENT HAVING BEEN GRANTED ON AUGUST 12, 1957 BY THE UNITED STATES OF AMERICA TO CYPRESS GARDENS ESTATES CORPORATION BY AN INSTRUMENT RECORDED AT PAGES 107, 108, 109 OF BOOK 21 OF THE PUBLIC RECORDS IN THE OFFICE OF THE CLERK OF THE CIRCUIT COURT FOR INDIAN RIVER COUNTY, FLORIDA.

SUBJECT, HOWEVER, TO ALL EXISTING EASEMENTS AND RIGHTS-OF-WAY FOR ROADS, HIGHWAYS, RAILROADS, PIPELINES, PUBLIC UTILITIES AND DRAINAGE DITCHES."

GENERAL NOTES:

1. UNLESS IT BEARS THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER, THIS DRAWING, SKETCH, PLAT OR MAP IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT VALID.
2. NO SEARCH OF THE PUBLIC RECORDS WAS MADE BY THIS FIRM OR SURVEYOR FOR EASEMENTS, RESERVATIONS, ABANDONMENTS, RESTRICTIONS AND/OR RIGHT-OF-WAY.
3. NO FOUNDATIONS OR UNDERGROUND UTILITIES HAVE BEEN FIELD LOCATED PER THIS SURVEY, UNLESS OTHERWISE NOTED.
4. NO TITLE COMMITMENT OR ABSTRACT WAS FURNISHED TO THIS FIRM OR SURVEYOR.
5. DESCRIPTION SHOWN HEREON AS FURNISHED BY THE CLIENT AND RECORDED IN OFFICIAL RECORD BOOK 62, PAGES 255-265, PUBLIC RECORDS, INDIAN RIVER COUNTY, FLORIDA.
6. THE LAST DAY FIELD WORK WAS PERFORMED WAS ON OCTOBER 18, 2000.
7. THE EXPECTED USE OF THE LAND, AS CLASSIFIED BY THE MINIMUM TECHNICAL STANDARDS (61G17-6, F.A.C.) IS SUBURBAN. THE MINIMUM RELATIVE ACCURACY FOR THIS TYPE OF BOUNDARY SURVEY IS 1 FOOT IN 7500. THE MEASUREMENTS AND CALCULATIONS OF THE CLOSED GEOMETRIC FIGURE WERE FOUND TO MEET OR EXCEED THIS ACCURACY REQUIREMENT.
8. ELEVATIONS BASED ON NORTH AMERICAN VERTICAL DATUM 88 (NAVD 88).
9. BENCHMARK = NATIONAL GEODETIC SURVEY, FEDERAL BASE NETWORK CONTROL STATION DESIGNATION "SEBAPORT", INDIAN RIVER COUNTY, FLORIDA, USGS QUAD "SEBASTIAN" 1970. NAVD 88 ELEVATION = 5.485 METERS OR 18.00 FEET, ADJUSTED.
10. UNLESS A COMPARISON IS SHOWN, MEASURED VALUES AND DEED VALUES ARE THE SAME. (C) = OBSERVED VALUE (ALL MEASUREMENTS SHOWN HEREON ARE OBSERVED UNLESS SHOWN OTHERWISE) (D) = DEED VALUE (C) = CALCULATED VALUE
11. PROPERTY ACQUIRED FROM UNITED STATES NAVY ON JANUARY 29, 1959. ALL AIRPORT PROPERTY IS SUBJECT TO PROVISIONS AND CONDITIONS REQUIRED BY THE SURPLUS PROPERTY ACT.

ACREAGE TABLE:
GROSS: 625.51± ACRES (TO CENTERLINE OF ROSELAND ROAD)
NET: 619.17± ACRES (LESS 33' RIGHT-OF-WAY ROSELAND ROAD)
NET: 615.97± ACRES (LESS 53' RIGHT-OF-WAY ROSELAND ROAD)

REFERENCES:

"MAP OF LANDS TO BE OCCUPIED BY ROSELAND FIELD, INDIAN RIVER COUNTY, FLORIDA" BY ROBERT M. ANGAS, REGISTERED ENGINEER No. 536, REGISTERED LAND SURVEYOR No. 25 N.A.S. DRAWING No. 58-1-1, APPROVED 14 MARCH, 1942.

STATE OF FLORIDA, STATE ROAD DEPARTMENT RIGHT-OF-WAY MAP, SECTION 88602, ROAD No. S-505, INDIAN RIVER COUNTY, APPROVED BY CLARENCE E. DAVIDSON, DIVISION ENGINEER, 3-27-62.

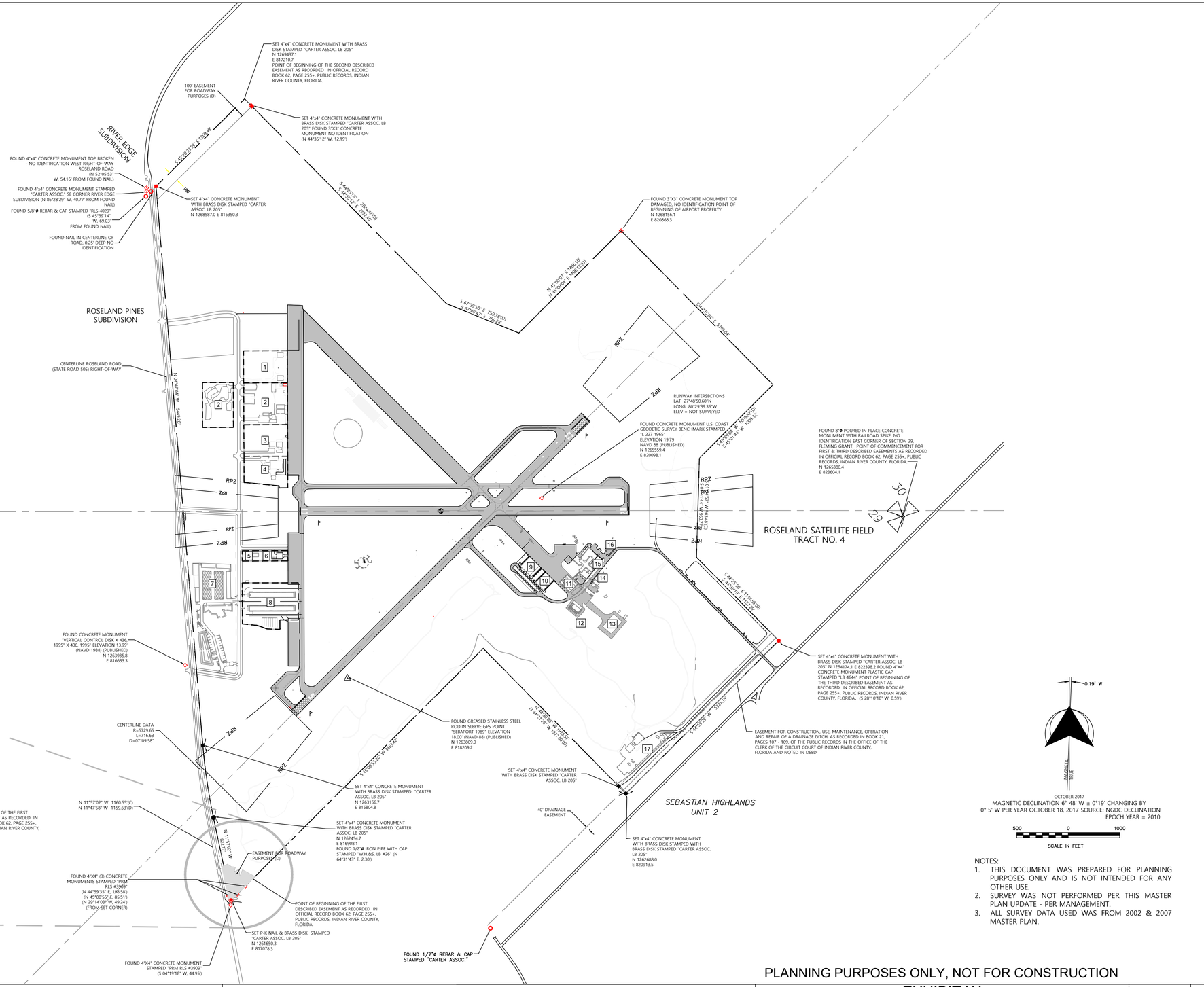
PLAT OF RIVER EDGE SUBDIVISION, RECORDED IN PLAT BOOK 8, PAGE 81, PUBLIC RECORDS OF INDIAN RIVER COUNTY, FLORIDA. RECORDED JUNE 21, 1974.

SURVEY BY MASTELLER, MOLER & REED, INC. FOR O.R.E.O. PROJECT No. 3382.03 LAST REVISION DATE: 11-15-96.

PLAT OF COLLIER CLUB, PHASE 1, RECORDED IN PLAT BOOK 15, PAGE 56, PUBLIC RECORDS OF INDIAN RIVER COUNTY, FLORIDA. RECORDED FEBRUARY 2, 1999.

PLAT MAPS BY INDIAN RIVER COUNTY TAX APPRAISER'S OFFICE COMPILED 02/16/1999 OF SECTION 22 & 28, FLEMING GRANT.

SURVEY BY LLOYD AND ASSOCIATES CONSULTING ENGINEERS OF SEBASTIAN AIRPORT, JOB No. 9265, FILE No. 116-45. (NO DATE AVAILABLE).



NOTES:
1. THIS DOCUMENT WAS PREPARED FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR ANY OTHER USE.
2. SURVEY WAS NOT PERFORMED PER THIS MASTER PLAN UPDATE - PER MANAGEMENT.
3. ALL SURVEY DATA USED WAS FROM 2002 & 2007 MASTER PLAN.

PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED TKDA
DRAWN TKDA
CHECKED TKDA

TKDA
Engineering
Architecture
Planning
444 Cedar Street, Suite 1500 . Saint Paul, MN 55101
651.292.4400
tkda.com

SEBASTIAN MUNICIPAL AIRPORT
SEBASTIAN, FLORIDA

SEBASTIAN MUNICIPAL AIRPORT

EXHIBIT 'A'
AIRPORT PROPERTY INVENTORY MAP

PROJ. NO. 16256 | X26

OCTOBER 2018

SHEET 10 OF 10

CHAPTER NINE
Airport Implementation Plan and Financial Sustainability

Chapter Overview and Introduction

The primary objective of this chapter is to analyze the financial feasibility of developing projects included in the Capital Improvement Program (CIP) for Sebastian Municipal Airport (X26 future SEB)). The preceding chapters (Chapters 4 and 5) of this master plan update identified existing and future demand and facilities needed to accommodate current and projected service levels. Suggested development includes a variety of airside, landside and support facility improvements in addition to other non-aviation revenue enhancement recommendations.

However, Capital Improvements shown on the Airport Layout Plan (ALP) should not be constructed as a commitment by the City of Sebastian to build these projects. Projects are considered by City and Airport management and given to City Council for review and approval based on need, benefit, and available funding.

The proposed financial plan was developed after evaluating the financial structure of the Sebastian Municipal Airport within the City system and identifying potential sources of revenue that may be available to fund proposed capital improvement projects. These funding sources were applied to projects over an estimated phasing schedule (short, mid, and long-term including beyond the 20-year planning period) to determine the financial implications of undertaking the recommended capital improvements. Detailed tables of historical and forecast financial data is provided in **Appendix I** of this report.

The implementation plan presented herein describes the staging of proposed improvements based upon: need, prerequisite projects and anticipated funding as well as provides the basic financial requirements of each and identifies various means of funding. It is the intent of this implementation plan to provide general financial guidance to the Airport Staff and City Council Members in making policy decisions with regard to recommended airport development over the twenty-year planning period and beyond.

Typically, the onset of demand spawns the design, engineering and construction of various facilities to accommodate such demand. As a result, although identified, some projects were shown to occur beyond the twenty-year planning period once consistent growth trends are recognized. This will allow the airport to proactively pursue projects to accommodate demand.

Still, various funding sources (e.g. FAA, FDOT, local match and other third party funding) identified in the CIP plan are in no way a guarantee of funding. The availability of funding is dependent upon a number of factors including federal and state budgets, airport needs nationwide, identified demand, and the type of projects being pursued (e.g. safety projects typically take priority over other types of development).

As a result, this chapter highlights the financially feasible implementation plan based upon forecast triggers as well as proposed capital improvement program through the years 2038. Updated guidance provided by FAA and FDOT regarding likely AIP project funding was incorporated and used to determine likely funding needs. Detailed tables of historical and forecast financial demand is provided in Appendix I of this report.

Implementation Plan

The facilities implementation plan provides guidance on how to implement the findings and recommendations of the planning effort. The implementation plan will vary depending upon the complexity of airport projects as well as airport sponsor's preferences. Since the Implementation Plan (also referred to as Capital Improvement Plan) will be updated annually, a simple schedule providing a listing of key projects, project descriptions, interrelated projects and special considerations were provided.

The likely funding evaluation of proposed project funding was based upon historical funding data as well as information outlined in the 2014 FAA Order 5100.38D, *Airport Improvement Program Handbook*, which provides guidance, policies and procedures used to administer the FAA Airport Improvement Program (AIP).

The implementation plan for Sebastian Municipal Airport and the City of Sebastian was developed to provide the Sponsor (City of Sebastian), FAA and FDOT with information necessary to integrate master plan recommendations as well as identify existing and upcoming needs for achieve financial sustainability. The facilities implementation plan must address all of the airport's planned capital projects including those that are not associated with the recommendations of the master plan (e.g. pavement maintenance) to ensure that adequate fiscal, staff and scheduling and other resources are available. Further, documentation must be

prepared to clearly delineate planned development. Ultimately, the facilities implementation plan must balance funding constraints (i.e. project sequencing limitations, environmental processing needs, agency and tenant approvals, etc.). The plan should also coordinate with the master plan ALP and Airport's financial plan.

Implementation Criteria

Criteria used to phase proposed project implementation includes:

- Minimizing operational impacts
- Maintaining a logical sequence for development
- Initiating project specific planning, environmental, design as well as land acquisition and other needs are in place to support needed development
- Projects should be implemented based upon demand. Therefore, effective monitoring of likely operational and passenger needs is critical.

Project phasing as highlighted in this chapter were based upon forecast growth, financial feasibility and plans for logical development. Phasing shown is based upon immediate sponsor needs as well as Sponsor priorities. The phasing and financial feasibility analysis is illustrative of likely needs based upon current demand triggers. The actual implementation schedule may change based upon growth and other factors.

Implementation Triggers

As noted in previous chapters, planning activity levels (PALs) were used to define specific and qualitative indicators that should trigger planned development. These indicators are not tied to a specific year, but are used to help identify the impending need for additional facilities given present demand and capacity relationship. Implementation triggers were used to populate the Airport's 20-year Capital Improvement Plan as well as cash flow and financial analysis.

Airport Capital Improvement Plan

The Capital Improvement Program is a key element of the facility implementation plan. Projects illustrated on the ALP should be described in the Sponsor's CIP. The capital improvement program or capital improvement plan includes all airport planning and development projects, both eligible and ineligible for FAA AIP funding. The FAA considers actual funding requests through the Airports Capital improvement Plan (ACIP) Process.

Based upon required and recommended capital improvement projects as well as general maintenance and operational requirements, a 20-year capital improvement program was developed which includes anticipated funding in addition to an airport financial analysis.

Development Considerations

This chapter highlights the Airport's current financial structure, historical budget, historical state and federal funding sources as well as other factors that may impact funding of capital improvements outlined as part of recommended airport development. X26 is a federally obligated airport, and, therefore, the financial plan must be consistent with federal and state grant program and funding policies.

Specific factors include:

- The airport development plan can be funded over the twenty-year master plan time frame; project justification is demand or necessity driven and will be constructed when activity triggers development. As airport activity grows, increased user fees and other funds should become available for use toward needed capital improvements.
- It is anticipated that airfield projects will be comprised primarily through a combination of FAA entitlement and discretionary funding sources and state funding programs
- As part of the Airport's federal obligations, it must maintain infrastructure to support and retain airport users and tenants. Based upon this obligation, regular maintenance and rehabilitation of airport facilities and pavement will be required throughout the 20-year planning program. Portions of airport improvements, including airfield pavement, markings, navigational aids, etc. are eligible for federal and state funding contributions. Periodic rehabilitation is considered as part of the airport financial analysis and capital improvements program.
- As operations and demand increases, it is recommended that the airport implement tenant increases and user charges as well as consider various alternative revenue sources to provide the necessary revenue levels to support the local grant match needs. Future and ultimate planned development revealed pockets of airport property which may be used for supplemental for supplemental revenue development. These 'airport pockets' are not suitable for aviation use primarily due to the distance between the properties and the airport operating area. Compatible development options would include aviation related or support businesses, light industry and commercial development, as well as warehousing or low volume retail.

Project Sequencing and Master Schedule

Since Airport projects may be complex, the implementation plan must consider the interrelationships among the projects in the sponsor's existing and revised CIP. By establishing project interrelationships, development may be sequenced on the CIP to minimize conflicts, save money and create a schedule that may be maintained through the implementation plan.

The facility implementation plan should cover the same years as the forecast planning effort. In this case, the forecast planning effort covered Fiscal Years 2018 through 2038. This twenty-year planning period was broken down in to five and 10-year planning horizons (e.g. Short Term 2017/18 through 2023/24; Mid-Term 2024/25 through 2029/30; and Long-Term (2030/31 to 2037/38). As part of this process, triggers for key improvements were incorporated into the project sequencing plan to allow the sponsor to respond to activity levels as they occur. This methodology is especially useful in addressing long-range implementation planning.

TABLE 9-1
AIRPORT ACTIVITY FACTORS AND ACTIONS

Activity Type	Activity Information	Planning Activity Triggers	Action
Annual Operations	Indicates the annual operational demand at the Airport	Demand is ≥ 60% ASV	Monitor for increasing growth trends and capacity enhancements. Initiate planning and environmental analyses to support growth as needed
		Demand is ≥ 80% ASV	Monitor for continued growth and initiate engineering design and permitting as needed
Critical Aircraft Demand	Indicates the most demanding aircraft operations and is used to identify specific facilities	Demand ≥ 500 annual operations within 5 years	Monitor growth, identify facility needs to support critical aircraft needs and initiate planning, environmental and design.
FAR Part 139 Demand	Indicates use of the airport for commercial passenger operations. Requires FAA Inspection and Part 139 Certification	Letter from on-demand large air charter, small aircraft scheduled service or large and small scheduled service	Monitor demand and work with regulatory agencies and users to install facilities and implement procedures and policies to support commercial demand levels (Category I, II, III or IV)

TABLE 9-1 AIRPORT ACTIVITY FACTORS AND ACTIONS			
Activity Type	**Activity Information**	**Planning Activity Triggers**	**Action**
Based Aircraft Demand	Indicates the need for additional storage space to support based aircraft demand and surface parking	Demand is > 90% of existing storage capacity	Monitor based aircraft activity for increasing or decreasing trends, including aircraft type, size and storage needs. Provide additional hangar and apron storage space when there is a sustained increase in based aircraft demand.
Transient Aircraft Demand	Indicates need for additional temporary storage, surface parking and other facilities including A/D Facilities	Demand is > 90% of existing storage capacity	Monitor activity and trends. Identify preferred aircraft storage needs, pilot and passenger needs, etc. Work with on-airport businesses and local businesses to identify transient aircraft needs.
Tenant/User Demand	Indicates utilization of existing facilities and potential need for improvements	None	Monitor tenant needs and identify potential MP projects that may fit their needs
Business Demand	Indicates interest from businesses seeking to operate at the Airport	Business Interest	Work with interested businesses to identify their needs and determine if a proposed project identified in the MP will support their needs
Sources: TKDA, 2017			

Key Activities and Documentation Requirements

The implementation plan should provide information regarding key activities and responsibilities since project lead time is significant. Thus early identification of key projects and responsibilities will ensure timely implementation. A sample of key activities may include:

- Sponsor specific project approval requirements
- Tenant Approvals
- Environmental Processing needs (CATEX, EA, EIS, etc.)
- Land acquisition,
- Sponsor-specific project implementation process activities

- Agency Coordination, and
- Public Coordination activities

Key activities and responsibilities should include what activities should be undertaken, funding, by what party and recommended timing of activities. This information should be incorporated into the CIP master schedule and financial analysis.

The facilities implementation plan provides a new or revised Capital Improvement Program that addresses major development in sufficient detail to allow the sponsor to determine how to fund each project in the CIP. The plan clearly indicates other agencies that are anticipated to provide grants-in-aid so they can determine the appropriate level of likely local involvement.

FAA Federal Funding

The Airport and Airway Improvement Act of 1982 authorized funding for the Airport Improvement Program from the Airport and Airway Trust Fund ('Trust Fund') to be used for airport development, planning and noise compatibility programs. Funding for the Trust Fund is provided through several user taxes on airfare, air freight and aviation fuel. These grants are then disbursed in accordance with the FAA's Airport Improvement program through annual entitlement or discretionary provisions. FAA Order 5100.38D, Airport Improvement Program (AIP) effective September 30, 2014 sets forth the policies and procedures for administration of the AIP program by the FAA.

FAA AIP demand typically exceeds available funds; therefore, the FAA rates projects based upon current national priorities and objectives. Projects that rate a higher priority will likely receive higher consideration for available funding.

Project Priorities

FAA distributes AIP to general aviation and commercial service airport in accordance with the type of airport (commercial hub or non-hub, GA, etc.) as well as project priority and need. The FAA uses the ACIP National Priority Rating system to determine the distribution of AIP grant funds. This system uses an equation which considers the airport and projects rule in relation to FAA National Priorities.

The following point systems are assigned to project purpose categories, which are then used to calculate the likelihood of federal funding.

- Safety and Security = 10 points
- Statutory Programs = 9 points

- Planning = 8 points
- Reconstruction = 8 points
- Environmental = 8 points
- Capacity = 7 points
- Standards = 6 points, and
- Other = 4 points

FAA Entitlement Funds – GA Airports

Congress, in 2000, created the general aviation entitlement grant to provide annual funding up to $150,000 per fiscal year to individual general aviation airports in the NPIAS system. These entitlement grants are to be used to fund capital improvement and repair projects. General aviation airports typically use these funds to undertake construction projects, such as runways, taxiways and apron, as well as pavement maintenance, navigational aids, lighting as well as planning and environmental projects. Numerous GA airport have stated that they would be unable to undertake any major capital improvement projects without AIP funding grants.

In 2012, the FAA Reauthorization Act decreased FAA Entitlements from 95 to 90 percent of total federal eligible project costs, with the remaining 10 percent match typically split between the State and Airport Sponsor. The FAA entitlements can fund AIP-eligible projects per FDOT approval, and can be carried over and accumulate for up to four years. It is anticipated that future non-primary entitlements will continue at the current levels for general aviation airports under future aviation FAA re-authorization acts.

FAA Discretionary Funding

Any remaining AIP funds at the national level not mandated by set-asides, such as the Airport Noise and the Military Airport Program, or assigned to entitlements are designated as discretionary funds. Eligible discretionary projects are typically those that enhance airport capacity, address noise, or enhance safety and security, or are directed to certain national project priorities. The more expensive projects in the Airport Development Program and ACIP, such as airfield pavement rehabilitation, are expected to be funded from FAA discretionary funds. Discretionary funds, which vary from year-to-year, may provide up to 90 percent of the cost of eligible projects with local or state funds covering the remaining 10 percent match. The FAA distributes discretionary funds to projects that best carry out the purpose of the AIP, with highest priority given to safety, security, reconstruction, capacity and standards. The sponsor must also be able to commence work using discretionary funds either during the same fiscal year as the grant agreement or within 6 months, whichever is later.

FAA Apportionment

Each fiscal year, the FAA apportions AIP funds into major entitlement categories such as enplanements, non-primary and state apportionment funds. Funding for projects is apportioned to the individual state based on an area/population formula considering the entire 50 states.

Florida Department of Transportation

The Florida Department of Transportation provides a variety of funding mechanisms to support airport development. The State offers three specific airport related funding programs: Airport Construction Grant Program, the Airport Maintenance and Operation Program and the Hangar Loan Revolving Account Program.

Airport Construction Grant Program

The State construction grant is used to fund most capital improvement projects at state airports as long as the improvement provides a justifiable benefit to the air-traveling public. Typically, eligible airports are also part of the National Plan of Integrated Airport Systems (NPIAS), so they are also eligible for federal funds. State participation varies from year to year. Anticipated funding levels used for this analysis based upon current NPIAS input is illustrated in **Tables 9-2 and 9-3.**

TABLE 9-2 STATE OF FLORIDA GRANT SHARE PERCENTAGES JULY 1, 2017-JUNE 30, 2019		
PROJECT TYPE	**EXISTING FYS 16/17**	**NEW FYS 18/19**
Air Service Marketing	70	70
Maintenance and Operations	75	75
Fuel Systems and Fuel Trucks	70	70
Equipment	80	80
Construction	80	80
Navigational Aids	80	80
AWOS	80	80

TABLE 9-3 FEDERAL GRANT AND STATE PERCENTAGE ESTIMATES		
PROJECT TYPE	**EXISTING FYS 17/18**	**NEW FYS 18/19**
90% FAA Participation	5	5**
95% Federal Participation	2.5	2.5***
Equipment	5	5**

Note:
**Match will be limited based upon total project funding
When all items are FAA eligible, the State 5% may be capped
When FAA ineligible items exist, but are eligible for SAF, the State will participation in those items at the state rate. The State 5% may be limited depending upon the amount of funding requested for FAA Ineligible items
Source: FDOT Office of Aeronautics, Airport Funding Rates

Project Costs

Cost estimates were developed for anticipated projects likely to be initiated between 2018 through 2038. Project costs were based upon preliminary layouts developed as part of the Alternatives Analyses. Estimated quantities for major items, such as concrete, sub base, cut and fill, etc. were developed using FDOT and historical unit cost bid specification data as well as construction costs for mobilization, drainage (where applicable) and engineering services.

Cost estimates included various soft costs as illustrated in **Table 9-4**, such as engineering design, permitting, airport administration, construction management, etc., which are included on most construction projects.

TABLE 9-4
CONSTRUCTION ENGINEERING SOFT COST PERCENTAGES

SOFT COST	PERCENTAGE
Engineering Design Fee	7%
Construction Management/Inspection	7%
Allowance for Permitting Fees	3%
Survey and Design Testing	3%
Inspection and Testing	8%
Airport Administration	2%
Total Soft Costs	**30%**

Source: TKDA Aviation Engineering Specifications, 2017

In addition to the engineering soft costs applied to all construction projects, a 15 percent contingency fee was applied to all capital improvement projects with the exception of environmental, planning and other similar studies. Associated contingency fees associated with these projects were already incorporated into the baseline cost estimates. The 15% contingency fee associated with architectural and engineering related projects was applied to account for potential unknown factors including fuel costs, raw material, permitting issues, mitigation needs, etc.

Cost estimates related to planning, environmental, stormwater and other documentation was based upon specific airport needs and average project development estimates. Preliminary architectural costs along with construction was based upon FDOT data and similar projects completed within the region. All project cost estimates are provided in 2017 dollar values. Project cost adjustments using the FDOT inflation factors and conversion table based upon anticipated year of project initiation was applied to the forecast twenty year Airport CIP and pro forma airport financial analysis.

Airport Master Plan Capital Improvement Plan

Table 9-5 summarizes anticipated funding sources associated with the Airport's 20-year airport development program based upon funding and demand determined at the time of this program's preparation. Projects anticipated to occur beyond the 20-year planning period were not included in this capital improvement program. Project costs are planning estimates and

place holders. The proposed capital development plan is split into three phases based upon FAA fiscal years: short-term (2017-2023); mid-term (2024-2029) and long-term (2030-2037).

CAPITAL PROJECT FEASIBILITY SUMMARY

Airports have a variety of sources to support ongoing maintenance and capital development. However, funding is based upon project justification, demand, project eligibility, and regulatory and community approvals. In development of the X26 capital improvement program, the following were assumed:

- Most proposed capital projects are demand driven
- Proposed capital plan allows for flexibility
- Partial or staged funding of proposed projects is feasible
- Innovative financing options are available, and
- Increased Governmental Support in the mid to long-term is possible

Airport capital projects are typically closely coordinated with the FAA and FDOT, particularly when Airport Improvement Program (AIP) funding or NEPA environmental documentation is required. Further, to address proposed use of Airport property for non-traditional use, additional agency coordination is needed. Therefore for each project listed in the CIP the Airport will be responsible for the following:

- Update the Airport Capital Improvement Program (ACIP) and financial documentation
- Verify the justification supporting the project and request FAA/FDOT participation for projects using AIP funding.
- Assure completion of the necessary environmental processing through agency coordination
- Prepare and submit grant applications
- Prepare and issue a Request For Qualification and selecting the consultant/engineer for the project planning, design, or environmental analysis, as applicable
- Prepare and issue a Request For Proposals and selection for project construction, management, and related construction services; these services may be provided or assisted by the design engineer
- Provide project administration including FAA grant maintenance and close out

This financial analysis is based on continued FAA and State funding as levels forecast for the next two to three years. However, due to competition for both FAA and State funding, the City of Sebastian must continuously work with FAA and FDOT to provide effective justification for

planned development as well as coordinate with the Agencies in pursuit of alternative revenue sources.

Recommended Capital Improvement Plan

Tables 9-5 and 9-6 provide a summary and detailed representation of the suggested Airport capital improvement program based upon the City's goals and suggestions outlined in the master plan. This analysis indicates that funding will likely be available to plan, design, and construct the projects identified in the Master Plan. This financial analysis is based on continued FAA and State funding at current levels. However, there is a competition for public funds, so the Airport will need to aggressively market the need for its proposed capital projects to the FAA, State of Florida, and other agencies as opportunities arise. Innovative sources, including other federal funding sources, may be required to address all the proposed projects if they are to be completed in the recommended time frame.

It should be noted that project costs are planning estimates and are used for programming purposes. For those projects included in the FAA ACIP, the costs reflect engineering-level cost opinions, based on current year values, and not adjusted for inflation. Also, it is important to note that the review of funding eligibility produces an estimate of the minimum local share funds that must be available through the sponsor to undertake the various projects. Actual funding received is often less than the maximum eligible due to competition for limited funds, low project priority rankings, or incomplete lobbying efforts to secure maximum funding.

TABLE 9-5
CIP SUMMARY

	Total Project Costs	FAA Grants (Entitlement and Discretionary)	FDOT Grant	Local Share*	Third Party	Other Sources
Short-Term (FAA 2017-2023	$25,129,870	$11,337,723	$8,965,154	$4,826,994	$0	$0
Mid-Term (FAA 2024-2029	$17,288,400	$1,861,560	$9,372,000	$2,454,840	$3,600,000	$0
Long-Term (FAA 2030-2037)	$17,835,122	$5,678,310	$7,197,706	$1,859,106	$3,100,000	$0
Total	**$60,253,392**	**$18,877,593**	**$25,534,860**	**$9,140,940**	**$6,700,000**	**$0**

*Notes: *includes funding from internal sources including loans from City of Sebastian Economic Development*
Source: TKDA 2017

This Page was Intentionally Left Blank

TABLE 9-6
TWENTY YEAR CAPITAL IMPROVEMENT PROGRAM
(FAA FYS 2017-2038)
IN 2017 DOLLARS

FDOT FY	FAA FY	PROJECTS	COST ESTIMATES	FAA PERCENT	AIP	DISCRETIONARY	TOTAL	FDOT PERCENT	FDOT FUNDING	LOCAL PERCENT	LOCAL MATCH	THIRD PARTY %	THIRD PARTY	OTHER FUNDING SOURCES
2018	2017	12 Shade Hangars and Minor Pavement Rehabilitation	$625,000	0%	$0	$0	$0	80%	$500,000	20%	$125,000	0%	$0.00	$0.00
2018	2017	Taxiway C, D and E Design	$879,654	90%	$0	$791,689	$791,689	5%	$43,983	5%	$43,983	0%	$0.00	$0.00
2018	2017	Master Plan Update and Environmental Studies	$291,000	90%	$150,000	$111,900	$261,900	5%	$14,550	5%	$14,550	0%	$0.00	$0.00
2018	2017	AWOS Upgrade	$106,000	0%	$0	$0	$0	80%	$84,800	20%	$21,200	0%	$0.00	$0.00
		Total 2017	**$1,901,654**		**$150,000**	**$903,589**	**$1,053,589**		**$643,333**		**$204,733**		**$0**	**$0**
2019	2018	Taxiway C, D and E Construction	$2,000,000	90%	$150,000.00	$1,650,000.00	$1,800,000.00	5%	$100,000	5%	$100,000	0%	$0.00	$0.00
2019	2018	Republish Runway 10/28 as Utility Runway Only (12,500 lbs. or less)	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0.00	$0.00
2019	2018	Decrease Runway 10-28 primary surface to 250 feet	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0.00	$0.00
2019	2018	Request modification to standards for Airport Drive West and portion of Roseland Road located in Runway 10 RPZ	$400	0%	$0.00	$0.00	$0.00	0%	$0	100%	$400	0%	$0.00	$0.00
2019	2018	Decrease Runway Protection Zones from 500 x 1000 x 700 to 250 x 1000 x 450 feet on both Runway 10 and 28.	$0	0%	$0.00	$0.00	$0.00	0%	$0	100%	$0	0%	$0.00	$0.00
2019	2018	Change airport designator	$400	0%	$0.00	$0.00	$0.00	0%	$0	100%	$400	0%	$0.00	$0.00
2019	2018	Economic Development Refurbishment (on-site restaurant)	$100,000	0%	$0.00	$0.00	$0.00	50%	$50,000	50%	$50,000	0%	$0.00	$0.00
		Total 2018	**$2,100,800**		**$150,000**	**$1,650,000**	**$1,800,000**		**$150,000**		**$150,800**		**$0**	**$0**
2020	2019	Taxiway C, D, and E Construction	$1,518,616	90%	$150,000	$1,216,754	$1,366,754	5%	$75,931	5%	$75,931	0%	$0.00	$0.00
2020	2019	Add Skydive Landing Area Markings/Identification	$10,000	0%	$0	$0	$0	80%	$8,000	20%	$2,000	0%	$0.00	$0.00
2020	2019	Add lighted wind cone near infield and northwest ramp to support skydiving activity.	$600	0%	$0	$0	$0	80%	$480	20%	$120	0%	$0.00	$0.00
2020	2019	Construct Hangars/T-Hangars	$1,000,000	0%	$0	$0	$0	80%	$800,000	20%	$200,000	0%	$0.00	$0.00
		Total 2019	**$2,529,216**		$150,000	$1,216,754	$1,366,754		$884,411		$278,051		$0	$0
2021	2020	Airport Drive East - Design and Site Work Non-Aviation Development	$2,000,000	0%	$0	$0	$0	50%	$1,000,000	50%	$1,000,000	0%	$0.00	$0
2021	2020	Narrow Taxiway A to 35 feet to allow for adjacent movement area and development (pavement remarking and overlay)	$4,896,000	90%	$150,000	$4,256,400	$4,406,400	5%	$244,800	5%	$244,800	0%	$0.00	$0
2021	2020	Construct Hangars/T-Hangars	$1,250,000	0%	$0	$0	$0	80%	$1,000,000	20%	$250,000	0%	$0.00	$0
2021	2020	South Quadrant - expand Electrical Vault	$50,000	0	$0	$0	$0	80%	$40,000	20%	$10,000	0%	$0.00	$0
		Total 2020	**$8,196,000**		**$150,000**	**$4,256,400**	**$4,406,400**		**$2,284,800**		**$1,504,800**		**$0**	**$0**
2022	2021	Construction - Airport West Access Road	$2,000,000	0%	$0	$0	$0	80%	$1,600,000	20%	$400,000	0%	$0.00	$0
2022	2021	Remove obstructions to approach to Runway 23	$10,000	90%	$9,000	$0	$9,000	5%	$500	5%	$500	0%	$0.00	$0
2022	2021	Landscaping related to obstruction removal	$200,000	0%	$0	$0	$0	0	$0	100%	$200,000	0%	$0.00	$0
2022	2021	Airport drive east - building (18 spaces) - $5 million (50/50)	$3,000,000	0%	$0	$0	$0	50%	$1,500,000	50%	$1,500,000	0%	$0.00	$0
		Total 2021	**$5,210,000**		**$9,000**	**$0**	**$9,000**		**$3,100,500**		**$2,100,500**		**$0**	**$0**
2023	2022	Pavement rehabilitation of Runway 5-23 (includes remarking) - full depth	$3,000,000	90%	$291,000	$2,409,000	$2,700,000	5%	$150,000	5%	$150,000	0%	$0.00	$0

TABLE 9-6
TWENTY YEAR CAPITAL IMPROVEMENT PROGRAM
(FAA FYS 2017-2038)
IN 2017 DOLLARS

FDOT FY	FAA FY	PROJECTS	COST ESTIMATES	FAA PERCENT	AIP	DISCRETIONARY	TOTAL	FDOT PERCENT	FDOT FUNDING	LOCAL PERCENT	LOCAL MATCH	THIRD PARTY %	THIRD PARTY	OTHER FUNDING SOURCES
2023	2022	Add Runway End Identifier Lights (REILs) to Runway 5-23 thresholds	$2,200	90%	$0	$1,980	$1,980	5%	$110	5%	$110	0%	$0.00	$0
2023	2022	Design and Permitting GA Apron and Shade Hangar Expansion	$220,000	0%	$0	$0	$0	80%	$176,000	20%	$44,000	0%	$0.00	$0
		Total 2022	**$3,222,200**		**$291,000**	**$2,410,980**	**$2,701,980**		**$326,110**		**$194,110**		**$0**	**$0**
2024	2023	Construct Additional Shade Hangars (6) and Expand Apron	$1,310,000	0%	$0	$0	$0	80%	$1,048,000	20%	$262,000	0%	$0.00	$0
2024	2023	Design and Construct Helipad Parking Area South Terminal Quadrant	$60,000	0%	$0	$0	$0	80%	$48,000	20%	$12,000	0%	$0.00	$0
2024	2023	Design and Permitting Hangar Development - Southwest Quadrant	$600,000	0%	$0	$0	$0	80%	$480,000	20%	$120,000	0%	$0.00	$0
		Total 2023	**$1,970,000**		**$0**	**$0**	**$0**		**$1,576,000**		**$394,000**		**$0**	**$0**
SUBTOTAL SHORT-TERM DEVELOPMENT (2017-2023)			**$25,129,870**		**$900,000**	**$10,437,723**	**$11,337,723**		**$8,965,154**		**$4,826,994**		**$0**	**$0**
2025	2024	Design and permitting Tie-Down Apron - Northwest Quadrant	$940,000	0%	$0	$0	$0	80%	$752,000	20%	$188,000	0%	$0.00	$0
2025	2024	Site Preparation - New Corporate/Box Hangar Development - Southwest Quadrant	$3,000,000	0%	$0	$0	$0	80%	$2,400,000	20%	$600,000	0%	$0.00	$0
2025	2024	Wildlife/Security Fence Expansion and Relocation	$500,000	0%	$0	$0	$0	80%	$400,000	20%	$100,000	0%	$0.00	$0
2025	2024	Box/Corporate Hangar Construction - Third Party	$1,200,000	0%	$0	$0	$0	0%	$0	0%	$0	100%	$1,200,000.00	$0
		Total 2024	**$5,640,000**		**$0**	**$0**	**$0**		**$3,552,000**		**$888,000**		**$1,200,000**	**$0**
2026	2025	Construction New Tie-down Apron and drainage	$4,700,000	0%	$0	$0	$0	80%	$3,760,000	20%	$940,000	0%	$0.00	$0
2026	2025	Box/Corporate Hangar Construction - Third Party	$1,200,000	0%	$0	$0	$0	0%	$0	0%	$0	100%	$1,200,000.00	$0
		Total 2025	**$5,900,000**		**$0**	**$0**	**$0**		**$3,760,000**		**$940,000**		**$1,200,000**	**$0**
2027	2026	Acquire property (~0.7 acres) - Runway 10 Runway Protection Zone	$8,400	90%	$7,560	$0	$7,560	0%	$0	10%	$840	0%	$0.00	$0
2027	2026	Acquire property (~5 Acres) - Runway 28 Runway Protection Zone	$60,000	90%	$54,000	$0	$54,000	0%	$0	10%	$6,000	0%	$0.00	$0
2027	2026	Airport Business/Marketing Plan - Financial Self Sustainability	$80,000	0%	$0	$0	$0	50%	$40,000	50%	$40,000	0%	$0.00	$0
		Total 2026	**$148,400**		**$61,560**	**$0**	**$61,560**		**$40,000**		**$46,840**		**$0**	**$0**
2028	2027	Rehabilitate Runway 10-28 and determine actual pavement strength	$1,200,000	90%	$538,440	$541,560	$1,080,000	5%	$60,000	5%	$60,000	0%	$0.00	$0
2028	2027	Rehabilitate Taxiway B in conjunction with Runway 10-27	$800,000	90%	$0	$720,000	$720,000	5%	$40,000	5%	$40,000	0%	$0.00	$0
		Total 2027	**$2,000,000**		**$538,440**	**$1,261,560**	**$1,800,000**		**$100,000**		**$100,000**		**$0**	**$0**
2029	2028	Design and Permitting - Corporate Hangar Development (80 x 80) - Northwest Quadrant	$400,000	0%	$0	$0	$0	80%	$320,000	20%	$80,000	0%	$0.00	$0
		Total 2028	**$400,000**		**$0**	**$0**	**$0**		**$320,000**		**$80,000**		**$0**	**$0**

TABLE 9-6
TWENTY YEAR CAPITAL IMPROVEMENT PROGRAM
(FAA FYS 2017-2038)
IN 2017 DOLLARS

FDOT FY	FAA FY	PROJECTS	COST ESTIMATES	FAA PERCENT	AIP	DISCRETIONARY	TOTAL	FDOT PERCENT	FDOT FUNDING	LOCAL PERCENT	LOCAL MATCH	THIRD PARTY %	THIRD PARTY	OTHER FUNDING SOURCES
2030	2029	Site Preparation Corporate Hangar Development - Northwest Quadrant	$2,000,000	0%	$0	$0	$0	80%	$1,600,000	20%	$400,000	0%	$0.00	$0
2030	2029	Corporate Hangar Development - Third Party	$1,200,000	0%	$0	$0	$0	0%	$0	0%	$0	100%	$1,200,000.00	$0
		Total 2029	**$3,200,000**		**$0**	**$0**	**$0**		**$1,600,000**		**$400,000**		**$1,200,000**	**$0**
SUBTOTAL MIDTERM DEVELOPMENT (2024-2029)			**$17,288,400**		**$600,000**	**$1,261,560**	**$1,861,560**		**$9,372,000**		**$2,454,840**		**$3,600,000**	**$0**
2031	2030	Environmental Analysis	$50,000	90%	$45,000	$0	$45,000	5%	$2,500	5%	$2,500	0%	$0.00	$0
2031	2030	Taxiway C, D and E - Pavement Overlay	$1,500,000	90%	$405,000	$945,000	$1,350,000	5%	$75,000	5%	$75,000	0%	$0.00	$0
2031	2030	Terminal Apron Overlay	$300,000	0%	$0	$0	$0	80%	$240,000	20%	$60,000	0%	$0.00	$0
2031	2030	Corporate Hangar Development - Third Party	$1,200,000	0%	$0	$0	$0	0%	$0	0%	$0	100%	$1,200,000.00	$0
		Total 2030	**$3,050,000**		**$450,000**	**$945,000**	**$1,395,000**		**$317,500**		**$137,500**		**$1,200,000**	**$0**
2032	2031	Site Preparation Fixed Based Operator Facilities North and East of Existing Terminal Area	$280,000	0%	$0	$0	$0	80%	$224,000	20%	$56,000	0%	$0.00	$0
2032	2031	Construct Jet A and 100LL (or Bio-Fuel) fuel farm	$300,000	0%	$0	$0	$0	80%	$240,000	20%	$60,000	0%	$0.00	$0
2032	2031	Fenceline extension/construction	$12,000	0%	$0	$0	$0	80%	$9,600	20%	$2,400	0%	$0.00	$0
2032	2031	FBO Construction Phase I- Third Party	$500,000	0%	$0	$0	$0	50%	$250,000	0%	$0	50%	$250,000.00	$0
		Total 2031	**$1,092,000**		**$0**	**$0**	**$0**		**$723,600**		**$118,400**		**$250,000**	**$0**
2033	2032	South Quadrant - Maintenance/Rehabilitate fuel tanks - Terminal Apron	$60,000.0	0%	$0	$0	$0	50%	$30,000	50%	$30,000	0%	$0.00	$0
2033	2032	Design and Permitting North Access Road	$65,000	0%	$0	$0	$0	80%	$52,000	20%	$13,000	0%	$0.00	$0
2033	2032	Master Plan Update	$250,000	90%	$10,000	$215,000	$225,000	5%	$12,500	5%	$12,500	0%	$0.00	$0
2033	2032	Environmental/Stormwater Study	$100,000	90%	$90,000	$0	$90,000	5%	$5,000	5%	$5,000	0%	$0.00	$0
2033	2032	FBO Construction Phase 2- Third Party	$900,000	0%	$0	$0	$0	50%	$450,000	0%	$0	50%	$450,000.00	$0
		Total 2032	**$1,375,000**		**$100,000**	**$215,000**	**$315,000**		**$549,500**		**$60,500**		**$450,000**	**$0**
2034	2033	Construct North Quadrant Access Road (~2000 lf)	$200,000	0%	$0	$0	$0	80%	$160,000	20%	$40,000	0%	$0.00	$0
2034	2033	Taxiway A and GA Apron Pavement Overlay and Remarking	$325,000	90%	$200,000	$92,500	$292,500	5%	$16,250	5%	$16,250	0%	$0.00	$0
2034	2033	Fenceline Extension	$48,000	0%	$0	$0	$0	80%	$38,400	20%	$9,600	0%	$0.00	$0
		Total 2033	**$573,000**		**$200,000**	**$92,500**	**$292,500**		**$214,650**		**$65,850**		**$0**	**$0**
2035	2034	Design Taxiway F and Connector Taxiways and Preliminary Site Work Permitting for North Quadrant Development	$1,172,000	50%	$150,000	$436,000	$586,000	40%	$468,800	10%	$117,200	0%	$0.00	$0
		Total 2034	**$1,172,000**		**$150,000**	**$436,000**	**$586,000**		**$468,800**		**$117,200**		**$0**	**$0**
2036	2035	Demolish former Runway 13-31	$200,000	90%	$0	$180,000	$180,000	5%	$10,000	5%	$10,000	0%	$0.00	$0
2036	2035	Construct 35 foot wide Taxiway F with taxiway edge lighting at location of former Runway 13-31	$1,080,556	90%	$150,000	$822,500	$972,500	5%	$54,028	5%	$54,028	0%	$0.00	$0
2036	2035	Runway 5-23 Pavement Overlay (Cold in Place Recycling method) and markings	$952,567	90%	$150,000	$707,310	$857,310	5%	$47,628	5%	$47,628	0%	$0.00	$0
		Total 2035	**$2,233,122**		**$300,000**	**$1,709,810**	**$2,009,810**		**$111,656**		**$111,656**		**$0**	**$0**

TABLE 9-6
TWENTY YEAR CAPITAL IMPROVEMENT PROGRAM
(FAA FYS 2017-2038)
IN 2017 DOLLARS

FDOT FY	FAA FY	PROJECTS	COST ESTIMATES	FAA PERCENT	AIP	DISCRETIONARY	TOTAL	FDOT PERCENT	FDOT FUNDING	LOCAL PERCENT	LOCAL MATCH	THIRD PARTY %	THIRD PARTY	OTHER FUNDING SOURCES
2037	2036	North Quadrant - Construct Connector Taxiways	$1,300,000	0%	$0	$0	$0	80%	$1,040,000	20%	$260,000	0%	$0.00	$0
2037	2036	North Quadrant - Site Preparation for Hangar Development	$2,500,000	0%	$0	$0	$0	80%	$2,000,000	20%	$500,000	0%	$0.00	$0
2037	2036	North Quadrant - Construct Tie-down Apron	$2,000,000	0%	$0	$0	$0	80%	$1,600,000	20%	$400,000	0%	$0.00	$0
2037	2036	Fenceline Expansion	$60,000	0%	$0	$0	$0	80%	$48,000	20%	$12,000	0%	$0.00	$0
		Total 2036	**$5,860,000**		**$0**	**$0**	**$0**		**$4,688,000**		**$1,172,000**		**$0**	**$0**
2038	2037	Construct Helipad Parking Area on North Quadrant Apron	$80,000	0%	$0	$0	$0	80%	$64,000	20%	$16,000	0%	$0.00	$0
2038	2037	Pavement Overlay - Runway 10-28 and Taxiway B	$1,200,000	90%	$300,000	$780,000	$1,080,000	5%	$60,000	5%	$60,000	0%	$0.00	$0
2038	2037	Hangar Development - North Quadrant - Third Party	$1,200,000	0%	$0	$0	$0	0%	$0	0%	$0	100%	$1,200,000.00	$0
		Total 2037	**$2,480,000**		**$300,000**	**$780,000**	**$1,080,000**		**$124,000**		**$76,000**		**$1,200,000**	**$0**
SUBTOTAL LONG-TERM DEVELOPMENT (2030-2037)			**$17,835,122**		**$1,500,000**	**$4,178,310**	**$5,678,310**		**$7,197,706**		**$1,859,106**		**$3,100,000**	**$0**
TOTAL CAPITAL IMPROVEMENT PROGRAM			**$60,253,392**		**$3,000,000**	**$15,877,593**	**$18,877,593**		**$25,534,860**		**$9,140,940**		**$6,700,000**	**$0**

Sources: City of Sebastian Historical Information, FAA and FDOT funding breakdown and TKDA 2017

Financial Feasibility Analysis

This section focuses on the ability of the airport sponsor to fund projects as outlined in the master plan. The sponsor's ability to fund its local portion of projected development or to find alternative sources of funding to supplement the local share is key to determining the overall financial feasibility of planned development.

Airport development can be financed from various sources including Federal and State grants in aid, private financing, third party development as well as loans, bonds and local funds. Sources of local funding based upon historical financial data provided by the Sponsor show trends in income patterns as well as sources of airport operating revenues and expenses. X26's major sources of local revenues include: airport tenant leases; aircraft fuel charges, as well as some non-aeronautical land leases.

Airport revenues and expenses can fluctuate from year to year based upon such variabilities as the: sale of fuel sold, aircraft operational demand, as well as number of tenants, design and construction costs, maintenance fees as well as other factors. Therefore, it is assumed that X26 will continue to receive some level of federal and state funding to support capital improvement for the next twenty years. Therefore, the financial plan also assumes that cost estimates will remain stable and that additional local funding will be obtained through increases in lease agreements, operations and alternative funding sources.

The financial analysis was provided to demonstrate the costs and benefits of capital improvements as well as identify the local funding sources for proposed capital improvements. The Sebastian Municipal Airport is owned and operated by the City of Sebastian and is overseen by the City Council. The City manages the airport finances but maintains all revenues and expenses in a separate account to avoid intermingling with other city funds. This independent reporting complies with FAA's requirements that airport funds be identified separately for other non-aviation sources.

Historical Financial Statements

Historical data obtained from the City of Sebastian through the year 2017. This data was used as the baseline for the Project Cash Flow and Financial Pro Forma Statement.

Table 9-7
Historical Revenues and Performance Measurements

Description	Fiscal Year Actual 2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Amended Budget 2015/16
Airport Fund Revenue											
Operating Revenue	$375,769	$335,907	$383,385	$365,229	$389,715	$380,742	$422,908	$429,823	$422,843	$383,698	$397,055
Intergovernmental	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Non-operating revenues	$30,062	$24,413	$6,692	$7,539	$19,766	$0	$0	$0	$0	$0	$0
Total	**$405,831**	**$360,320**	**$390,077**	**$372,768**	**$409,481**	**$380,742**	**$422,908**	**$429,823**	**$422,843**	**$383,698**	**$397,055**
Operating Revenue											
Fuel Sales - Fuel Flowage Fee FBO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Sales - 100LL Airport Self-Serve Only	$0	$0	$158,833	$94,611	$89,058	$112,782	$72,886	$53,780	$49,504	$71,366	$72,000
Fuel Sales - Jet A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cost of Sales	$0	$0	($136,680)	($71,523)	($69,945)	($95,858)	($55,681)	($44,137)	($36,177)	($62,452)	($37,500)
Nontaxable rents	$0	$5,001	$5,376	$2,000	$391	$391	$391	$391	$391	$391	$391
Rents and royalties	$313,564	$266,893	$288,835	$275,004	$303,710	$300,744	$344,925	$359,031	$348,026	$313,585	$302,940
Other misc. revenues	$62,031	$63,854	$66,840	$64,933	$66,256	$62,674	$60,095	$60,566	$60,848	$60,547	$58,974
Sales Tax Commission	$175	$159	$181	$204	$245	$9	$292	$192	$251	$261	$250
Total operating revenue	**$375,770**	**$335,907**	**$383,385**	**$365,229**	**$389,715**	**$380,742**	**$422,908**	**$429,823**	**$422,843**	**$383,698**	**$397,055**
Non-operating revenue											
Intergovernmental sources	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Airport -FDOT JPA Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Airport -FAA AIO Revenue	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Intergovernmental Sources	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Table 9-7
Historical Revenues and Performance Measurements

Description	Fiscal Year Actual 2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Amended Budget 2015/16
Other non-operating revenue:											
Interest earnings	$12,633	$2,916	$678	$806	-$165	$37	$5	$0	$149	($230)	$200
SBA Interest Earnings	$17,429	$15,160	$2,089	$0	$0	$0	$0	$0	$0	$0	$0
Sale of Fixed Assets	$0	($3,663)	$3,925	$0	$0	$0	$4,125	$0	$50	$20,602	$0
Sale of Surplus Materials/Scrap					$207	$0	$0	$0	$0	$0	$0
Contributions and Donations	$0	$10,000	$0	$5,000	$0	$0	$0	$0	$0	$0	$178,500
Insurance Proceeds					$0	$0	$4,475	$0	$0	$0	$0
Reimbursements	$0	$0	$0	$1,733	$9,204	$8,982	$8,199	$7,799	$11,633	$11,169	$13,000
Transfer from Fund 130 DST	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,000
Transfer from Fund 455					$10,520	$0	$0	$0	$0	$0	$0
Total other non-operating revenue	**$30,062**	**$24,413**	**$6,692**	**$7,539**	**$19,766**	**$9,019**	**$16,804**	**$7,799**	**$11,832**	**$31,541**	**$203,700**
Total airport revenues	$405,832	$360,320	$390,077	$372,768	$409,481	$389,761	$439,712	$437,622	$434,675	$415,239	$600,755
Use of unrestricted reserves	($20,980)	$259,904	$334,169	$61,998	$13	$15,222	$0	$4,376	$0	$0	($22,000)
Total Airport Sources	**$384,852**	**$620,224**	**$724,246**	**$434,766**	**$409,494**	**$404,983**	**$439,712**	**$441,998**	**$434,675**	**$415,239**	**$578,755**
Performance Indicators	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Acres available for development	218	218	108	108	108	108	108	108	108	108	108
Airport Leasehold Revenues	$313,564	$266,893	$288,835	$275,005	$303,710	$301,135	$345,316	$359,422	$348,417	$313,976	$303,331
Est. Revenue Per Acre (rounded)									$3,226	$2,907	$2,809

Notes: Miscellaneous revenues includes money obtained from Signature for T-Hangars, Sebastian Skydiving, badges, etc.
Sources: City of Sebastian Historical Records FYs 2005-2016

Table 9-8
Historical Expenses

Description	Fiscal Years 2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Amended 2015/16
PERSONAL SERVICES											
Salaries	$110,921	$163,076	$175,698	$174,863	$172,550	$170,060	$146,487	$129,428	$53,528	$94,353	$95,305
OT	$9,443	$868	$377	$186	$1,087	$0	$0	$74	$462	$609	$500
FICA	$12,080	$11,996	$11,930	$11,980	$11,868	$11,464	$11,678	$9,804	$5,028	$3,778	$4,452
Clothing Allow	$200	$240	$240	$240	$240	$240	$240	$120	$120	$120	$120
Deferred Compensation	$11,706	$13,253	$14,600	$15,483	$15,161	$14,489	$14,801	$11,835	$6,293	$4,843	$5,238
Group Health Insurance Premiums	$11,960	$13,928	$16,140	$21,149	$21,074	$19,241	$18,384	$8,649	$6,868	$5,948	$6,479
Dependent Health Ins Premiums	$5,775	$6,788	$7,744	$14,847	$13,185	$10,508	$10,377	$4,590	$4,037	$3,823	$4,499
Health Reimbursement Account				$0	$0		$3,033	$1,718	$1,438	$894	$3,054
Employee Assistance Program	$83	$92	$69	$69	$69	$69	$63	$46	$30	$23	$24
Worker's Comp	$6,728	$6,823	$5,916	$5,374	$4,431	$3,326	$3,381	$3,940	$3,712	$2,701	$5,025
OPEB Accrued Expenses	$0	$0	$1,690	$1,758	-$5,988	-$207	$0	$0	-$26	$32	$0
TOTAL	**$168,896**	**$217,064**	**$234,404**	**$245,949**	**$233,677**	**$229,190**	**$208,444**	**$170,204**	**$81,490**	**$117,124**	**$124,696**
OPERATING EXPENSES											
Professional Svcs	$6,865	$2,169	$1,119	$0	$0	$0	$749	$8,125	$3,500	$0	$0
Audit Fees	$6,337	$7,040	$6,580	$4,692	$2,517	$2,265	$2,039	$1,758	$1,404	$1,264	$1,264
Admin Svcs provided by GF	$72,225	$42,958	$50,036	$52,592	$36,656	$42,980	$44,203	$52,772	$47,495	$49,180	$47,762
Maintenance Svcs by GF	$0	$0	$0	$0	$0	$0	$15,458	$67,000	$56,583	$0	$0
Other Contractual Services	$362	$10,812	$1,685	$5,450	$3,268	$2,023	$3,350	$3,133	$2,740	$4,002	$2,650
Environmental Services	$0	$0	$0	$0	$0	$0	$175	$0	$0	$0	$0
Janitorial Services	$85	$4,895	$4,500	$4,308	$5,461	$4,537	$4,757	$532	$0	$0	$0
Pest/Weed/Mowing Services	$1,110	$1,245	$2,598	$800	$600	$600	$588	$450	$862	$825	$900
Travel/Per Diem	$2,982	$1,367	$1,439	$0	$0	$0	$0	$0	$0	$1,749	$500
Phone	$299	$9,563	$12,607	$14,342	$17,564	$8,031	$6,162	$2,683	$3,436	$3,598	$3,750
Cell Phone	$1,344	$1,130	$1,191	$968	$888	$1,044	$1,151	$737	$387	$415	$240
Internet	$40	$66	$105	$109	$1,157	$1,173	$1,220	$1,321	$950	$536	$505
Postage	$514	$278	$285	$239	$299	$387	$225	$253	$118	$47	$250
Express Mail	$0	$0	$0	$0	$0	$0	$0	$70	$0	$11	$50
Electric	$10,616	$10,787	$14,771	$15,816	$24,988	$26,165	$23,710	$22,351	$23,640	$25,554	$25,200
Water/Sewer	$137	$776	$1,309	$944	$1,511	$2,465	$2,331	$1,863	$2,044	$2,855	$3,500
Insurance	$4,685	$33,142	$18,368	$13,129	$13,715	$19,434	$27,442	$25,485	$25,580	$26,624	$30,002
Claims	$0	$0	$0	$0	$0	$0	$967	$0	$0	$0	$0
R&M Building	$0	$1,368	$1,564	$1,077	$6,949	$1,714	$4,347	$3,404	$6,593	$6,676	$18,082

Table 9-8
Historical Expenses

Description	Fiscal Years 2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Amended 2015/16
R&M Vehicles	$1,708	$1,099	$2,117	$2,840	$2,455	$1,947	$4,707	$3,312	$1,498	$2,698	$3,500
R&M Office Equipment	$1,473	$1,400	$1,076	$584	$18	$214	$0	$0	$0	$0	$0
R&M Operating Equipment	$3,212	$6,084	$14,614	$7,094	$6,784	$10,694	$18,917	$11,939	$9,971	$15,338	$8,000
R&M Fencing	$660	$1,183	$1,164	$219	$1,413	$1,597	$8,605	$990	$2,380	$634	$3,000
R&M Ground Maintenance	$1,328	$1,329	$1,646	$1,323	$2,025	$2,390	$2,890	$1,889	$6,839	$2,307	$476
Printing and Binding	$0	$0	$0	$439	$0	$0	$0	$0	$0	$139	$0
Promotional Activities	$0	$0	$0	$0	$0	$0	$436	$258	$282	$108	$500
Advertising Expenditures	$3,000	$2,792	$1,906	$1,874	$2,878	$5,677	$623	$30	$0	$0	$0
Legal Ads	$0	$0	$103			$0	$0	$0	$0	$294	$0
Litigation Expenses	$0	$200,804	$0			$0	$0	$0	$0	$0	$0
Department Supplies	$1,145	$2,337	$2,427	$1,269	$603	$1,386	$748	$844	$1,695	$2,524	$1,200
Bank Charges	$0	$235	$4,488	$2,610	$2,406	$3,043	$2,043	$1,639	$1,504	$2,133	$1,500
Computer Supplies	$321	$65	$80	$476	$263	$205	$55	$124	$7	$69	$0
Small Tools and Equipment	$2,286	$1,870	$801	$505	$819	$185	$60	$577	$215	$1,675	$500
Gas and Oil	$6,233	$6,407	$11,506	$6,864	$6,762	$9,518	$6,647	$7,754	$5,867	$7,303	$4,800
Uniforms and shoes	$822	$413	$532	$790	$628	$513	$339	$223	$221	$185	$290
Safety equipment	$0	$0	$100	$161	$0	$0	$0	$0	$0	$0	$0
dues and memberships	$780	$1,325	$775	$525	$494	$400	$400	$430	$430	$330	$500
books and publications	$0	$84	$0			$0	$0	$18	$0	$0	$0
Training and Education	$820	$515	$110	$75	$20	$0	$0	$0	$30	$440	$1,500
Non-ad Valorem Tax	$11,168	$10,339	$10,756	$9,878	$9,965	$16,656	$10,522	$13,327	$13,426	$13,769	$13,769
Total Operating Expenses* (# must be rounded)	**$141,761**	**$365,877**	**$172,358**	**$151,992**	**$153,106**	**$167,243**	**$195,866**	**$235,291**	**$219,697**	**$173,282**	**$174,190**
TOTAL AIRPORT EXPENSES	**$384,852**	**$620,222**	**$725,467**	**$434,766**	**$409,494**	**$404,983**	**$439,712**	**$440,440**	**$415,148**	**$311,885**	**$564,720**

Sources: Historical data from City of Sebastian (2005-2016)

Forecast Financial Pro Forma Statement

A project cash flow analysis was developed using 10 years (2005-2016) historical data to identify the viability of X26 to meet its local share obligations. As part of the analysis, it was assumed that lease revenues would start to be obtained related to construction of various hangar facilities. Miscellaneous fees include: funds received for airport badges, Sebastian Aero Fuel, Sheltair Investment Fees, and Skydive Sebastian Fuel. All of these miscellaneous lease revenues were due for an increase based upon FAA and FDOT fair market value requirements. Therefore, the overall 2017 CPI growth rate of 2.10% was conservatively applied annually to address anticipated increase in revenues.

In addition, future fuel sales, hangar lease revenues and airport land revenues were tied to forecast operational and based aircraft demand in an effort to effectively forecast likely revenues. 2017 CPI Indices were used to determine likely revenues and expenses through the 20-year planning period. **Tables 9-9 through 9-11** highlight the projected cash flow analysis and the likely pro forma financial analysis in an effort to determine if X26 can pay its local share of planned development. Loans from the City Economic Fund including 3.923% annual interest was included in the analysis in an effort to determine when the Airport will be operating in the "Black." Based upon this pro forma analysis, the airport will be self-sustaining as of Fiscal Year 2024/25.

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
											AIRPORT REVENUES
Operating Revenue											
Fuel Sales - Fuel Flowage Fee Pilot's Paradise	$0	$0	$0	$0	NA	$2,005	$1,935	$1,869	$1,804	$1,991	$2,021
Fuel Sales - 100LL Airport Self-Serve Only	$49,504	$71,366	$72,000	NA		$120,280	$116,129	$112,122	$108,253	$104,518	$106,121
Fuel Sales - Jet A	$0	$0	$0	NA	NA	$0	$0	$0	$0	$0	$0
Cost of Sales	($36,177)	($62,452)	($37,500)	$391	2.1%	$399	$408	$416	$425	$434	$443
Nontaxable rents	$391	$391	$303,331	$308,999	NA	$338,235	$443,025	$443,025	$443,025	$443,025	$443,025
Rents and royalties	$348,026	$313,585	$302,940	$321,517	2.1%	$328,269	$335,163	$342,201	$349,387	$356,724	$364,215
Other miscellaneous revenues[1]	$60,848	$60,547	$58,974	$60,123	2.1%	$61,386	$62,675	$63,991	$65,335	$66,707	$68,108
Sales Tax Commission	$251	$261	$250	$250	0.3%	$251	$252	$253	$254	$255	$256
Total Operating Revenue	**$422,592**	**$383,698**	**$699,995**	**$691,280**		**$850,824**	**$959,586**	**$963,877**	**$968,483**	**$973,653**	**$984,189**
Intergovernmental (FAA and FDOT Grants)											
Intergovernmental sources	$0	$0	$0	$643,333	NA	$150,000	$884,411	$2,284,800	$3,100,500	$326,110	$1,576,000
Airport -FDOT JPA Revenue	$0	$0	$0	$1,053,589	NA	$1,800,000	$1,366,754	$4,406,400	$9,000	$2,701,980	$0
Airport - Third Party Revenue	$0	$0	$0	$0	NA	$0	$0	$0	$0	$0	$0
Airport - Other Revenue Sources (Loans, etc.)	$0	$0	$0	$0	NA	$0	$0	$0	$0	$0	$0

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Total Intergovernmental and Other Revenue	**$0**	**$0**	**$0**	**$1,696,921**		**$1,950,000**	**$2,251,165**	**$6,691,200**	**$3,109,500**	**$3,028,090**	**$1,576,000**
Non-operating revenues											
Other non-operating revenue:	$0	$0	$0	$100	1.0%	$101	$102	$103	$104	$105	$106
Interest earnings	$149	($230)	$200	$0	1.0%	$0	$0	$0	$0	$0	$0
SBA Interest Earnings	$0	$0	$0	$0	1.0%	$0	$0	$0	$0	$0	$0
Sale of Fixed Assets	$50	$20,602	$0	$0	1.0%	$0	$0	$0	$0	$0	$0
Sale of Surplus Materials/Scrap	$0	$0	$0	$0	1.0%	$0	$0	$0	$0	$0	$0
Contributions and Donations	$0	$0	$178,500	$0	1.0%	$0	$0	$0	$0	$0	$0
Insurance Proceeds	$0	$0	$0	$0	2.3%	$0	$0	$0	$0	$0	$0
Reimbursements	$11,633	$11,169	$13,000	$0	1.0%	$0	$0	$0	$0	$0	$0
Transfer from Fund 130 DST	$0	$0	$12,000	$0	1.0%	$0	$0	$0	$0	$0	$0
Transfer from Fund 455	$0	$0	$0	$100		$101	$102	$103	$104	$105	$106
Total Non-Operating Revenues	*$11,832*	*$31,541*	*$203,700*	*$200*		*$202*	*$204*	*$206*	*$208*	*$210*	*$212*
TOTAL REVENUES	***$434,424***	***$415,239***	***$903,695***	***$2,388,401***		***$2,801,026***	***$3,210,956***	***$7,655,283***	***$4,078,191***	***$4,001,953***	***$2,560,401***
AIRPORT EXPENSES:											
Personnel Services											
Salaries	$53,528	$94,353	$95,305	$98,164	3.0%	$101,109	$104,142	$107,266	$150,484 *	$154,999	$159,649

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
OT	$462	$609	$500	$508	1.5%	$515	$523	$531	$539	$547	$555
FICA	$5,028	$3,778	$4,452	$4,545	2.1%	$4,641	$4,738	$4,837	$4,939	$5,043	$5,149
Clothing Allow	$120	$120	$120	$120	2.1%	$123	$126	$129	$132	$135	$138
Deferred Compensation	$6,293	$4,843	$5,238	$5,343	2.0%	$5,450	$5,559	$5,670	$5,783	$5,899	$6,017
Group Health Insurance Prem.	$6,868	$5,948	$6,479	$6,609	2.0%	$6,741	$6,876	$7,014	$7,154	$7,297	$7,443
Dependent Health Ins Prem.	$4,037	$3,823	$4,499	$4,593	2.1%	$4,690	$4,788	$4,889	$4,992	$5,097	$5,204
Health Reimbursement Account	$1,438	$894	$3,054	$3,118	2.1%	$3,184	$3,251	$3,319	$3,389	$3,460	$3,533
Employee Assistance Program	$30	$23	$24	$25	2.1%	$25	$26	$27	$28	$29	$30
Worker's Comp	$3,712	$2,701	$5,025	$3,000	2.1%	$3,063	$3,127	$3,193	$3,260	$3,328	$3,398
OPEB Accrued Expenses	($26)	$32	$0	$0	2.1%	$0	$0	$0	$0	$0	$0
Total Personnel Services	**$81,490**	**$117,124**	**$124,696**	**$126,025**		**$129,541**	**$133,156**	**$136,875**	**$180,700**	**$185,834**	**$191,116**
Operating Expenses											
Professional Svcs	$3,500	$0	$0	$1,000	2.0%	$1,020	$1,040	$1,061	$1,082	$1,104	$1,126
Audit Fees	$1,404	$1,264	$1,264	$1,264	1.0%	$1,277	$1,290	$1,303	$1,316	$1,329	$1,342
Admin Svcs provided by GF	$47,495	$49,180	$47,762	$48,100	2.0%	$49,062	$50,043	$51,044	$52,065	$53,106	$54,168
Maintenance Svcs by GF	$56,583	$0	$0	$18,900	0.0%	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900
Other Contractual Services	$2,740	$4,002	$2,650	$3,100	1.0%	$3,131	$3,162	$3,194	$3,226	$3,258	$3,291
Environmental Services	$0	$0	$0	$0	0.0%	$0	$0	$0	$0	$0	$0
Janitorial Services	$0	$0	$0	$0	0.0%	$0	$0	$0	$0	$0	$0

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Pest/Weed/Mowing Services	$862	$825	$900	$900	1.0%	$909	$918	$927	$936	$945	$954
Travel/Per Diem	$0	$1,749	$500	$500	1.5%	$508	$516	$524	$532	$540	$548
Phone	$3,436	$3,598	$3,750	$3,600	1.5%	$3,654	$3,709	$3,765	$3,821	$3,878	$3,936
Cell Phone	$387	$415	$240	$250	2.1%	$255	$260	$265	$271	$277	$283
Internet	$950	$536	$505	$700	2.1%	$715	$730	$745	$761	$777	$793
Postage	$118	$47	$250	$250	2.0%	$255	$260	$265	$270	$275	$281
Express Mail	$0	$11	$50	$50	2.0%	$51	$52	$53	$54	$55	$56
Electric	$23,640	$25,554	$25,200	$25,200	2.0%	$25,704	$26,218	$26,742	$27,277	$27,823	$28,379
Water/Sewer	$2,044	$2,855	$3,500	$3,500	2.0%	$3,570	$3,641	$3,714	$3,788	$3,864	$3,941
Insurance	$25,580	$26,624	$30,002	$30,000	2.0%	$30,600	$31,212	$31,836	$32,473	$33,122	$33,784
Claims	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
R&M Building	$6,593	$6,676	$18,082	$10,500	3.0%	$10,815	$11,139	$11,473	$11,817	$12,172	$12,537
R&M Vehicles	$1,498	$2,698	$3,500	$3,500	3.0%	$3,605	$3,713	$3,824	$3,939	$4,057	$4,179
R&M Office Equipment	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
R&M Operating Equipment	$9,971	$15,338	$8,000	$11,100	3.0%	$11,433	$11,776	$12,129	$12,493	$12,868	$13,254
R&M Fencing	$2,380	$634	$3,000	$2,000	3.0%	$2,060	$2,122	$2,186	$2,252	$2,320	$2,390
R&M Ground Maintenance	$6,839	$2,307	$476	$3,200	3.0%	$3,296	$3,395	$3,497	$3,602	$3,710	$3,821
Printing and Binding	$0	$139	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
Promotional Activities	$282	$108	$500	$500	3.0%	$515	$530	$546	$562	$579	$596
Advertising Expenditures	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
Legal Ads	$0	$294	$0	$100	3.0%	$103	$106	$109	$112	$115	$118
Litigation Expenses	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
Department Supplies	$1,695	$2,524	$1,200	$1,800	3.0%	$1,854	$1,910	$1,967	$2,026	$2,087	$2,150
Bank Charges	$1,504	$2,133	$1,500	$1,700	3.0%	$1,751	$1,804	$1,858	$1,914	$1,971	$2,030
Computer Supplies	$7	$69	$0	$100	3.0%	$103	$106	$109	$112	$115	$118
Small Tools and Equipment	$215	$1,675	$500	$500	3.0%	$515	$530	$546	$562	$579	$596

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Gas and Oil	$5,867	$7,303	$4,800	$4,800	3.0%	$4,944	$5,092	$5,245	$5,402	$5,564	$5,731
Uniforms and shoes	$221	$185	$290	$300	3.0%	$309	$318	$328	$338	$348	$358
Safety equipment	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
Dues and memberships	$430	$330	$500	$500	3.0%	$515	$530	$546	$562	$579	$596
Books and publications	$0	$0	$0	$0	3.0%	$0	$0	$0	$0	$0	$0
Training and Education	$30	$440	$1,500	$1,500	3.0%	$1,545	$1,591	$1,639	$1,688	$1,739	$1,791
Non-ad Valorem Tax	$13,426	$13,769	$13,769	$13,769	3.0%	$14,182	$14,607	$15,045	$15,496	$15,961	$16,440
TOTAL OPERATING EXPENSES* (# must be rounded)	**$219,697**	**$173,282**	**$174,190**	**$193,183**		**$197,156**	**$201,220**	**$205,385**	**$209,649**	**$214,017**	**$218,487**
Total Capital Outlay (Project Summary)	*$928*	$2,078	$195,809	$1,901,654	NA	$2,100,800	$2,529,216	$8,196,000	$5,210,000	$3,222,200	$1,970,000
										Non-Operating Expenses	
Aids to private organizations	$0	$0	$0	$0	0.0%	$0	$0	$0	$0	$0	$0
Interest-DST Fund Advance (debt interest)	$19,425	$19,401	$20,025	$19,600	0.0%	$19,600	$19,600	$19,600	$34,139	$46,749	$46,749
Intrafund transfer to AP capital	$0	$0	$0	$0	0.0%	$0	$0	$0	$0	$0	$0
Intrafund transfer to General Fund (debt)	$0	$0	$50,000	$50,000	0.0%	$50,000	$50,000	$50,000	$87,089	$119,258	$119,258
Contingency	$93,608	$0	$0	$0	0.0%	$0	$0	$0	$0	$0	$0
Total Non-operating expenses	$113,033	$19,401	$70,025	$69,600		$69,600	$69,600	$69,600	$121,227	$166,007	$166,007
Total Airport Expenses	**$415,148**	**$311,885**	**$564,720**	**$2,290,462**		**$2,497,097**	**$2,933,192**	**$8,607,860**	**$5,721,576**	**$3,788,058**	**$2,545,610**

TABLE 9-9
HISTORICAL AND SHORT TERM PRO FORMA CASH FLOW ANALYSIS
(2017 DOLLARS)

Fiscal Years	2013/14	Actual 2014/15	Amended 2015/16	Adopted 2016/17	Growth Rate	Forecast 2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Change in Resources (Revenues - Expenses)	$19,276	$103,354	$338,975	$97,940		$303,929	$277,764	($952,577)	($1,643,385)	$213,895	$14,792
Surplus Airport Funds previous year	$0	$0	$0	$0		$0	$303,929	$581,692	$0	$0	$213,895
Use of unrestricted reserves (Change in resources+ Surplus/Deficit)	($19,276)	($103,354)	($338,975)	($97,940)		$303,929	$581,692	($370,885)	($1,643,385)	$213,895	$228,687
Total Economic Development (borrow from General Fund)	*$0*	$0	$0	$0		$0	$0	$370,885	$1,643,385	$0	$0
Performance Estimates	**$0**	**$0**	**$0**	**$0**		**$303,929**	**$581,692**	**$0**	**$0**	**$213,895**	**$228,687**
10 year loan									37,088.51	37,088.51	37,088.51
20 Year loan										82,169.27	82,169.27
Interest Rates									0.392%	0.392%	0.392%

Notes:*Additional Staff Added
If the City relieves the airport of its existing debt payment of $50,000 per year, the airport will likely achieve self-sufficiency prior to estimated 2025 date.
Sources: Historical accounting data, City of Sebastian Florida and TKDA 2017

Table 9-10
Mid-Term Pro Forma Cash Flow Analysis
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
AIRPORT REVENUES							
Operating Revenue							
Fuel Sales - Fuel Flowage Fee Pilot's Paradise	NA	$2,052	$2,084	$2,116	$2,417	$2,453	$2,489
Fuel Sales - 100LL Airport Self-Serve Only		$107,749	$109,403	$111,081	$112,785	$114,459	$116,157
Fuel Sales - Jet A	NA	$0	$0	$0	$0	$0	$0
Cost of Sales	2.1%	$452	$462	$471	$481	$491	$502
Nontaxable rents	NA	$559,626	$559,626	$559,626	$559,626	$559,626	$673,796
Rents and royalties	2.1%	$371,864	$379,673	$387,646	$395,787	$404,098	$412,584
Other miscellaneous revenues[1]	2.1%	$69,538	$70,998	$72,489	$74,011	$75,566	$77,152
Sales Tax Commission	0.3%	$257	$258	$259	$260	$261	$262
Total Operating Revenue		**$1,111,538**	**$1,122,503**	**$1,133,688**	**$1,145,367**	**$1,156,953**	**$1,282,943**
Intergovernmental (FAA and FDOT Grants)							
Intergovernmental sources	NA	$3,552,000	$3,760,000	$40,000	$100,000	$320,000	$1,600,000
Airport -FDOT JPA Revenue	NA	$0	$0	$61,560	$1,800,000	$0	$0
Airport - Third Party Revenue	NA	$1,200,000	$1,200,000	$0	$0	$0	$1,200,000

Table 9-10 Mid-Term Pro Forma Cash Flow Analysis (2017 Dollars)							
Fiscal Years	Growth Rates	Forecast					
		2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Airport - Other Revenue Sources (Loans, etc.)	NA	$0	$0	$0	$0	$0	$0
Total Intergovernmental and Other Revenue		**$4,752,000**	**$4,960,000**	**$101,560**	**$1,900,000**	**$320,000**	**$2,800,000**
Non-operating revenues							
Other non-operating revenue:	1.0%	$107	$108	$109	$110	$111	$112
Interest earnings	1.0%	$0	$0	$0	$0	$0	$0
SBA Interest Earnings	1.0%	$0	$0	$0	$0	$0	$0
Sale of Fixed Assets	1.0%	$0	$0	$0	$0	$0	$0
Sale of Surplus Materials/Scrap	1.0%	$0	$0	$0	$0	$0	$0
Contributions and Donations	1.0%	$0	$0	$0	$0	$0	$0
Insurance Proceeds	2.3%	$0	$0	$0	$0	$0	$0
Reimbursements	1.0%	$0	$0	$0	$0	$0	$0
Transfer from Fund 130 DST	1.0%	$0	$0	$0	$0	$0	$0
Transfer from Fund 455		$107	$108	$109	$110	$111	$112
Total Non-Operating Revenues		***$214***	***$216***	***$218***	***$220***	***$222***	***$224***
TOTAL REVENUES		***$5,863,752***	***$6,082,719***	***$1,235,466***	***$3,045,587***	***$1,477,175***	***$4,083,167***

Table 9-10 Mid-Term Pro Forma Cash Flow Analysis (2017 Dollars)							
Fiscal Years	Growth Rates	Forecast					
		2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
AIRPORT EXPENSES							
Personnel Services							
Salaries	3.0%	$164,438	$169,371	$214,452	$220,886	$227,513	$234,338
OT	1.5%	$563	$571	$580	$589	$598	$607
FICA	2.1%	$5,257	$5,367	$5,480	$5,595	$5,712	$5,832
Clothing Allow	2.1%	$141	$144	$147	$150	$153	$156
Deferred Compensation	2.0%	$6,137	$6,260	$6,385	$6,513	$6,643	$6,776
Group Health Insurance Prem.	2.0%	$7,592	$7,744	$7,899	$8,057	$8,218	$8,382
Dependent Health Ins Prem.	2.1%	$5,313	$5,425	$5,539	$5,655	$5,774	$5,895
Health Reimbursement Account	2.1%	$3,607	$3,683	$3,760	$3,839	$3,920	$4,002
Employee Assistance Program	2.1%	$31	$32	$33	$34	$35	$36
Worker's Comp	2.1%	$3,469	$3,542	$3,616	$3,692	$3,770	$3,849
OPEB Accrued Expenses	2.1%	$0	$0	$0	$0	$0	$0
Total Personnel Services		*$196,548*	*$202,139*	*$247,891*	*$255,010*	*$262,336*	*$269,873*
Operating Expenses							
Professional Svcs	2.0%	$1,149	$1,172	$1,195	$1,219	$1,243	$1,268
Audit Fees	1.0%	$1,355	$1,369	$1,383	$1,397	$1,411	$1,425

Table 9-10 Mid-Term Pro Forma Cash Flow Analysis (2017 Dollars)							
Fiscal Years	Growth Rates	Forecast					
		2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Admin Svcs provided by GF	2.0%	$55,251	$56,356	$57,483	$58,633	$59,806	$61,002
Maintenance Svcs by GF	0.0%	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900
Other Contractual Services	1.0%	$3,324	$3,357	$3,391	$3,425	$3,459	$3,494
Environmental Services	0.0%	$0	$0	$0	$0	$0	$0
Janitorial Services	0.0%	$0	$0	$0	$0	$0	$0
Pest/Weed/Mowing Services	1.0%	$964	$974	$984	$994	$1,004	$1,014
Travel/Per Diem	1.5%	$556	$564	$572	$581	$590	$599
Phone	1.5%	$3,995	$4,055	$4,116	$4,178	$4,241	$4,305
Cell Phone	2.1%	$289	$295	$301	$307	$313	$320
Internet	2.1%	$810	$827	$844	$862	$880	$898
Postage	2.0%	$287	$293	$299	$305	$311	$317
Express Mail	2.0%	$57	$58	$59	$60	$61	$62
Electric	2.0%	$28,947	$29,526	$30,117	$30,719	$31,333	$31,960
Water/Sewer	2.0%	$4,020	$4,100	$4,182	$4,266	$4,351	$4,438
Insurance	2.0%	$34,460	$35,149	$35,852	$36,569	$37,300	$38,046
Claims	3.0%	$0	$0	$0	$0	$0	$0
R&M Building	3.0%	$12,913	$13,300	$13,699	$14,110	$14,533	$14,969
R&M Vehicles	3.0%	$4,304	$4,433	$4,566	$4,703	$4,844	$4,989
R&M Office Equipment	3.0%	$0	$0	$0	$0	$0	$0
R&M Operating Equipment	3.0%	$13,652	$14,062	$14,484	$14,919	$15,367	$15,828

Table 9-10
Mid-Term Pro Forma Cash Flow Analysis
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
R&M Fencing	3.0%	$2,462	$2,536	$2,612	$2,690	$2,771	$2,854
R&M Ground Maintenance	3.0%	$3,936	$4,054	$4,176	$4,301	$4,430	$4,563
Printing and Binding	3.0%	$0	$0	$0	$0	$0	$0
Promotional Activities	3.0%	$614	$632	$651	$671	$691	$712
Advertising Expenditures	3.0%	$0	$0	$0	$0	$0	$0
Legal Ads	3.0%	$122	$126	$130	$134	$138	$142
Litigation Expenses	3.0%	$0	$0	$0	$0	$0	$0
Department Supplies	3.0%	$2,215	$2,281	$2,349	$2,419	$2,492	$2,567
Bank Charges	3.0%	$2,091	$2,154	$2,219	$2,286	$2,355	$2,426
Computer Supplies	3.0%	$122	$126	$130	$134	$138	$142
Small Tools and Equipment	3.0%	$614	$632	$651	$671	$691	$712
Gas and Oil	3.0%	$5,903	$6,080	$6,262	$6,450	$6,644	$6,843
Uniforms and shoes	3.0%	$369	$380	$391	$403	$415	$427
Safety equipment	3.0%	$0	$0	$0	$0	$0	$0
Dues and memberships	3.0%	$614	$632	$651	$671	$691	$712
Books and publications	3.0%	$0	$0	$0	$0	$0	$0
Training and Education	3.0%	$1,845	$1,900	$1,957	$2,016	$2,076	$2,138
Non-ad Valorem Tax	3.0%	$16,933	$17,441	$17,964	$18,503	$19,058	$19,630
Total Operating Expenses* (# must be rounded)		**$223,073**	**$227,764**	**$232,570**	**$237,496**	**$242,537**	**$247,702**

Table 9-10 Mid-Term Pro Forma Cash Flow Analysis (2017 Dollars)							
Fiscal Years	Growth Rates	Forecast 2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Total Capital Outlay (Project Summary)	NA	$5,640,000	$5,900,000	$148,400	$2,000,000	$400,000	$3,200,000
Non-Operating Expenses							
Aids to private organizations	0.0%	$0	$0	$0	$0	$0	$0
Interest-DST Fund Advance (debt interest)	0.0%	$46,749	$51,970	$68,894	$68,894	$68,894	$68,894
Intrafund transfer to AP capital	0.0%	$0	$0	$0	$0	$0	$0
Intrafund transfer to General Fund (debt)	0.0%	$119,258	$132,577	$175,750	$175,750	$175,750	$175,750
Contingency	0.0%	$0	$0	$0	$0	$0	$0
Total Non-operating expenses		$166,007	$184,547	$244,644	$244,644	$244,644	$244,644
Total Airport Expenses		**$6,225,628**	**$6,514,450**	**$873,505**	**$2,737,150**	**$1,149,517**	**$3,962,219**
Change in Resources (Revenues - Expenses)		($361,876)	($431,731)	$361,961	$308,437	$327,658	$120,948
Surplus Airport Funds previous year		$228,687	$0	$0	$361,961	$670,399	$998,057
Use of unrestricted reserves (Change in		($133,189)	($431,731)	$361,961	$670,399	$998,057	$1,119,005

Table 9-10
Mid-Term Pro Forma Cash Flow Analysis
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
resources+ Surplus/Deficit)							
Total Economic Development (borrow from General Fund)		$133,189	$431,731	$0	$0	$0	$0
Performance Estimates		**$0**	**$0**	**$361,961**	**$670,399**	**$998,057**	**$1,119,005**
10 year loan (2020-2030)		37,088.51	37,088.51	37,088.51	37,088.51	37,088.51	37,088.51
20 Year loan (2021-2041)		82,169.27	82,169.27	82,169.27	82,169.27	82,169.27	82,169.27
10 year loan (2024-2034)		$13,318.86	$13,318.86	$13,318.86	$13,318.86	$13,318.86	$13,318.86
10 Year loan (2025-2035)			$43,173.08	$43,173.08	$43,173.08	$43,173.08	$43,173.08
Interest Rates		0.392%	0.392%	0.392%	0.392%	0.392%	0.392%

Notes: New employee added in FY 2025/2026
Sources: City of Sebastian Historical Records, US CPI Index, Local Growth Rates and TKDA 2017

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
AIRPORT REVENUES:										
Operating Revenue										
Fuel Sales - Fuel Flowage Fee Pilot's Paradise	NA	$2,526	$2,564	$2,891	$2,932	$2,974	$3,017	$3,060	$3,104	$3,149
Fuel Sales - 100LL Airport Self-Serve Only		$117,881	$119,630	$121,406	$123,150	$124,919	$126,714	$128,534	$130,381	$132,259
Fuel Sales - Jet A	NA	$0	$0	$0	$82,189	$86,285	$90,585	$95,099	$99,839	$104,814
Cost of Sales	2.1%	$512	$523	$534	$545	$557	$568	$580	$593	$605
Nontaxable rents	NA	$673,796	$673,796	$673,796	$673,796	$818,512	$818,512	$818,512	$818,512	$986,992
Rents and royalties	2.1%	$421,249	$430,095	$439,127	$448,349	$457,764	$467,377	$477,192	$487,213	$497,444
Other miscellaneous revenues[1]	2.1%	$78,773	$80,427	$82,116	$83,840	$85,601	$87,399	$89,234	$91,108	$93,021
Sales Tax Commission	0.3%	$263	$264	$265	$266	$267	$268	$269	$270	$271
Total Operating Revenue		**$1,295,000**	**$1,307,299**	**$1,320,134**	**$1,415,067**	**$1,576,878**	**$1,594,439**	**$1,612,481**	**$1,631,019**	**$1,818,556**
Intergovernmental (FAA and FDOT Grants)										
Intergovernmental sources	NA	$317,500	$723,600	$549,500	$214,650	$468,800	$111,656	$4,688,000	$124,000	$0.00
Airport -FDOT JPA Revenue	NA	$1,395,000	$0	$315,000	$292,500	$586,000	$2,009,810	$0	$1,080,000	$0.00
Airport - Third Party Revenue	NA	$1,200,000	$250,000	$450,000	$0	$0	$0	$0	$1,200,000	$0.00
Airport - Other Revenue Sources (Loans, etc.)	NA	$0	$0	$0	$0	$0	$0	$0	$0	$0.00
Total Intergovernmental and Other Revenue		**$2,912,500**	**$973,600**	**$1,314,500**	**$507,150**	**$1,054,800**	**$2,121,466**	**$4,688,000**	**$2,404,000**	**$0.00**
Non-operating revenues										
Other non-operating revenue:	1.0%	$113	$114	$115	$116	$117	$118	$119	$120	$121

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
Interest earnings	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
SBA Interest Earnings	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sale of Fixed Assets	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sale of Surplus Materials/Scrap	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contributions and Donations	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Insurance Proceeds	2.3%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Reimbursements	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfer from Fund 130 DST	1.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfer from Fund 455		$113	$114	$115	$116	$117	$118	$119	$120	$121
Total Non-Operating Revenues		*$226*	*$228*	*$230*	*$232*	*$234*	*$236*	*$238*	*$240*	*$242*
TOTAL REVENUES		***$4,207,726***	***$2,281,127***	***$2,634,864***	***$1,922,449***	***$2,631,912***	***$3,716,142***	***$6,300,719***	***$4,035,259***	***$1,818,798***
AIRPORT EXPENSES:										
Personnel Services										
Salaries	3.0%	$241,368	$248,609	$256,067	$263,749	$271,661	$279,811	$328,205	$338,051	$348,193
OT	1.5%	$616	$625	$634	$644	$654	$664	$674	$684	$694
FICA	2.1%	$5,954	$6,079	$6,207	$6,337	$6,470	$6,606	$6,745	$6,887	$7,032
Clothing Allow	2.1%	$159	$162	$165	$168	$172	$176	$180	$184	$188
Deferred Compensation	2.0%	$6,912	$7,050	$7,191	$7,335	$7,482	$7,632	$7,785	$7,941	$8,100
Group Health Insurance Prem.	2.0%	$8,550	$8,721	$8,895	$9,073	$9,254	$9,439	$9,628	$9,821	$10,017
Dependent Health Ins Prem.	2.1%	$6,019	$6,145	$6,274	$6,406	$6,541	$6,678	$6,818	$6,961	$7,107
Health Reimbursement Account	2.1%	$4,086	$4,172	$4,260	$4,349	$4,440	$4,533	$4,628	$4,725	$4,824

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
Employee Assistance Program	2.1%	$37	$38	$39	$40	$41	$42	$43	$44	$45
Worker's Comp	2.1%	$3,930	$4,013	$4,097	$4,183	$4,271	$4,361	$4,453	$4,547	$4,642
OPEB Accrued Expenses	2.1%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Personnel Services		$277,631	$285,614	$293,829	$302,284	$310,986	$319,942	$369,159	$379,845	$390,842
Operating Expenses										
Professional Svcs	2.0%	$1,293	$1,319	$1,345	$1,372	$1,399	$1,427	$1,456	$1,485	$1,515
Audit Fees	1.0%	$1,439	$1,453	$1,468	$1,483	$1,498	$1,513	$1,528	$1,543	$1,558
Admin Svcs provided by GF	2.0%	$62,222	$63,466	$64,735	$66,030	$67,351	$68,698	$70,072	$71,473	$72,902
Maintenance Svcs by GF	0.0%	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900	$18,900
Other Contractual Services	1.0%	$3,529	$3,564	$3,600	$3,636	$3,672	$3,709	$3,746	$3,783	$3,821
Environmental Services	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Janitorial Services	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pest/Weed/Mowing Services	1.0%	$1,024	$1,034	$1,044	$1,054	$1,065	$1,076	$1,087	$1,098	$1,109
Travel/Per Diem	1.5%	$608	$617	$626	$635	$645	$655	$665	$675	$685
Phone	1.5%	$4,370	$4,436	$4,503	$4,571	$4,640	$4,710	$4,781	$4,853	$4,926
Cell Phone	2.1%	$327	$334	$341	$348	$355	$362	$370	$378	$386
Internet	2.1%	$917	$936	$956	$976	$996	$1,017	$1,038	$1,060	$1,082
Postage	2.0%	$323	$329	$336	$343	$350	$357	$364	$371	$378
Express Mail	2.0%	$63	$64	$65	$66	$67	$68	$69	$70	$71
Electric	2.0%	$32,599	$33,251	$33,916	$34,594	$35,286	$35,992	$36,712	$37,446	$38,195
Water/Sewer	2.0%	$4,527	$4,618	$4,710	$4,804	$4,900	$4,998	$5,098	$5,200	$5,304
Insurance	2.0%	$38,807	$39,583	$40,375	$41,183	$42,007	$42,847	$43,704	$44,578	$45,470
Claims	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
R&M Building	3.0%	$15,418	$15,881	$16,357	$16,848	$17,353	$17,874	$18,410	$18,962	$19,531
R&M Vehicles	3.0%	$5,139	$5,293	$5,452	$5,616	$5,784	$5,958	$6,137	$6,321	$6,511
R&M Office Equipment	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
R&M Operating Equipment	3.0%	$16,303	$16,792	$17,296	$17,815	$18,349	$18,899	$19,466	$20,050	$20,652
R&M Fencing	3.0%	$2,940	$3,028	$3,119	$3,213	$3,309	$3,408	$3,510	$3,615	$3,723
R&M Ground Maintenance	3.0%	$4,700	$4,841	$4,986	$5,136	$5,290	$5,449	$5,612	$5,780	$5,953
Printing and Binding	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Promotional Activities	3.0%	$733	$755	$778	$801	$825	$850	$876	$902	$929
Advertising Expenditures	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Legal Ads	3.0%	$146	$150	$155	$160	$165	$170	$175	$180	$185
Litigation Expenses	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Department Supplies	3.0%	$2,644	$2,723	$2,805	$2,889	$2,976	$3,065	$3,157	$3,252	$3,350
Bank Charges	3.0%	$2,499	$2,574	$2,651	$2,731	$2,813	$2,897	$2,984	$3,074	$3,166
Computer Supplies	3.0%	$146	$150	$155	$160	$165	$170	$175	$180	$185
Small Tools and Equipment	3.0%	$733	$755	$778	$801	$825	$850	$876	$902	$929
Gas and Oil	3.0%	$7,048	$7,259	$7,477	$7,701	$7,932	$8,170	$8,415	$8,667	$8,927
Uniforms and shoes	3.0%	$440	$453	$467	$481	$495	$510	$525	$541	$557
Safety equipment	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Dues and memberships	3.0%	$733	$755	$778	$801	$825	$850	$876	$902	$929
Books and publications	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Training and Education	3.0%	$2,202	$2,268	$2,336	$2,406	$2,478	$2,552	$2,629	$2,708	$2,789
Non-ad Valorem Tax	3.0%	$20,219	$20,826	$21,451	$22,095	$22,758	$23,441	$24,144	$24,868	$25,614
TOTAL OPERATING EXPENSES* (# must be rounded)		**$252,991**	**$258,407**	**$263,961**	**$269,649**	**$275,473**	**$281,442**	**$287,557**	**$293,817**	**$300,232**
Total Capital Outlay (Project Summary)	NA	$3,050,000	$1,092,000	$1,375,000	$573,000	$1,172,000	$2,233,122	$5,860,000	$2,480,000	$0
Non-Operating Expenses										
Aids to private organizations	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	Forecast 2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38
Interest-DST Fund Advance	0.0%	$68,894	$49,134	$49,134	$49,134	$49,134	$49,134	$49,134	$49,134	$49,134
Intrafund transfer to AP capital	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
Intrafund transfer to General Fund	0.0%	$175,750	$125,342	$125,342	$125,342	$125,342	$125,342	$125,342	$125,342	$125,342
Contingency	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL Non-operating expenses		$244,644	$174,477	$174,476	$174,476	$174,476	$174,476	$174,476	$174,476	$174,476
Total Airport Expenses		**$3,825,266**	**$1,810,498**	**$2,107,266**	**$1,319,409**	**$1,932,935**	**$3,008,982**	**$6,691,192**	**$3,328,138**	**$865,550**
Change in Resources (Revenues - Expenses)		$382,460	$470,629	$527,598	$603,040	$698,977	$707,159	($390,473)	$707,121	$953,248
Surplus Airport Funds previous year		$1,119,005	$1,501,465	$1,972,094	$3,102,732	$3,705,772	$4,404,750	$5,111,909	$4,721,436	$5,428,557
Use of unrestricted reserves (Change in resources+ Surplus/Deficit)		$1,501,465	$1,972,094	$2,499,693	$3,705,772	$4,404,750	$5,111,909	$4,721,436	$5,428,557	$6,381,805
Total Economic Development (borrow from General Fund)		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Performance Estimates		**$1,501,465**	**$1,972,094**	**$2,499,693**	**$3,705,772**	**$4,404,750**	**$5,111,909**	**$4,721,436**	**$5,428,557**	**$6,381,805**
10 year loan (2020-2030)		37,088.51	37,088.51							
20 Year loan (2021-2041)		82,169.27	82,169.27	82,169.27	82,169.27	82,169.27	82,169.27	82,169.27	82,169.27	82,169.27
10 year loan (2024-2034)		$13,318.86	$13,318.86	$13,318.86	$13,318.86	$13,318.86	$13,318.86			
10 Year loan (2025-2035)			$43,173.08	$43,173.08	$43,173.08	$43,173.08	$43,173.08	$43,173.08		
Interest Rates		0.392%	0.392%	0.392%	0.392%	0.392%	0.392%	0.392%	0.392%	0.392%

TABLE 9-11
LONG-TERM PRO FORMA CASH FLOW ANALYSIS
(2017 Dollars)

Fiscal Years	Growth Rates	2029/30	2030/31	2031/32	2032/33	Forecast 2033/34	2034/35	2035/36	2036/37	2037/38

Notes: New Employee added in 2030; Additional FBO added to airport which provides Jet A fuel
Sources: City of Sebastian Historical Records, US CPI Index 2017, Local and National Growth Rates, and TKDA 2017

Revenue Enhancement Opportunities

Changes in the economic climate, competition for federal and state funding, aging infrastructure and airline consolidation are all driving Airport's to evaluate additional revenue sources in an effort to be financially self-sustaining. Since aviation related revenue streams are becoming less reliable, airports around the country are evaluating how to utilize airport property and facilities not necessarily needed to support aviation operations to provide additional sources of income. As noted in the CIP, portions of the available airport property (approximately 108 acres) may be used to support relocation of the City's Public Works Complex, Aviation and Non-Aviation Commercial Development along the Airport Road East, as well as future development within the north portion of the airport. Using 2017 property lease rates, the following revenues may be obtained from proposed development as illustrated in **Table 9-12**. These revenues were also included in **Tables 9-9** through **9-11** under Rents and Royalties.

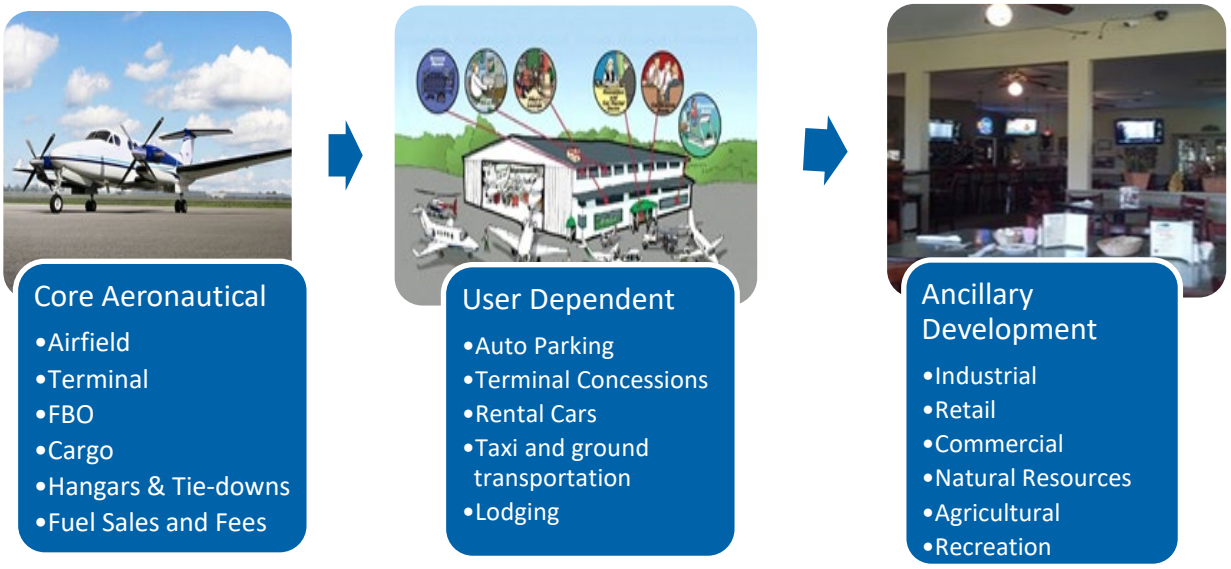
Table 9-12
Available Land Lease Revenues
(2017 Dollars)
2.10% Annual CPI Growth Rate

Fiscal Year	Available Acreage	Estimated Revenues	Estimated Revenue per Acre
2016/17	108	$308,998.80	$3,000.00
2017/18	108	$338,235.00	$3,063.00
2018/19	93	$443,024.85	$3,127.32
2019/20	93	$443,024.85	$3,193.00
2020/21	93	$443,024.85	$3,260.05
2021/22	93	$443,024.85	$3,328.51
2022/23	93	$443,024.85	$3,398.41
2023/24	78	$559,625.54	$3,469.78
2024/25	78	$559,625.54	$3,542.64
2025/26	78	$559,625.54	$3,617.04
2026/27	78	$559,625.54	$3,692.99
2027/28	78	$559,625.54	$3,770.55
2028/29	70	$673,796.06	$3,849.73
2029/30	70	$673,796.06	$3,930.57
2030/31	70	$673,796.06	$4,013.12
2021/32	70	$673,796.06	$4,097.39
2032/33	60	$673,796.06	$4,183.44
2033/34	60	$818,511.72	$4,271.29
2034/35	60	$818,511.72	$4,360.99
2035/36	60	$818,511.72	$4,452.57
2036/37	60	$818,511.72	$4,546.07
2037/38	50	$986,992.33	$4,641.54

Sources: City of Sebastian Historical Records, Current property estimates, US CPI index and TKDA 2017

Further, according to ACRP Document 19, *Airport Revenue Diversification*, the original regulatory framework for "airport operations, planning and capital projects was instituted to support the airport's primary mission…to support airlines and other aeronautical users."[1] However, changes in the field including access to capital to support aeronautical demand continue to require airports to evolve to remain relevant. Airport's, therefore, are looking at airport city concepts similar to those overseas in which the airport supports a wide array of businesses in order to support growth and maintain the safety and integrity of the airport for continued aviation use. Development options as shown in **Figure 9-1** may include:

FIGURE 9-1
AIRPORT REVENUE DIVERSIFICATION



Source: KRAMER Aerotek Inc. (2009), ACRP 19: Airport Revenue Diversification, Transportation Research Board, 2010 and TKDA 2017

[1] Kramer S. Lois, KRAMER Aerotek Inc., ACRP 19: Airport Revenue Diversification, Transportation Research Board, Washington DC 2010, pp. 2

However, "Federal definitions of aeronautical and non-aeronautical activity and financial reporting requirements on Forms 5100-126 and -127 can make it a challenge to discern the types and extent of non-aeronautical activity at an airport that is not passenger-dependent."[2]

Summary

Financing the recommended CIP is generally a function of availability of federal, state, local and third-party funding sources at the time of specific project implementation. As previously mentioned, due to the conceptual nature of a master plan, implementation of most of these capital projects should occur only after demand warrants and costs are further refined. Therefore, the project capital costs developed for the Airport must be viewed as preliminary, reflecting a master plan level of detail subject to refinement in subsequent implementation steps. Based on the information and assumptions used, the financial analysis indicates that additional funding is needed to implement planned development. As a result, the City should seek to maximize Federal, State, and other funding sources including considering various revenue enhancement options as well as looking at increasing rental rates to support future growth.

[2] Ibid



APPENDIX A – GLOSSARY OF AVIATION ACRONYMS

Sebastian Municipal Airport Master Plan Update

AAC – Aircraft Approach Category

ADG – Airplane Design Group

ADO – Airports District Office

AGIS – Airports Geographic Information Systems

AGL – Above Ground Level

AIM – Aeronautical Information Manual

ALP – Airport Layout Plan

AOA – Airport Operating Area

APRC – Approach Reference Code

ARC – Airport Reference Code

ARP – Airport Reference Point

ATCT – Air Traffic Control Tower

AWOS – Automated Weather Observing System

BMP – Best Management Practice

CEQ – Council of Environmental Quality

CTAF – Common Traffic Advisory Frequency

DPRC – Departure Reference Code

EA – Environmental Assessment

EIS – Environmental Impact Statement

EO – Environmental Overview

FAA – Federal Aviation Administration

FBO – Fixed Base Operator

GHG – Greenhouse Gas

GIS – Geographic Information Systems

GPS – Global Positioning System

HHW – Household Hazardous Waste

HIRL – High Intensity Runway Light

HITL – High Intensity Taxiway Light

IFR – Instrument Flight Rules

ILS – Instrument Landing System

JPA – Joint Participation Agreements

LL – Low Lead

LNAV – Lateral Navigation

LPV – Localizer Precision with Vertical Guidance

LIRL – Low Intensity Runway Edge Lights

MIRL – Medium Intensity Runway Light

MITL – Medium Intensity Taxiway Light

MMSW – Mixed Municipal Solid Waste

MPU – Master Plan Update

MSL – Mean Sea Level

MSWLF – Municipal Solid Waste Landfills

NCDC – National Climatic Data Center

NDB – Non-directional Beacon

NEPA – National Environmental Protection Act/Agency

NM – Nautical Miles

NPIAS – National Plan of Integrated Airport Systems

NRCS – National Resources Conservation Service

NR**HP** – National Register of Historic Places

PAPI – Precision Approach Path Indicator

POTW – Publicly Owned Treatment Works

RDC – Runway Design Code

RNAV – Area Navigation

ROFA – Runway Object Free Area

ROFZ – Runway Obstacle Free Zone

RPZ – Runway Protection Zone

RSA – Runway Safety Area

RVR – Runway Visual Range

SOP – Standard Operating Procedure

SWPPP – Stormwater Pollution Prevention Plan

TAC – Technical Advisory Committee

TDG – Taxiway Design Group

TMDL – Total Maximum Daily Load

USDA – United States Department of Agriculture

USDI – United States Department of the Interior

USEPA – United States Environmental Protection Agency

USFWS – United States Fish and Wildlife Service

VASI – Visual Approach Slope Indicator

VFR – Visual Flight Rules

VNAV – Vertical Navigation

VOR – Very High Frequency Omnidirectional Radar and Range

This Page was Intentionally Left Blank



APPENDIX B – STAKEHOLDER INVOLVEMENT

This Page was Intentionally Left Blank

SEBASTIAN MUNICIPAL AIRPORT



Sebastian Municipal Airport Master Plan Update

Technical Advisory Meeting

TKDA

March 17, 2017

TKDA

CITY OF SEBASTIAN

HOME OF PELICAN ISLAND

Airport Objectives and Goals

- Airport Objectives:
  - ★ Financially self-sustaining
  - ★ In compliance with all regulations
  - ★ A "good neighbor" in the community
  - ★ A state-of-the-art facility serving GA users and the air transportation needs of the community
  - ★ Other Objectives?
- Airport Goals?
  - ✓ Financially self-sustaining
  - ✓ Attract New Business to Area
  - ✓ On-Airport Development - Facilities
  - ✓ Other Goals?

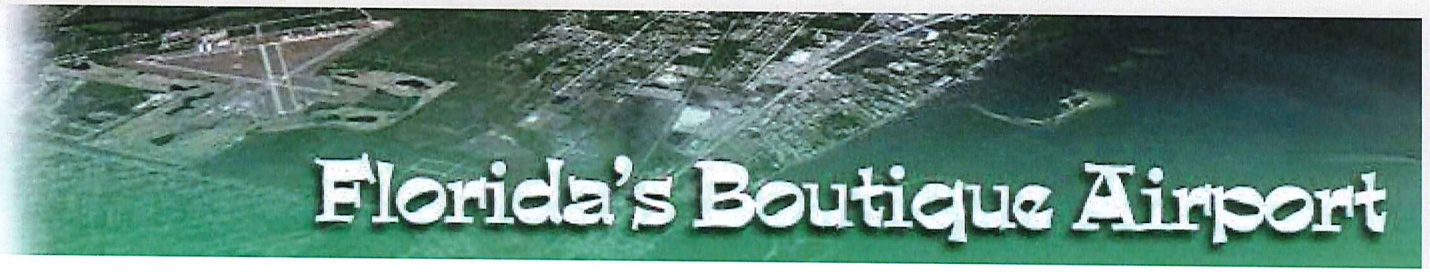
SEBASTIAN MUNICIPAL AIRPORT



Meeting Objectives

- Discuss Master Planning process
- Outline expectations and participation of aviation community
- Present preliminary goals, objectives, forecasts and facility needs
- **Identify Airport Development Alternative Options**
- Provide Tentative Project and Meeting Schedule

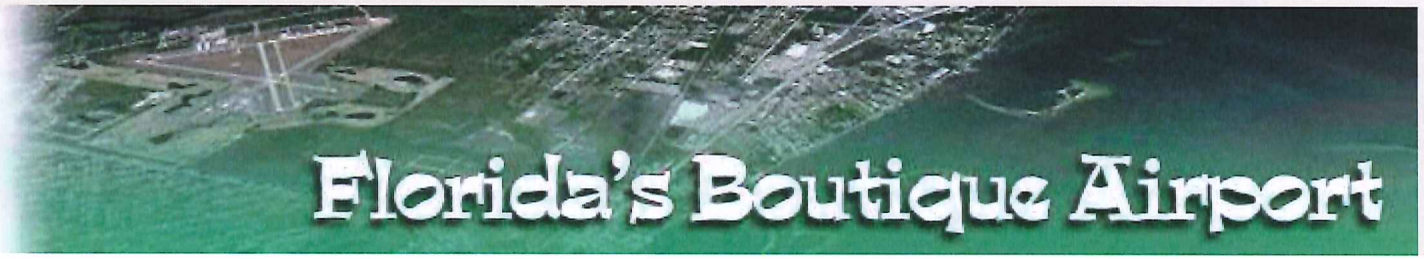
SEBASTIAN MUNICIPAL AIRPORT



Master Plan Overview

- **What is a Master Plan**
  - Plan Objectives
  - Ultimate Goals
- **New Regulatory Requirements**
  - Sustainability
  - Wildlife Mitigation
  - Waste Management
  - Financial Self-Sufficiency
  - Airport Property Inventory
  - Runway Protection Zone Issues
  - Zoning and Impacts to Operations
  - Compatible Land Use

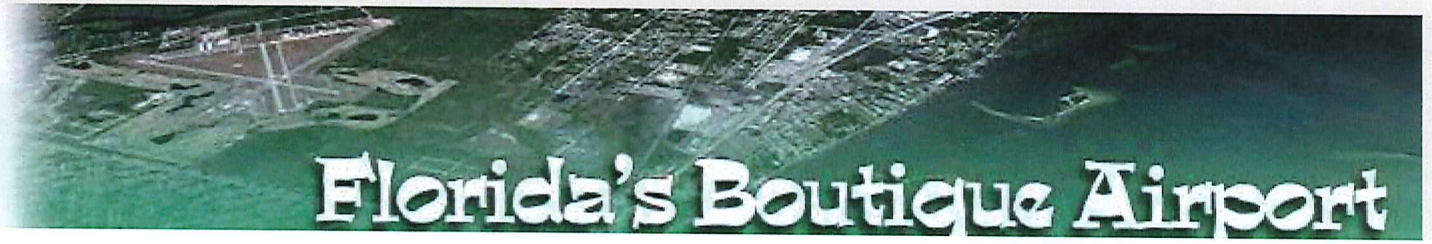
SEBASTIAN MUNICIPAL AIRPORT



Master Plan Update Process

Airport Goals and Existing Conditions	*Identify Airport and Community Goals, Grant Assurance Requirements and Ultimate Vision* *Compile existing airport data and conditions*
Aviation Forecasts of Demand	*Develop reasonable assessment of future aircraft operations and Identify Design Aircraft*
Facility Requirements	*Current facilities vs. forecast demand.* *Identify necessary improvements;*
Alternative Development Options	*Develop potential airport alternative development scenarios considering potential sustainable options and alternative revenue development*

SEBASTIAN MUNICIPAL AIRPORT



Master Plan Update Process

Alternative Evaluation and Recommended Development	*Evaluate development options based upon client, regulatory agency and public input. Identify recommended development and preliminary opportunities and costs*
Wildlife, Sustainability and Waste Management Plans	*Includes identification and mitigation recommendations related to wildlife attractants, operational, financial and developmental options to support airport growth as well as evaluate solid waste reuse related to general and construction wastes*
Airport Layout Plan	*Recommended Requirements, Survey Data, Land Use, Encumbered Property, and Boundary Survey are incorporated into Airport Plans Set*
Implementation Plan	*Projects are identified, phased, and funding sources will be identified. Financially Feasible Development Program/Capital Improvement Program will be prepared.*



Public Involvement

- Technical Advisory Committee Meetings
- X26 Tenant Meetings
- Public Information Workshop
- City Commission Briefings
- Project Coordination Meetings (Client and Regulatory Agencies)
- City Website Project Updates

SEBASTIAN MUNICIPAL AIRPORT



Airport Sustainability



"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

- World Commission on Environment and Development (Brundtland Commission), 1983

CITY OF SEBASTIAN
HOME OF PELICAN ISLAND

Wildlife Hazard Assessment

SEBASTIAN MUNICIPAL AIRPORT



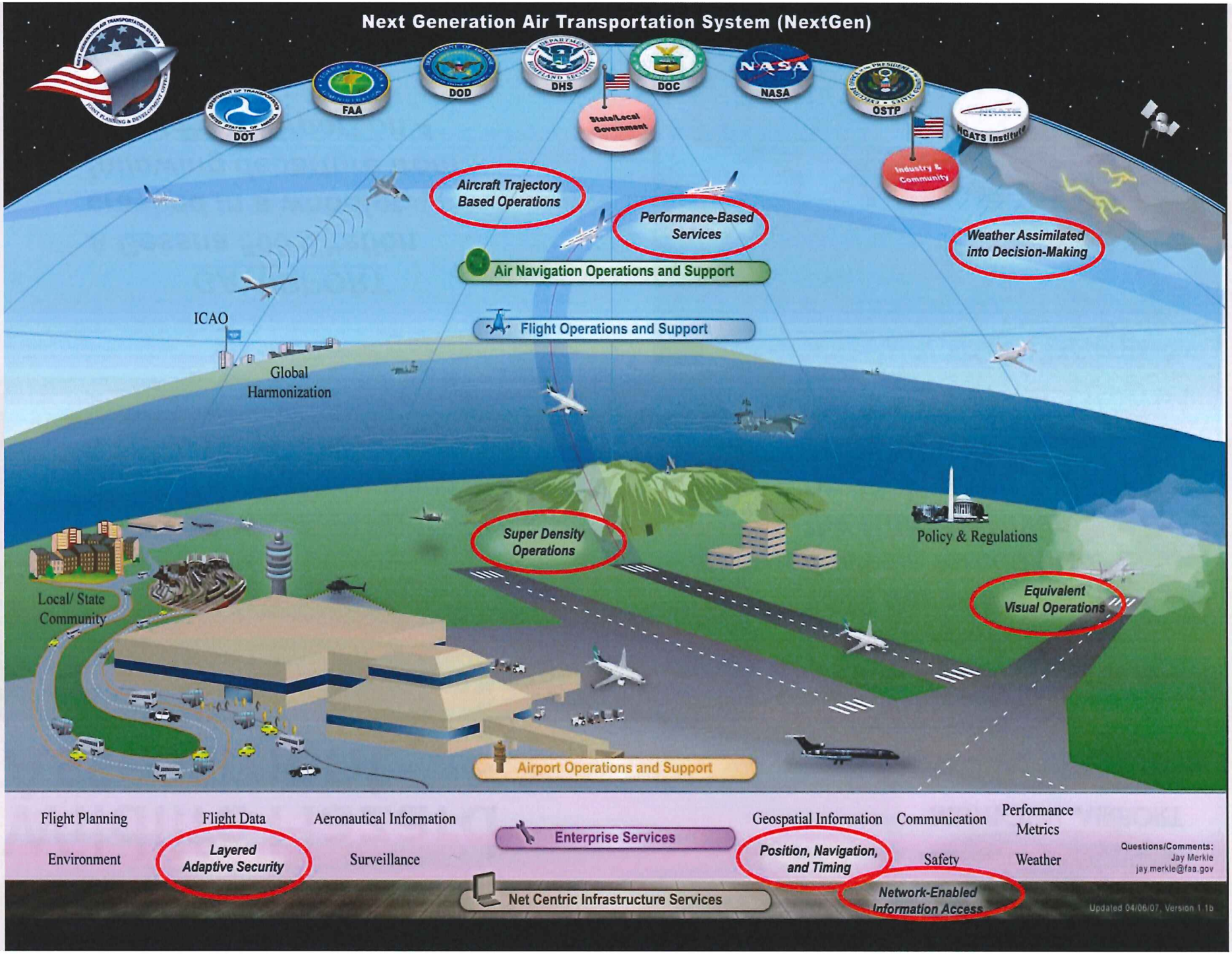
139 AIRPORT

US Airways Flight 1549 departing La Guardia forced into the Hudson River on 15 January 2009.

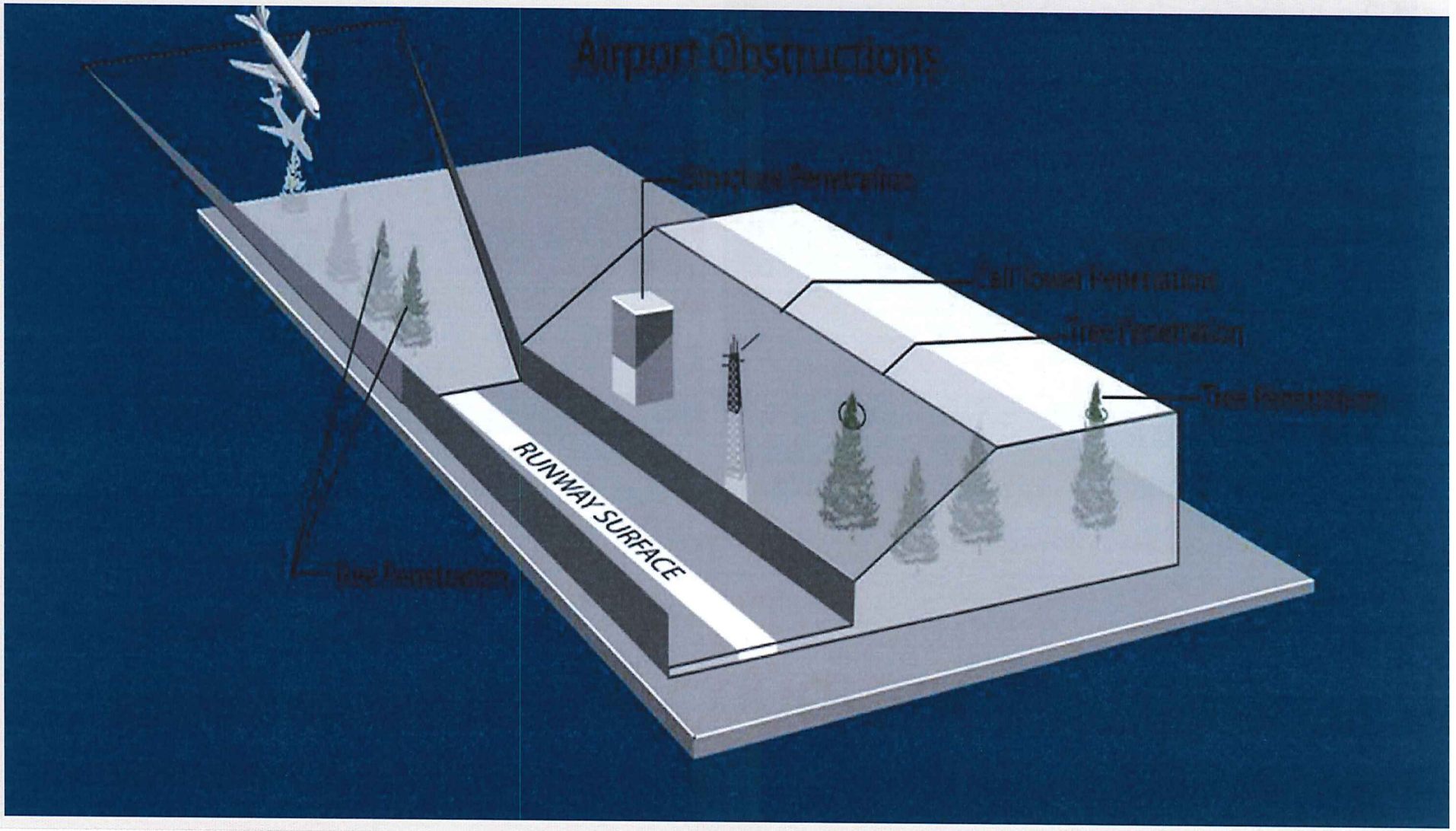


GA AIRPORT

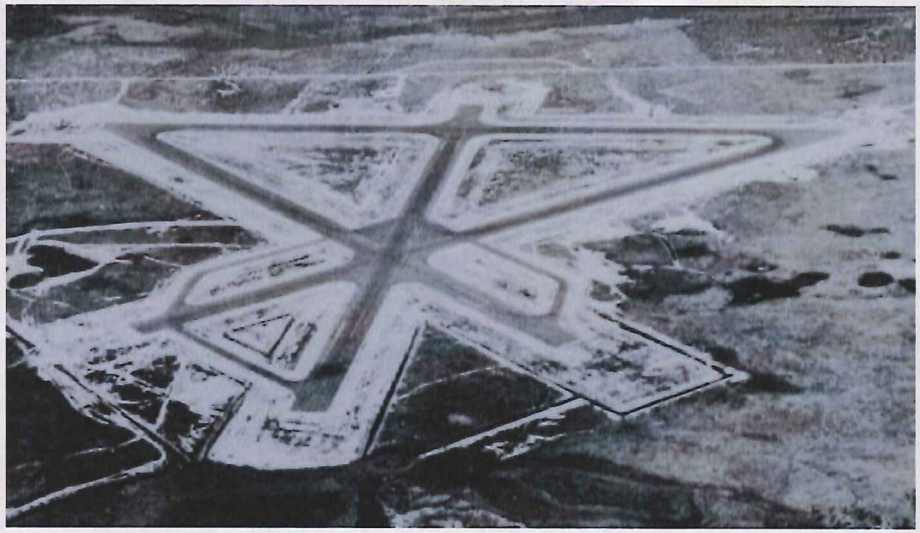
A Cessna 500 Citation crashed in a woodlot following departure from Wiley Post Airport on 4 March 2008.


Next Generation Air Transportation System (NextGen)
DOT
FAA
DOD
DHS
DOC
NASA
OSTP
State/Local Government
Industry & Community
NGATS Institute
Aircraft Trajectory Based Operations
Performance-Based Services
Weather Assimilated into Decision-Making
Air Navigation Operations and Support
Flight Operations and Support
ICAO
Global Harmonization
Super Density Operations
Policy & Regulations
Local/ State Community
Equivalent Visual Operations
Airport Operations and Support
Flight Planning
Flight Data
Aeronautical Information
Enterprise Services
Geospatial Information
Communication
Performance Metrics
Environment
Layered Adaptive Security
Surveillance
Position, Navigation, and Timing
Safety
Weather
Network-Enabled Information Access
Net Centric Infrastructure Services
Questions/Comments:
Jay Merkle
jay.merkle@faa.gov
Updated 04/06/07, Version 1.1b

Compatible Land Use



Step 1: Existing Conditions – Then and Now





SEBASTIAN MUNICIPAL AIRPORT



Current Aircraft Demand



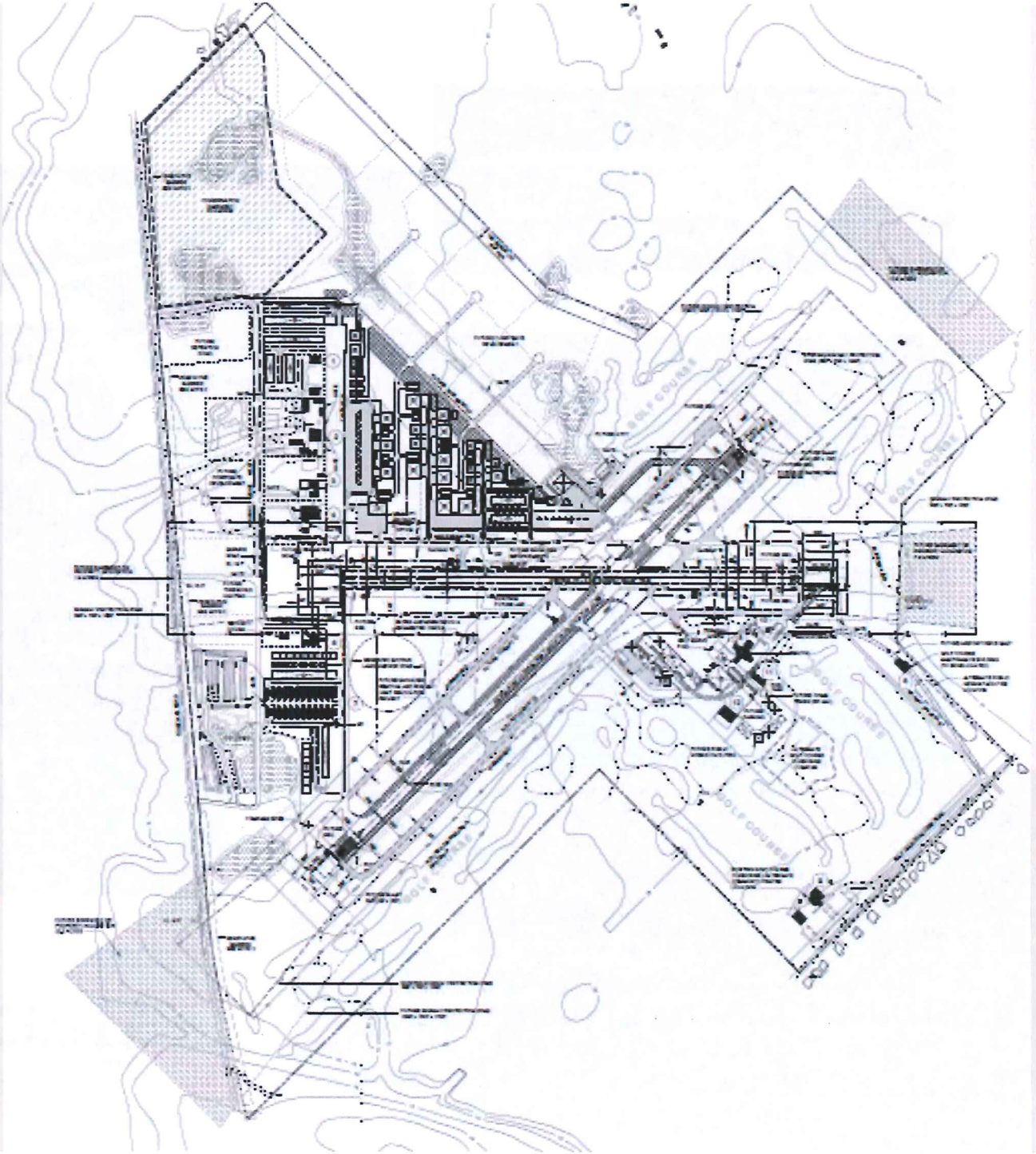






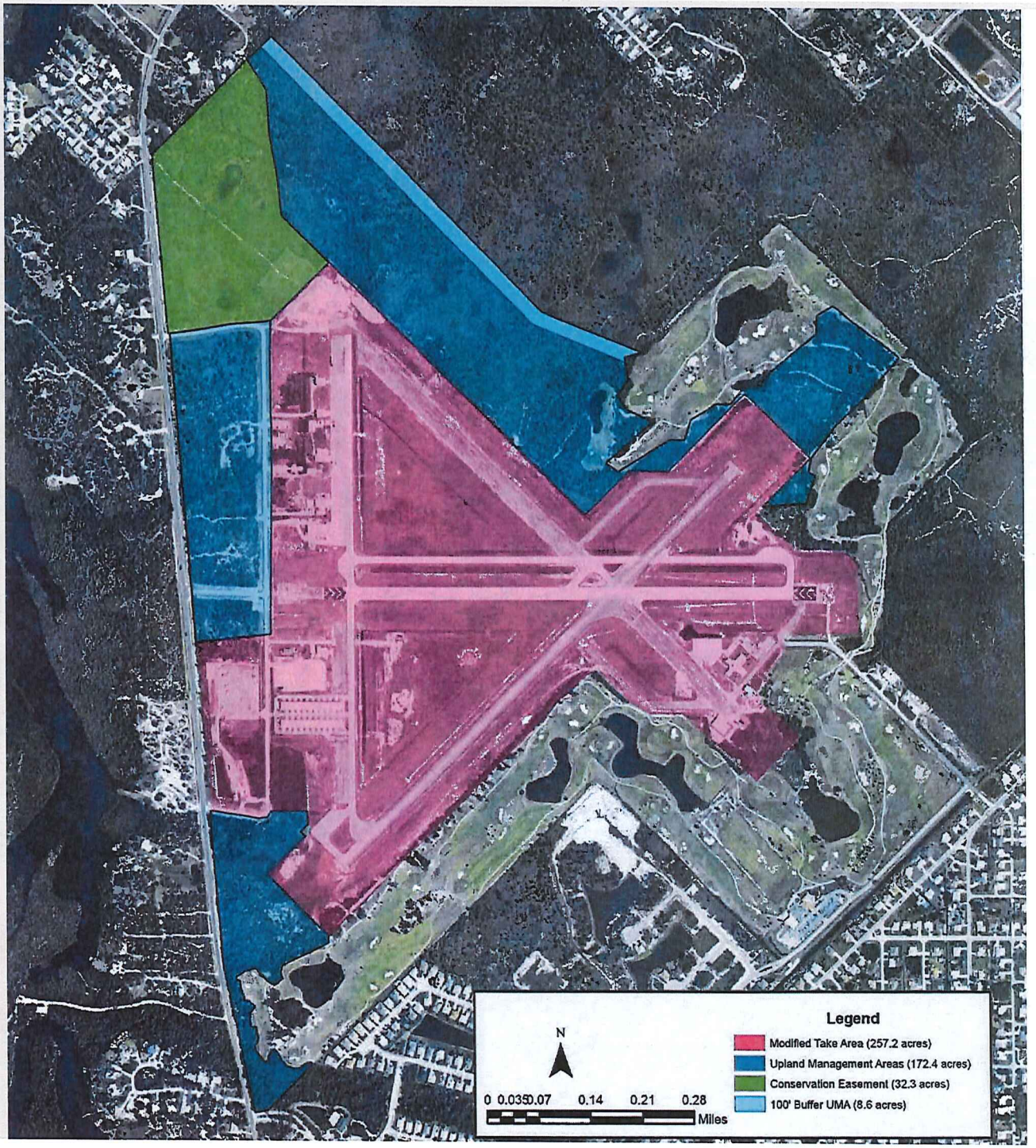


2010 Airport Layout Plan



SEBASTIAN
MUNICIPAL AIRPORT

On Airport Conservation



SEBASTIAN
MUNICIPAL AIRPORT

Step 2: Aviation Activity Forecasts

- Historical and Current Air Traffic Activity
- Factors and Opportunities Impacting Activity Levels
- Socioeconomic Forecasts and Demand
- Activity Forecasts
- Peaking Forecasts
- Design Aircraft













SEBASTIAN MUNICIPAL AIRPORT

AIRCRAFT DEMAND

- Based Aircraft
  - Baseline uses www.basedaircraft.com
  - Registered aircraft only
  - Experimental/non-airworthy aircraft included
- Operational Activity
  - Aircraft Operation = 1 takeoff or 1 landing
  - Touch and go = 2 operations

	2016	2017	2021	2026	2031	2036
Based AC	62	63	66	70	74	79
Operations:	42,449	43,004	45,298	47,652	50,080	52,556
Transient	29,774	30,124	30,975	31,285	31,439	31,114
Local	12,675	12,880	14,323	16,367	18,641	21,442

SEBASTIAN MUNICIPAL AIRPORT



Fleet Mix Forecasts – Based Aircraft

Year	SEP	MEP	TP	Jet	Helo	Experimental	LSA	Other
2016	53	5	2	0	0	0	0	2
2017	53	5	2	0	1	0	0	2
2021	55	5	2	0	1	1	0	2
2026	57	5	2	0	1	1	2	2
2031	58	5	3	0	2	2	2	2
2036	59	6	4	1	2	1	4	2

SEBASTIAN MUNICIPAL AIRPORT



Fleet Mix Forecasts – Aircraft Operations

Year	SEP	MEP	TP	Jet	Helo	Experimental	LSA	Other
2016	34,001	2,816	4,485	-	52	991	-	104
2017	34,454	2,838	4,551	-	52	1,004	-	105
2021	36,327	2,926	4,824	-	54	1,057	-	110
2026	38,169	2,997	5,116	-	57	1,146	52	115
2031	40,082	3,066	5,419	6	60	1,264	63	120
2036	42,010	3,133	5,733	24	63	1,392	77	124

Planning Activity Levels – Critical Aircraft













SEBASTIAN MUNICIPAL AIRPORT

Florida's Boutique Airport

Facility Requirements - Overview

- Runway and Taxiway Needs
- Aircraft Storage
  - Shade hangars – alternative to T-Hangars
  - T-hangar - demand
  - Condo hangars – possible development Northeast Quadrant
  - Corporate hangars – demand for larger hangars
- Airfield Needs
  - Apron Expansion/Reuse
  - NAVAIDs
- Landside Needs
  - Access Roads
  - Utility Expansion



Runway Length and Critical Aircraft

Critical Aircraft	ARC Code	FAR Part 23 MTOW Takeoff Length	FAR Part 23 Landing Length	2016 Operations	2021 Operations	FAR Part 135.385(c) or 135.387(a) Landing Length (Air Taxi)
Twin Otter DHC-6	A-II	1,418	1,215	1,564	1,683	1,736
Beech 200	B-II	3,013	3,292	2,816	3,005	4,703
King Air 350i	B-II	3,848	3,115	0	27	4,450

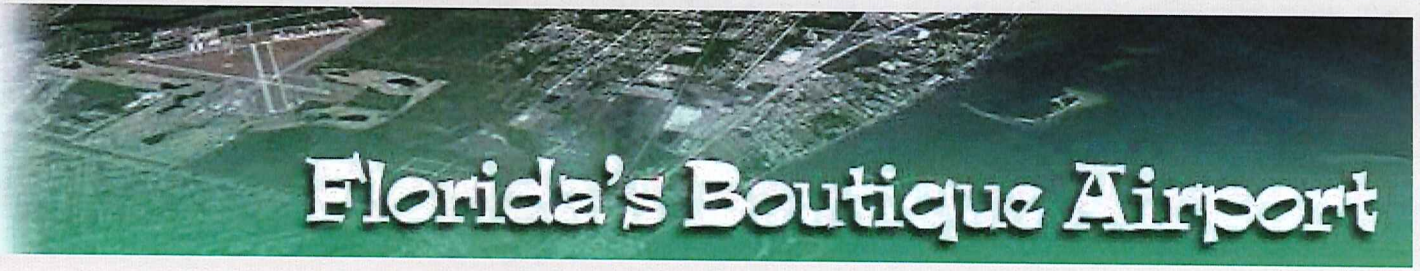
Adjusted for Maximum Average Temperature, Airport Elevation, Changes in runway end elevations and aircraft use.



Other Aircraft Operating Requirements At ISA standards

Aircraft	Type	Take Off Field Length	Landing Distance
Britten-Norman Islander	Piston	1,218ft (371 m)	980ft (299 m)
Twin Otter DHC-6	Turboprop	1,200ft (366 m)	1,050ft (320 m)
Pilatus PC-12	Turboprop	2,600ft (793 m)	2,170ft (661 m)
King Air 350	Turboprop	3,300ft (1,006 m)	2,692ft (821 m)
Citation Mustang	Personal Jet	3,110ft (948 m)	2,380ft (725 m)
Phenom 300	Light Jet	3,138ft (956 m)	2,621ft (799 m)

SEBASTIAN MUNICIPAL AIRPORT



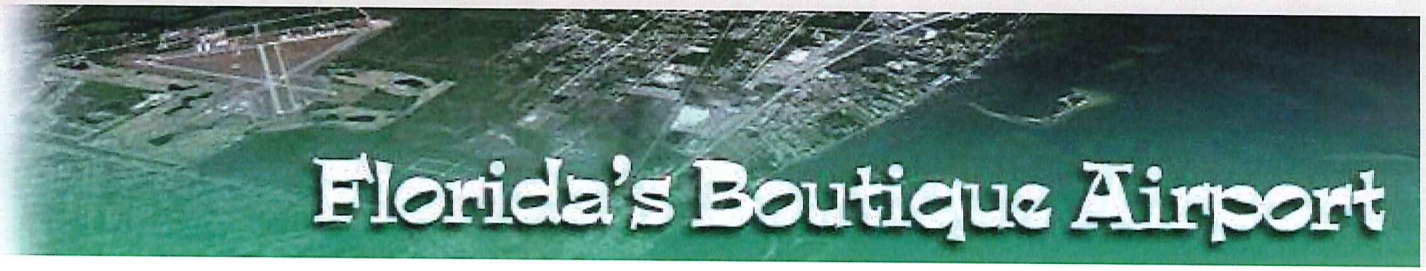
Airport Development Options – 20+ Years



Next Steps

- Finalize Forecasts – Submit to Agencies for Approval
- Finalize Demand Capacity and Facility Needs
- Create Preliminary Alternative Options, including opportunities and impacts
- Technical Advisory Committee 2
- Public/City Council Meeting

SEBASTIAN MUNICIPAL AIRPORT



Draft Schedule

Deliverable	Estimated Date
Draft Final Forecasts, Facility Needs and Alternative Options	May 2017
Submit Forecasts to Agencies for Review	June 2017
TAC Meeting 2	**June 2017**
City Council Briefing/Public Meeting	**June/July 2017**
Refine Alternative Options and Update Chapters 1-5 and Appendices	July/August 2017
Draft Airport Layout Plan	September 2017
Draft Implementation Plan	September 2017
TAC Meeting 3	**October 2017**
Draft Narrative Report and Airport Layout Plan to Sponsor	October 2017
City Council/Public Meeting Briefing	**October/November 2017**
Submit draft narrative and ALP to Agencies for conditional approval	November 2017
Finalize and Project Close-out	January 2018

TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and
Funding Manager
800 20th Place, Suite 1,
Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

City of Sebastian

City Council Meeting

June 14, 2017

6:00 p.m.

SEBASTIAN MUNICIPAL AIRPORT



TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and
Funding Manager
800 20th Place, Suite 1,
Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

Why Do Airports Need Master Plans?

- ✓ To comply with Federal and State regulations governing Airport Management, Maintenance and Development.

What is a Master Plan?

- ✈ Projection of the Airport's ultimate growth over a 20-year timeframe.
- ✈ Plan for the ultimate development of physical facilities.
- ✈ Development guide, including timing and costs, that considers adjacent land uses and environmental issues.
- ✈ Step-by-step description of the logic used in formulating the plan.
- ✈ Display of the plan in graphical and written form.
- ✈ Positions the Airport to compete for FAA and FDOT funding (up to 95%).

SEBASTIAN MUNICIPAL AIRPORT



TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and Funding Manager
800 20th Place, Suite 1, Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

Master Plan Regulatory Requirements

- ✓ Financially Self-Sustaining
- ✓ Compliant with Grant Assurances - FAA(39) & FDOT(24)
- ✓ Compliant with Federal, State and Local Requirements
- ✓ "Good neighbor" in the community
- ✓ Wildlife Mitigation
- ✓ Solid Waste Management and Airport Sustainability
- ✓ Airport Property Inventory
- ✓ Runway Protection Zone Issues
- ✓ Zoning and Impacts to Operations
- ✓ Compatible Land Use

SEBASTIAN MUNICIPAL AIRPORT



TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and Funding Manager
800 20th Place, Suite 1, Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

Master Plan Elements



SEBASTIAN MUNICIPAL AIRPORT

Florida's Boutique Airport

STEPS OF THE MASTER PLAN

Inventory

- Airport Goals and Opportunities Identification
- Inventory of Existing Conditions

Activity Forecasts

- Aircraft Demand Forecasts
- Existing and Future Critical Aircraft Identification

Facility Requirements

- Airport Capacity Determination
- Identify Airport Facility Needs

Alternatives

- Preliminary Alternatives
- User and Community Input

STEPS OF THE MASTER PLAN

Refine Alternatives

- Refine and Evaluate Alternative Options
- Recommend Airport Development Plan

Environment

- Evaluate Environmental and Wildlife Impacts
- Create Waste Management Treatment Plan
- Create Sustainable Airport Development Plan

Airport Layout Plan

- Graphical Representation of 20-years of Development

Development Plan

- Phase proposed development
- Provide Financial Analysis of future revenue and expenses
- Create 20-year Airport Capital Improvement Program

TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and Funding Manager
800 20th Place, Suite 1, Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

Environmental Overview

- **Scrub Jay Survey:** Onsite survey conducted and completed on two potential areas of development on Airport property. Conclusion of survey determined no Scrub Jay impact will be caused by future development.
- **Wetland Delineation and Mitigation Recommendations:** Onsite survey to determine boundaries between wetlands and uplands.
- **Environmental Assessment:** The Environmental Assessment (EA) will be prepared to evaluate the potential impacts on the physical and human environment that could result from the proposed development and alternatives to that development.
- **Habitat Conservation Plan** with Indian River County and U.S. Fish and Wildlife

SEBASTIAN MUNICIPAL AIRPORT



TKDA

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208
Spring Hill, FL 34606
P **813-480-9900** | tkda.com

Danielle Gernert
Planning/Environmental and Funding Manager
800 20th Place, Suite 1, Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

Please Join Us!

Public Input for Sebastian Airport Master Plan

June 15, 2017

1:00 p.m. – 3:00 p.m.

City Hall Council Chambers

SEBASTIAN MUNICIPAL AIRPORT





Public Workshop – June 15, 2017

Why Do Airports Need Master Plans?

To comply with Federal and State regulations governing Airport Management, Maintenance and Development.

What is a Master Plan?

- Projection of the Airport's ultimate growth over a 20-year timeframe.
- Plan for the ultimate development of physical facilities.
- Development guide, including timing and costs that considers adjacent land uses and environmental issues.
- Step-by-step description of the logic used in formulating the plan.
- Display of the plan in graphical and written form.
- Positions the Airport to compete for FAA funding (up to 90%).

Master Plan Regulatory Requirements

- Financially Self-Sustaining
- Compliant with Grant Assurances
- Compliant with Federal, State and Local Requirements
- "Good neighbor" in the community
- Wildlife Mitigation
- Solid Waste Management and Airport Sustainability
- Airport Property Inventory
- Runway Protection Zone Issues
- Zoning and Impacts to Operations
- Compatible Land Use

Master Plan Elements



Steps of the Master Plan

Inventory	• Airport Goals and Opportunities Identification • Inventory of Existing Conditions
Activity Forecasts	• Aircraft Demand Forecasts • Existing and Future Critical Aircraft Identification
Facility Requirements	• Airport Capacity Determination • Identify Airport Facility Needs
Alternatives	• Preliminary Alternatives • User and Community Input
Refine Alternatives	• Refine and Evaluate Alternative Options • Recommend Airport Development Plan
Environmental	• Evaluate Environmental and Wildlife Impacts • Create Waste Management Treatment Plan • Create Sustainable Airport Development Plan
Airport Layout Plan	• Graphical Representation of 20-years of Development
Develoment of the Plan	• Phase proposed development • Provide Financial Analysis of future revenue and expenses • Create 20-year Airport Capital Improvement Program

Environmental Overview

- **Scrub Jay Survey**: Onsite survey conducted and completed on two potential areas of development on Airport property. Conclusion of survey determined no Scrub Jay impact will be caused by future development.
- **Wetland Delineation and Mitigation Recommendations**: Onsite survey to determine boundaries between wetlands and uplands.
- **Environmental Assessment**: The Environmental Assessment (EA) will be prepared to evaluate the potential impacts on the physical and human environment that could result from the proposed development and alternatives to that development.
- **Habitat Conservation Plan** with Indian River County and U.S. Fish and Wildlife

For Questions or Comments, please contact us:

Tricia Fantinato
Senior Planner
Project Manager
4377 Commercial Way #208 Spring Hill, FL 34606
P **813-480-9900** | tkda.com

TKDA

Danielle Gernert
Planning/Environmental and Funding Manager
800 20th Place, Suite 1, Vero Beach, FL 32960
P **772-217-9521** | **tkda.com**

SEBASTIAN MUNICIPAL AIRPORT

Airport Master Plan Study Update
Briefing for Sebastian Area Pilots

Saturday, August 12th, 2017 @ 11:00am

AGENDA

11:00 am Welcome and Introductions
- Scott Baker – Airport Director
- Danielle Gernert – Planning Consultant TKDA

Overview Briefing of What is about to be covered

11:10 am Danielle Gernert
- What is an Airport Master Plan Study and why is it important?
- How often are Airport Master Plan Studies updated?
- What are the main Elements of an Airport Master Plan?
- Progress report of the current Airport Master Plan Study.
- How you can provide input and comments

11:30 am Scott Baker
- Ongoing Airport Projects
  - AWOS with thunderstorm reporting
  - Final Construction of Hangar C
  - New Airport Business Tenants – Cruiser Aircraft, Inc.
  - Construction of new Taxiways Phase-1 (includes taxiway signage
  - Construction of Shade Hangars
- Upcoming Airport Projects
  - Construction of new Taxiways Phase-2 (includes taxiway signage)
  - Construction of Hangar D
- What's on your Wish List for the Airport?
  - Taxiway lighting?
  - REILs for 05 / 23 ?
  - High Octane Car Gas Availability?
  - 100LL Avgas Alternatives (SWIFT fuel)?
  -

12 noon Lunch (Kitchen patio) – Cheeseburgers, chips

Sebastian Municipal Airport
Master Plan Update



APPENDIX C – PROPERTY ENCUMBRANCE REPORT

This Page was Intentionally Left Blank

Airport Property can be accessed online using the City of Sebastian's Public Records Portal.

- Airport Deed 1
- Airport Deed 2
- Airport Deed 3
- Airport Auction of Surplus Property

This Page was Intentionally Left Blank

APPENDIX D

ENVIRONMENTAL SUPPORT DATA AND RESOURCES

FAA Resources

FAA Order 1050.1F – Environmental Impacts: Policies and Procedures

FAA Order 5050.4B – National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions

Advisory Circular

- **AC Number: 150/5200-33B** – Hazardous Wildlife Attractants On or Near Airports
- **AC Number: 150/5200-33C** (**DRAFT)** – Hazardous Wildlife Attractants On or Near Airports
- **AC Number: 150/5200-XXX (DRAFT) –** Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans
- **AC Number: 150/5200-36A –** Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports

Other Resources

The Florida Wetland Delineation Manual

This Page was Intentionally Left Blank

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
1050.1F

Effective Date:
7/16/15

SUBJ: Environmental Impacts: Policies and Procedures

This Order serves as the Federal Aviation Administration's (FAA) policy and procedures for compliance with the National Environmental Policy Act (NEPA) and implementing regulations issued by the Council on Environmental Quality (CEQ). The provisions of this Order and the CEQ Regulations apply to actions directly undertaken by the FAA and to actions undertaken by a non-Federal entity where the FAA has authority to condition a permit, license, or other approval. The requirements in this Order apply to, but are not limited to, the following actions: grants, loans, contracts, leases, construction and installation actions, procedural actions, research activities, rulemaking and regulatory actions, certifications, licensing, permits, plans submitted to the FAA by state and local agencies for approval, and legislation proposed by the FAA. The Order was last revised in 2006.

This Order updates FAA Order 1050.1E to: 1) provide a clear, concise, and up-to-date discussion of the FAA's requirements for implementing NEPA; and 2) clarify requirements in order to facilitate timely, effective, and efficient environmental reviews of FAA actions, including NextGen improvements.



Rich Swayze
Assistant Administrator
Policy, International Affairs & Environment

TABLE OF CONTENTS

Page

Chapter 1: General 1-1

1-1. Purpose of This Order 1-1
1-2. Audience 1-1
1-3. Where to Find This Order 1-1
1-4. How to Cite This Order 1-1
1-5. Cancellation 1-1
1-6. Related Publications 1-1
1-7. The National Environmental Policy Act and the Council on Environmental Quality Regulations 1-1
1-8. Federal Aviation Administration Policy 1-2
1-9. Applicability and Scope 1-3
1-10. Explanation of Policy Changes 1-3
1-10.1. Appendix A 1-3
1-10.2. Re-organization of Order 1-3
1-10.3. Federal Aviation Administration Policy 1-4
1-10.4. Roles of Lines of Business/Staff Offices 1-4
1-10.5. Responsibilities 1-4
1-10.6. Clarification of Policy that Applies to Environmental Assessments 1-4
1-10.7. Mitigation 1-4
1-10.8. Environmental Management System 1-4
1-10.9. Actions Normally Requiring an Environmental Assessment 1-4
1-10.10. Actions Normally Requiring an Environmental Impact Statement 1-5
1-10.11. Programmatic National Environmental Policy Act Documents and Tiering 1-5
1-10.12. NEPA Database. Adds a statement that 1-5
1-10.13. Environmental Impact Categories 1-5
1-10.14. Significance Determinations 1-5
1-10.15. Extraordinary Circumstances 1-5
1-10.16. Categorical Exclusion Documentation 1-6
1-10.17. Categorical Exclusion Public Notification 1-6
1-10.18. Categorical Exclusions 1-6
1-10.19. Environmental Assessment Format and Process 1-6

TABLE OF CONTENTS (continued)

Page

1-10.20. Use of Errata Sheets 1-6
1-10.21. Privacy 1-6
1-10.22. Termination of Environmental Impact Statement Preparation 1-6
1-10.23. Adoption of Other Agencies' National Environmental Policy Act Documents 1-6
1-10.24. Actions within the United States with Potential Transboundary Impacts 1-6
1-10.25. Environmental Effects of Major Federal Aviation Administration Actions Abroad 1-7
1-10.26. Emergency Actions 1-7
1-10.27. Written Re-evaluations 1-7
1-10.28. Review and Approval 1-7
1-10.29. Authority to Change This Order 1-7
1-10.30. Explanatory Guidance 1-7
1-10.31. Definitions 1-7
1-11. -1-50. Reserved 1-7

Chapter 2: National Environmental Policy Act Planning and Integration 2-1

2-1. Applicability of National Environmental Policy Act Procedures to Federal Aviation Administration Actions 2-1
2-1.1. Federal Aviation Administration Actions Subject to National Environmental Policy Act Review 2-1
2-1.2. Federal Aviation Administration Actions Not Subject to National Environmental Policy Act Review 2-1
2-2. Responsibilities 2-2
2-2.1. Responsibilities of the Federal Aviation Administration 2-2
2-2.2. Responsibilities of Applicants 2-6
2-2.3. Responsibilities of Contractors 2-7
2-3. Planning and Integration 2-7
2-3.1. Early Planning 2-7
2-3.2. Initial Environmental Review 2-7
2-3.3. Environmental Management System Approach 2-9
2-3.4. Reducing Paperwork 2-9
2-3.5. Reducing Delay 2-10

TABLE OF CONTENTS (continued)

Page

2-3.6. Mitigation 2-10
2-4. Coordination 2-10
2-4.1. Internal Federal Aviation Administration Coordination 2-10
2-4.2. Lead and Cooperating Agencies 2-11
2-4.3. Intergovernmental and Interagency Coordination 2-11
2-4.4. Tribal Consultation. 2-12
2-5. Public Involvement 2-12
2-5.1. Timing and Extent of Public Involvement. 2-12
2-5.2. Federal Aviation Administration Requirements for Public Involvement 2-12
2-5.3. Public Meetings, Workshops, and Hearings. 2-14
2-6. Plain Language 2-14
2-7. Limitations on Actions Involving Real Property Prior to Completing National Environmental Policy Act Review 2-15
2-8. -2-50. Reserved. 2-15

Chapter 3: Levels of National Environmental Policy Act Review 3-1

3-1. Three Levels of National Environmental Policy Act Review 3-1
3-1.1. Categorically Excluded Actions 3-1
3-1.2. Actions Normally Requiring an Environmental Assessment 3-1
3-1.3. Actions Normally Requiring an Environmental Impact Statement 3-3
3-2. Programmatic National Environmental Policy Act Documents and Tiering 3-3
3-3. FAA NEPA Database. 3-4
3-4. -3-50. Reserved. 3-4

Chapter 4: Impact Categories, Significance, and Mitigation 4-1

4-1. Environmental Impact Categories 4-1
4-2. Consideration of Impacts. 4-1
4-3. Significance and Significance Thresholds 4-3
4-3.1. General 4-3
4-3.2. Context and Intensity 4-3
4-3.3. Significance Thresholds 4-3
4-4. Mitigation 4-14

TABLE OF CONTENTS (continued)

Page

4-5. -4-50. Reserved 4-15

Chapter 5: Categorical Exclusions 5-1

5-1. General 5-1

5-2. Extraordinary Circumstances 5-1

5-3. Categorical Exclusion Documentation 5-3

5-4. Public Notification 5-4

5-5. Other Environmental Requirements 5-4

5-6. The Federal Aviation Administration's Categorical Exclusions 5-4

5-6.1. Categorical Exclusions for Administrative/General Actions. 5-5

5-6.2. Categorical Exclusions for Certification Actions 5-7

5-6.3. Categorical Exclusions for Equipment and Instrumentation 5-8

5-6.4. Categorical Exclusions for Facility Siting, Construction, and Maintenance 5-10

5-6.5. Categorical Exclusions for Procedural Actions 5-14

5-6.6. Categorical Exclusions for Regulatory Actions 5-16

5-7. -5-50. Reserved 5-17

Chapter 6: Environmental Assessments and Findings of No Significant Impact 6-1

6-1. General 6-1

6-2. Preparing Environmental Assessments. 6-2

6-2.1. Environmental Assessment Format 6-2

6-2.2. Environmental Assessment Process 6-3

6-2.3. Mitigation Considerations for Environmental Assessments 6-6

6-3. Finding of No Significant Impact 6-7

6-4. Decision Documents for Findings of No Significant Impact 6-9

6-5. -6-50. Reserved 6-9

Chapter 7: Environmental Impact Statements and Records of Decision 7-1

7-1. Preparation of Environmental Impact Statements 7-1

7-1.1. Environmental Impact Statement Format 7-2

7-1.2. Environmental Impact Statement Process 7-6

7-1.3. Decision Not to Prepare an Environmental Impact Statement 7-12

TABLE OF CONTENTS (continued)

Page

7-2. Environmental Impact Statement Record of Decision 7-12
7-2.1. Record of Decision Process 7-12
7-2.2. Record of Decision Content 7-13
7-2.3. Environmental Commitments 7-14
7-3. -7-50. Reserved 7-14

Chapter 8: Federal Aviation Administration Actions Subject to Special Procedures 8-1

8-1. Commenting on Other Agencies' National Environmental Policy Act Documents 8-1
8-2. Adoption of Other Agencies' National Environmental Policy Act Documents 8-2
8-3. Rulemaking 8-3
8-4. Legislative Proposals 8-4
8-5. Actions within the United States with Potential Transboundary Impacts 8-4
8-6. Effects of Major Federal Aviation Administration Actions Abroad 8-4
8-7. Emergency Actions 8-7
8-8. Council on Environmental Quality Referrals 8-8
8-9. -8-50. Reserved 8-8

Chapter 9: Time Limits, Written Re-Evaluations, and Supplemental National Environmental Policy Act Documents 9-1

9-1. Time Limits 9-1
9-2. Written Re-evaluations 9-1
9-3. Supplemental Environmental Assessments and Environmental Impact Statements 9-3
9-4. -9-50. Reserved 9-3

Chapter 10: Review and Approval of National Environmental Policy Act Documents 10-1

10-1. General 10-1
10-2. Review and Approval of Environmental Assessments, Findings of No Significant Impact, and Findings of No Significant Impact/Records of Decision 10-1
10-3. Review and Approval of Draft Environmental Impact Statements 10-2
10-4. Review and Approval of Final Environmental Impact Statements 10-2
10-5. Review and Approval of Supplemental Environmental Impact Statements. 10-3
10-6. Review and Approval of Records of Decision 10-3

TABLE OF CONTENTS (continued)

Page

10-7. -10-50. Reserved 10-4

Chapter 11: Administrative Information 11-1

11-1. Distribution 11-1

11-2. Authority to Change This Order 11-1

11-3. Process for Changing This Order 11-1

11-4. Explanatory Guidance 11-2

11-5. Definitions 11-2

11-6. -11-50. Reserved 11-4

Appendix A. Acronym List 1

Appendix B. Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303) 1

Appendix C. Federal Aviation Administration Guidance on Third Party Contracting for Environmental Impact Statement Preparation 1

Appendix D. National Environmental Policy Act Process Flowcharts 1

Chapter 1: General

1-1. Purpose of This Order. This Order provides the Federal Aviation Administration's (FAA) policies and procedures to ensure agency compliance with the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321-4335), the requirements set forth in the Council on Environmental Quality (CEQ), Title 40, Code of Federal Regulations (CFR), parts 1500-1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (CEQ Regulations), and Department of Transportation (DOT) Order 5610.1C, *Procedures for Considering Environmental Impacts*. The CEQ Regulations establish procedures for complying with NEPA. In accordance with 40 CFR § 1507.3 of the CEQ Regulations, this Order contains the FAA's implementing procedures, which supplement those regulations.

1-2. Audience. All FAA employees who approve, manage, or otherwise participate in actions requiring FAA compliance with NEPA, the CEQ Regulations, or DOT Order 5610.1C, and all FAA contractors and applicants involved in such actions.

1-3. Where to Find This Order. This Order can be found on the FAA's website at: https://employees.faa.gov/tools_resources/orders_notices/. This Order is available to the public at http://www.faa.gov/regulations_policies/orders_notices/ by clicking on the topic "Environment."

1-4. How to Cite This Order. This Order should be cited as FAA Order 1050.1F. The body of the Order is organized by paragraphs. If citing a particular paragraph, the format "FAA Order 1050.1F, Paragraph ___" should be used. For example, if referencing the definition for Noise Sensitive Area, the proper citation is "FAA Order 1050.1F, Paragraph 11-5.b.(10)."

1-5. Cancellation. FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* dated June 8, 2004 (as updated by Change 1, dated March 20, 2006), is cancelled.

1-6. Related Publications. The latest version of referenced publications should be used in conjunction with this order. The FAA Order 1050.1F Desk Reference (1050.1F Desk Reference) provides details on current guidance and updated technical information. This includes information about permits, licenses, consultations, and other forms of approval or review; up-to-date details on technical information such as FAA-approved tools for analyzing noise and air emissions; overviews of special purpose laws and requirements; and specific responsibilities and guidance for gathering data, assessing impacts, consulting other agencies, and involving the public. The 1050.1F Desk Reference can be found on the FAA's website at: http://www.faa.gov/regulations_policies/orders_notices/ by clicking on the topic, "Environment."

1-7. The National Environmental Policy Act and the Council on Environmental Quality Regulations. NEPA and the CEQ Regulations establish a broad national policy to protect and enhance the quality of the human environment, and require Federal agencies to develop programs and measures to meet national environmental goals. Section 102(2) of NEPA provides specific direction to Federal agencies, sometimes called "action-forcing" provisions (see 40 CFR §§ 1500.1(a), 1500.3, and 1507, CEQ Regulations) on how to implement the goals of NEPA. The major provisions include the requirement to use a systematic, interdisciplinary approach and develop implementing methods and procedures. Section 102(2)(C) requires detailed analysis in the form of Environmental Impact Statements (EISs) for proposed major Federal actions

significantly affecting the quality of the human environment. The CEQ Regulations additionally provide for Environmental Assessments (EAs) to assist agencies in determining whether potential environmental impacts are significant and Categorical Exclusions (CATEXs), which are categories of actions that the FAA has determined, based on previous experience, do not have significant individual or cumulative impact on the quality of the human environment except in extraordinary circumstances. The presence of extraordinary circumstances would preclude the use of a CATEX and would merit additional review in an EA or EIS. In addition to NEPA and the CEQ Regulations, other laws, regulations, and Executive Orders address aspects of the environment and require compliance by Federal agencies. The CEQ Regulations direct Federal agencies to list all Federal permits, licenses, and other approvals that must be obtained in implementing the proposed action, and, to the fullest extent possible, integrate compliance with such requirements with the NEPA process.

This Order implements the mandate of NEPA, as defined and discussed in the CEQ Regulations, within the programs of the FAA. The Order is not a substitute for the CEQ Regulations; rather, it supplements the CEQ Regulations for FAA programs. All FAA Lines of Business and Staff Offices (LOB/SOs) must comply with the CEQ Regulations as further implemented and supplemented by this Order.

1-8. Federal Aviation Administration Policy. The FAA's primary mission is to provide the safest, most efficient aerospace system in the world. NEPA compliance and other environmental responsibilities are integral components of that mission. The FAA is responsible for complying with the procedures and policies of NEPA and other environmental laws, regulations, and orders applicable to FAA actions. The FAA decision-making process must consider and disclose the potential impacts of a proposed action and its alternatives on the quality of the human environment. In meeting its NEPA obligations, the FAA should seek to achieve the policy objectives of 40 CFR § 1500.2 to the fullest extent possible. The FAA must integrate NEPA and other environmental reviews and consultations into agency planning processes as early as possible. Funding requirements must be justified and requested in accordance with existing budgetary and fiscal policies. Each FAA LOB/SO is responsible for seeking sufficient funds through the budget process to implement the provisions of this Order.

The Next Generation Air Transportation System (NextGen) involves operational and infrastructure improvements that require the FAA's environmental review in accordance with NEPA. The FAA's goal is to ensure timely, effective, and efficient environmental reviews of proposed NextGen improvements, consistent with Executive Order 13604, *Improving Performance of Federal Permitting and Review of Infrastructure Projects*, 77 *Federal Register* 18887 (March 28, 2012). The FAA is using an environmental management system (EMS) approach to improve the integration of environmental performance into the planning, decision-making, and operation of NextGen in furtherance of the goal of environmental protection that allows sustained aviation growth.

It is FAA policy to ensure the integrity of environmental reviews while emphasizing and implementing instructions in 40 CFR §§ 1500.4 and 1500.5 of the CEQ Regulations to reduce excessive paperwork and environmental process delays. The FAA implements an expedited and coordinated environmental review process for aviation safety projects, aviation security projects, and airport capacity projects at congested airports in accordance with Title III of Vision 100-Century of Aviation Reauthorization Act, also cited as the Aviation Streamlining Approval Process Act of 2003, 49 U.S.C. §§ 47171-47175. The FAA has also established expedited

environmental review procedures and processes for area navigation (RNAV) and required navigation performance (RNP) that offer efficiency improvements. In addition, Section 213 of the FAA Modernization and Reform Act of 2012, Public Law 112-95, established two legislative CATEXs that are included in this Order.

For projects subject to expedited environmental review, the FAA must comply with this Order, maintain the integrity of the environmental process, and respect the environmental responsibilities of other agencies. Expedited environmental reviews will be used to give review priority to certain projects, manage timelines during the review process, improve and expedite interagency coordination, reduce undue delays, and emphasize accountability. Certain airport capacity projects, aviation safety projects, and aviation security projects may be subject to special designation and treatment in accordance with provisions of the Aviation Streamlining Approval Process Act. Airport infrastructure projects may also be selected for review under Executive Order 13274, *Environmental Stewardship and Transportation Infrastructure Project Reviews*, 67 *Federal Register* 59449 (September 23, 2002). In addition, Executive Order 13604, *Improving Performance of Federal Permitting and Review of Infrastructure Projects*, 77 *Federal Register* 18887 (March 28, 2012) calls for the execution of Federal permitting and review processes, including environmental review processes, with maximum efficiency and effectiveness. *The Implementation Plan for the Presidential Memorandum on Modernizing Infrastructure Permitting* provides strategies for agencies to improve the Federal government's role in permitting and review processes, including improved coordination and project planning, and increased use of programmatic approaches and information technology tools. It is the responsibility of the FAA office that has the primary responsibility for a proposed action and that is leading the environmental review to ensure that applicable special review provisions are applied effectively.

1-9. Applicability and Scope. The provisions of this Order and the CEQ Regulations apply to actions directly undertaken by the FAA and to actions undertaken by a non-Federal entity where the FAA has authority to condition a permit, license or approval. The requirements in this Order apply, but are not limited, to the following actions: grants, loans, contracts, leases, construction and installation actions, procedural actions, research activities, rulemaking and regulatory actions, certifications, licensing, permits, plans submitted to the FAA by state or local agencies for approval, and legislation proposed by the FAA. Exceptions to these requirements are listed in Paragraph 2-1.2. The procedures in this Order apply to the extent practicable to ongoing activities and environmental documents begun before the effective date. However, procedures contained in this Order should not apply to ongoing environmental reviews where substantial revisions to ongoing environmental documents would be required. This Order does not apply to decisions made and final environmental documents issued prior to the effective date of this Order.

1-10. Explanation of Policy Changes. This paragraph briefly highlights significant changes from FAA Order 1050.1E.

1-10.1. Appendix A. Moves the information in Appendix A of FAA Order 1050.1E, *Analysis of Environmental Impact Categories*, to the 1050.1F Desk Reference, which can be easily updated, as necessary.

1-10.2. Re-organization of Order. Restructures the Order to make environmental compliance more efficient and effective, and to focus the discussion, reduce redundancies,

and provide FAA NEPA practitioners with a more user-friendly and clear document. Revises the numbering and structure to more closely follow FAA Order 1320.1, *FAA Directives Management*. Includes systematic editorial changes to ensure consistency with the FAA's plain language guidelines as established in FAA Order 1000.36, *FAA Writing Standards.*

1-10.3. Federal Aviation Administration Policy. Expands and updates the FAA's policy statement to include NextGen. The updated policy also includes an EMS approach to improve the integration of environmental performance into the planning, decision-making, and operation of NextGen in furtherance of the goal of environmental protection that allows sustained aviation growth. Finally, the policy reflects legislative provisions in FAA reauthorization to expedite the environmental review process for certain air traffic procedures and project delivery improvement.

1-10.4. Roles of Lines of Business/Staff Offices. Updates the titles and roles of FAA LOB/SOs to reflect changes to the FAA's organizational structure and initiatives since publication of FAA Order 1050.1E (see Paragraph 2-2.1.b).

1-10.5. Responsibilities. Clarifies the FAA's responsibilities (see Paragraph 2-2.1) and the role of applicants and contractors in the FAA's NEPA process (see Paragraphs 2-2.2 and 2-2.3). Includes a section on the state's role in the State Block Grant Program (see Paragraph 2-2.1e).

1-10.6. Clarification of Policy that Applies to Environmental Assessments. Explains in more detail than FAA Order 1050.1E Paragraphs 405 d, e, and f the differences between EAs and EISs and the requirement to consider connected actions in EAs.

1-10.7. Mitigation. Reorganizes and clarifies provisions relating to mitigation (see Paragraphs 2-3.6, 4-4, 6-2.3, and 7-1.1.h). Updates the FAA's policy regarding mitigation to be consistent with CEQ's Guidance on *Appropriate use of Mitigation and Monitoring and Clarifying the Appropriate use of Mitigated Findings of No Significant Impact*, 76 *Federal Register* 3843 (January 21, 2011). Clarifies which projects warrant environmental monitoring and the type and extent of monitoring.

1-10.8. Environmental Management System. Adds a discussion of EMS to highlight the importance of EMS and its application to all FAA programs, including NextGen (see Paragraph 2-3.3).

1-10.9. Actions Normally Requiring an Environmental Assessment. Adds new and revises existing actions normally requiring an EA to more clearly and accurately describe those FAA actions which normally require preparation of an EA. The new actions normally requiring an EA (see Paragraphs 3-1.2.b(13) and (16)) are:

(13) Establishment or modification of an Instrument Flight Rules Military Training Route (IR MTRs).

(16) Formal and informal runway use programs that may significantly increase noise over noise sensitive areas.

Actions normally requiring an EA that were substantively amended are included in Paragraphs 3-1.2.b(2), (10)-(12), and (14)-(15). FAA Order 1050.1E Paragraph 401o has been omitted from FAA Order 1050.1F.

1-10.10. Actions Normally Requiring an Environmental Impact Statement. Modifies and re-organizes the text in Paragraph 501 of FAA Order 1050.1E and adds specific examples of actions normally requiring an EIS (see Paragraph 3-1.3.b).

1-10.11. Programmatic National Environmental Policy Act Documents and Tiering. Combines the discussion of programmatic NEPA documents and tiering and revises the text to align with CEQ Regulations and guidance (see Paragraph 3-2).

1-10.12. NEPA Database. Adds a statement that FAA LOB/SOs should whenever possible, use the FAA NEPA Database to track projects and make final documents available to others in the FAA (see Paragraph 3-3).

1-10.13. Environmental Impact Categories. Adds a new Paragraph 4-1 to discuss the FAA's Environmental Impact Categories, previously discussed in Appendix A of FAA Order 1050.1E and now found in the accompanying 1050.1F Desk Reference. Adds Climate to the list of impact categories that must be considered in FAA NEPA documents. Combines Noise and Noise-Compatible Land Use as it relates to noise compatibility into a single impact category and creates a separate category for non-noise land use issues. Renames Fish, Wildlife, and Plants as Biological Resources and renames Light Emissions and Visual Impacts as Visual Effects. Renames Water Quality as Water Resources, which includes Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers under the new category. Removes construction impacts and secondary impacts as separate impact categories; instead, they are to be analyzed within each applicable environmental impact category.

1-10.14. Significance Determinations. Provides an exhibit in Paragraph 4-3.3 that summarizes the FAA's Significance Thresholds formerly described under individual environmental impact categories in Appendix A of FAA Order 1050.1E. This table also includes Factors to Consider in making determinations of significant impacts. Adds "Contaminate a public drinking water supply such that public health may be adversely affected" as a threshold under Surface Waters, and "Contaminate an aquifer used for public water supply such that public health may be adversely affected" as a new threshold under Groundwater (see Exhibit 4-1, Significance Determination for FAA Actions). The FAA has also added clarifying language to the Air Quality significance threshold to include instances where the increase in frequency or severity of an existing violation would be significant.

1-10.15. Extraordinary Circumstances. Adds national marine sanctuaries and wilderness areas to the list of resources that must be considered in evaluating actions for extraordinary circumstances that would preclude the use of a CATEX for a proposed action. Makes other text revisions, including modifying: (1) the description of wild and scenic rivers to be consistent with CEQ's August 10, 1980, memorandum, *Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory*; and (2) the description of actions likely to cause environmental contamination by hazardous materials, or likely to disturb an existing hazardous material contamination site such that new environmental contamination risks are created.

1-10.16. Categorical Exclusion Documentation. Updates the FAA's policy regarding CATEX documentation to be consistent with CEQ's Guidance on *Establishing, Applying, and Revising Categorical Exclusions under the National Environmental Policy Act*, 75 *Federal Register* 75628 (December 6, 2010) (see Paragraph 5-3). These updates include: clarifying when and what level of documentation is needed in the application of a CATEX and explaining what to include in CATEX documentation. Adds discussion of decision documents in connection with CATEXs (known as CATEX/Records of Decision [RODs]), which are not commonly used but may be advisable in unique circumstances.

1-10.17. Categorical Exclusion Public Notification. Adds discussion of public notification of CATEX use, consistent with CEQ's Guidance on *Establishing, Applying, and Revising Categorical Exclusions under the National Environmental Policy Act*, 75 *Federal Register* 75628 (December 6, 2010) (see Paragraph 5-4).

1-10.18. Categorical Exclusions. Adds new CATEXs and revises existing CATEXs to accommodate actions that do not significantly affect the environment. The new CATEXs are in Paragraphs 5-6.3i, 5-6.4bb, 5-6.4cc, 5-6.4dd, 5-6.4ee, 5-6.4ff, and 5-6.5f. In addition, two legislative CATEXs, consistent with Section 213(c) of the FAA Modernization and Reform Act of 2012, are added (see Paragraphs 5-6.5q and 5-6.5r). CATEXs that are substantively amended are in Paragraphs 5-6.4e (formerly 310e), 5-6.4i (formerly 310i), 5-6.4u (formerly 310u), and 5-6.5l (formerly 311l).

1-10.19. Environmental Assessment Format and Process. Revises the discussion of EA format and process to make the process more efficient and effective, explain each element, and clarify that an EA does not have to be as detailed as an EIS (see Paragraph 6-2). Adds cross-references to the EIS section, and makes additional minor revisions.

1-10.20. Use of Errata Sheets. The Order clarifies when errata sheets may be used in lieu of a final EA (see Paragraph 6-2.2.i) and final EIS (see Paragraph 7-1.2.f).

1-10.21. Privacy. Requires language in notices soliciting public comment on draft EAs and draft EISs stating that personal information provided by commenters (e.g., addresses, phone numbers, and email addresses) may be made publicly available (see Paragraphs 6-2.2.g and 7-1.2.d(1)(a)).

1-10.22. Termination of Environmental Impact Statement Preparation. Adds a new paragraph to explain the conditions under which the FAA may choose to terminate preparation of an EIS and clarifies what steps the FAA must take when this situation occurs (see Paragraph 7-1.3).

1-10.23. Adoption of Other Agencies' National Environmental Policy Act Documents. Clarifies and expands on requirements relating to FAA adoption of other agencies' NEPA documents (see Paragraph 8-2). Adds requirements for legal sufficiency review of adopted documents to clarify when this review is required (see Paragraph 8-2.c). Also adds a discussion of recirculation requirements to highlight that in some circumstances adopted documents must be recirculated (see Paragraph 8-2.e).

1-10.24. Actions within the United States with Potential Transboundary Impacts. Adds discussion of FAA policy with respect to consideration of transboundary impacts resulting from FAA actions (see Paragraph 8-5).

1-10.25. Environmental Effects of Major Federal Aviation Administration Actions Abroad. Updates the discussion of international actions to include how to coordinate communication with foreign governments within the FAA to clarify the correct practice. (See Paragraph 8-6).

1-10.26. Emergency Actions. Clarifies an alternative process to consider environmental impacts before taking emergency actions necessary to protect the lives and safety of the public. These alternative arrangements are limited to actions necessary to control the immediate impacts of an emergency. Adds text to provide for emergency procedures when a CATEX or an EA would be the appropriate level of NEPA review (see Paragraph 8-7). FAA Order 1050.1E only addressed emergency procedures for EISs.

1-10.27. Written Re-evaluations. Modifies and clarifies requirements relating to written re-evaluations. Adds a statement to explain that written re-evaluations may be prepared even when they are not required. Adds discussion of decision documents in connection with written re-evaluations (i.e., a "WR/ROD"). (See Paragraph 9-2)

1-10.28. Review and Approval. Consolidates and clarifies provisions relating to review, approval, and signature authority for FAA NEPA documents (see Chapter 10).

1-10.29. Authority to Change This Order. Revises text in Paragraph 11-2 to clarify the authority of various parties and to be consistent with other FAA Orders.

1-10.30. Explanatory Guidance. Clarifies provisions relating to explanatory guidance (see Paragraph 11-4).

1-10.31. Definitions. Adds definitions of "extraordinary circumstances," "NEPA lead," "special purpose laws and requirements," and "traditional cultural properties." Deletes definition of "Environmental Due Diligence Audit" because this term is no longer used in FAA Order 1050.1F. Revises the definitions of "environmental studies," "approving official," and "decisionmaker" to reflect current practice. Revises the definition of "human environment" to align with the CEQ Regulations. Changes "launch facility" to "commercial space launch site" to be consistent with 14 CFR part 420. Revises the definition of "noise sensitive area" to include a reference to Table 1 of 14 CFR part 150 rather than Appendix A of FAA Order 1050.1E, to provide context in light of the removal of Appendix A from this Order. "Major federal action" was added to the list of definitions as a cross reference to the CEQ Regulations. (See Paragraph 11-5.)

1-11. -1-50. Reserved.

Chapter 2: National Environmental Policy Act Planning and Integration

2-1. Applicability of National Environmental Policy Act Procedures to Federal Aviation Administration Actions.

2-1.1. Federal Aviation Administration Actions Subject to National Environmental Policy Act Review. Proposed actions and decisions by FAA officials are subject to NEPA review, except as provided in Paragraph 2-1.2 below. Specific FAA actions subject to NEPA review can include, but are not limited to, grants, loans, contracts, leases, construction and installation actions, procedural actions, research activities, rulemaking and regulatory actions, certifications, licensing, permits, plans submitted to the FAA that require the FAA's approval, and legislation proposed by the FAA. Although emergency actions are subject to NEPA review, special procedures may apply (see Paragraph 8-7). The FAA will not approve a proposed action until any required NEPA review has been completed.

2-1.2. Federal Aviation Administration Actions Not Subject to National Environmental Policy Act Review.

a. General. Actions are not subject to NEPA review if applicable Federal law expressly prohibits or makes compliance with NEPA impossible.

b. Advisory Actions. Some Federal actions are of an advisory nature. Actions of this type are not considered major Federal actions under NEPA, and NEPA review is therefore not required. If it is known or anticipated that some subsequent Federal action would be subject to NEPA, the FAA must so indicate in the advisory action. Examples of advisory actions include:

(1) Determinations under 14 CFR part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*;

(2) Determinations under 14 CFR part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*, which applies to civil or joint-use airports, helipads, and heliports; and

(3) Designation of alert areas and warning areas under FAA Order 7400.2, *Procedures for Handling Airspace Matters*.

c. Judicial or Administrative Civil Enforcement Actions. These actions do not require NEPA analysis (i.e., 14 CFR part 13, *Investigative and Enforcement Procedures*, and other administrative actions pursuant to the following: 14 CFR part 14, *Rules Implementing the Equal Access to Justice Act of 1980*; 14 CFR part 15, *Administrative Claims Under Federal Tort Claims Act*; 14 CFR part 16, *Rules of Practice for Federally-Assisted Airport Enforcement Proceedings*; and 14 CFR part 17, *Procedures for Protests and Contracts Disputes*).

d. Administrative Actions. NEPA review is not required for the promulgation of this Order or similar orders issued by the FAA Administrator or organizational elements as authorized by the FAA Administrator that provide supplemental instructions for agency compliance with NEPA procedures. NEPA review is also not required for administrative actions associated with a NEPA review (e.g., contractor selection).

2-2. Responsibilities.

2-2.1. Responsibilities of the Federal Aviation Administration.

a. General FAA Responsibilities:

(1) Ensuring compliance with NEPA, the CEQ Regulations, this Order, and other environmental requirements;

(2) Requesting appropriate environmental information and documents (including EAs, where appropriate) from applicants and providing guidance to applicants on providing such information;

(3) Independently and objectively evaluating applicant-submitted information and EAs and taking responsibility for content and adequacy of any such information or documents used by the FAA for compliance with NEPA or other environmental requirements;

(4) Selecting contractors to prepare environmental documents, guiding their work, and taking responsibility for contractor-prepared documents used by the FAA for compliance with NEPA or other environmental requirements; and

(5) Making CATEX determinations, approving EAs and EISs, and issuing Finding of No Significant Impact (FONSIs) and RODs.

b. Roles of Lines of Business/Staff Offices (LOB/SOs). The Chief Operating Officer and Assistant or Associate Administrators within the various FAA organizations must ensure their respective offices, regions, service areas, and centers comply with this Order. Responsibilities may be delegated in accordance with appropriate FAA orders, such as FAA Order 1100.154, *Delegations of Authority*.

(1) *The FAA Administrator* is responsible for managing the FAA with the assistance of the *Deputy Administrator*. Ultimately, the FAA Administrator is responsible for all NEPA compliance within the FAA.

(2) Each *FAA Associate and Assistant Administrator, the Chief Counsel, and the Chief Operating Officer* reports to the FAA Administrator and has specific responsibilities for complying with the NEPA process within their LOB/SO. These responsibilities are outlined below.

(a) *The Assistant Administrator for Civil Rights (ACR)* is responsible for determining whether projects receiving Federal financial assistance from the FAA comply with the appropriate civil rights laws, regulations, and Executive Orders, including those requirements under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, 59 *Federal Register* 7629 (February 16, 1994); the accompanying Presidential Memorandum, *Environmental Justice for Minority Populations* (February 11, 1994) (available at http://www.epa.gov/environmentaljustice/resources/policy/index.html) concerning environmental justice; the *Memorandum of Understanding on Environmental Justice and Executive Order 12898* (August 4, 2011), the revised *Department of Transportation Environmental Justice Strategy*, 77 *Federal Register* 18879 (March 28, 2012), and DOT Order 5610.2(a), 77 *Federal Register*

27534 (May 10, 2012), on environmental justice in the context of Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. §§ 2000d-2000d-7.

(b) *The Office of the Chief Counsel (AGC)* consists of legal staff at FAA Headquarters, FAA regions, and the Mike Monroney Aeronautical Center and William J. Hughes Technical Center (collectively referred to as "Center"). AGC is responsible for providing legal advice on NEPA compliance and legal requirements. AGC reviews actions that involve determinations under Section 4(f), 49 U.S.C. § 303; counsels and assists headquarters staff and regional offices in accomplishing FAA environmental review; and advises on the legal sufficiency of environmental documents. Regional Counsel and Center Counsel are responsible for providing legal counsel, assistance, and review in the conduct of regional actions and environmental activities and advising on the legal sufficiency of regional and Center environmental documents.

(c) *The Assistant Administrator for Human Resource Management (AHR)* is responsible for supporting the training needs associated with this order by leveraging the resources in the Office of Talent Development (AHD). AHD will work collaboratively with the Office of Environment and Energy (AEE) to promote the training and education needed to reinforce the National Environmental Policy Act (NEPA). AHD will work in partnership with the Mike Monroney Aeronautical Center (MMAC) and the LOB/SO learning professionals to deliver designated content.

(d) *The Assistant Administrator for NextGen (ANG)* provides leadership in planning and developing the Next Generation Air Transportation System (NextGen) and coordinates NextGen initiatives, programs, and policy development across the various FAA LOB/SOs.

(e) *The Assistant Administrator for Policy, International Affairs, and Environment (APL)* is responsible for providing policy guidance to the agency on implementing a wide range of environmental laws and regulations. Within APL, AEE provides policy oversight on FAA environmental actions; issues regulations for aircraft noise and emissions under 14 CFR parts 34 and 36; provides assistance in developing guidelines and procedures for FAA program areas; serves as the designated FAA NEPA liaison in accordance with 40 CFR § 1507.2, CEQ Regulations, "to be responsible for overall review of agency NEPA compliance" and Federal Preservation Officer in accordance with Section 110 of the National Historic Preservation Act, 54 U.S.C. §§ 306101(a) and 306102[1]; interprets policies established in this Order; provides assistance with computerized environmental tools, such as the Aviation Environmental Design Tool (AEDT) for aircraft noise and air quality; and provides advice to and supplements NEPA training programs in cooperation with AHT and other applicable organizational elements.

[1] The National Historic Preservation Act was previously codified at 16 U.S.C. § 470 et seq.

(f) *The Assistant Administrator for Office of Finance and Management (AFN)* is responsible for considering the environmental impacts of actions arising out of Acquisition Management Operations.

(g) *The Associate Administrator for Airports (ARP)* is responsible for considering the environmental impacts of proposed FAA approvals of Airport Layout Plan (ALP) modifications (regardless of funding sources), FAA-funded airport actions, and ensuring compliance with NEPA requirements and other Federal environmental laws, regulations, and orders. Airports personnel must comply with the NEPA requirements in this Order, supplemented by the current version of FAA Order 5050.4, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*. ARP's Office of Airport Planning and Programming, APP-400, provides guidance to Regional and District Airports personnel, airport sponsors, and environmental consultants concerning Federal, Departmental, and agency environmental policy regarding airport development actions.

(h) *The Assistant Administrator for Security and Hazardous Materials (ASH)* is responsible for considering the environmental impacts for all actions arising out of ASH initiatives that require compliance with NEPA and Federal environmental laws, regulations, and orders. ASH initiatives involve ensuring and promoting aviation safety in support of national security and the national aerospace system.

(i) *The Associate Administrator for Commercial Space Transportation (AST)* is responsible for considering the environmental impacts for all actions arising out of AST initiatives that require compliance with NEPA and other Federal environmental laws, regulations, and orders. Such initiatives include issuing licenses for the operation of commercial launch sites and licenses and experimental permits for the launch and reentry of commercial space launch vehicles.

(j) *The Chief Operating Officer for Air Traffic Organization (ATO)* is responsible for evaluating the environmental impacts for all actions arising out of ATO responsibilities that require compliance with NEPA and all other relevant Federal environmental laws, regulations, and orders, including changes in airspace and air traffic control procedures and FAA-funded construction and operation of National Airspace System (NAS) facilities.

(k) *The Associate Administrator for Aviation Safety (AVS)* is responsible for considering the environmental impacts of all actions arising out of AVS initiatives that require compliance with NEPA and other Federal environmental laws, regulations, and orders. AVS initiatives include the certification, production approval, and continued airworthiness of aircraft; and certification of pilots, mechanics, and others in safety-related positions.

c. Actions Undertaken by the FAA. The FAA may prepare environmental documentation in-house (i.e., using agency personnel and resources) or use a contractor in accordance with Paragraph 2-2.1.f below. For projects directly undertaken by the FAA and requiring an EA or EIS, the EA or EIS must be prepared at the feasibility analysis (go/no-go) stage and may be supplemented at a later stage.

d. FAA Approval of Applicant Actions. When an applicant requests FAA approval for an action, the FAA may request that the applicant submit information and analysis to support the required NEPA review. The FAA must independently evaluate any information or analysis submitted by an applicant before using it to support a NEPA review. The FAA may also request that an applicant prepare an EA. If an applicant prepares an EA, the FAA must ensure that the applicant complies with all requirements set forth in Paragraph 2-2.2, Responsibilities of Applicants. The FAA must advise and assist the applicant during preparation of the EA, and must independently evaluate and take responsibility for the EA to ensure that: (1) the applicant's potential conflict of interest does not impair the objectivity of the document; and (2) the EA meets the requirements of this Order.

The FAA may ask the applicant to correct any deficiencies in information, analysis, or an EA submitted by the applicant if the FAA is not satisfied with the original submittal or subsequent revisions. In such cases, the responsible FAA official will defer completion of the environmental review pending satisfactory correction of all identified deficiencies. Based on final review of an applicant submitted EA, the FAA determines whether to issue a FONSI or prepare an EIS. See Paragraph 6-2.1.a for a discussion on when an EA becomes a Federal document.

When an EIS is required, the FAA must prepare the EIS or select the contractor that will assist the FAA in preparing the EIS (see 40 CFR § 1506.5(c), CEQ Regulations). If "third-party contracting" is used to prepare an EIS, the FAA must select and supervise the contractor (see Paragraph 2-2.3). Third-party contracting refers to the preparation of an EIS by a contractor selected by the FAA and under contract to, and paid for by, an applicant (see Appendix C).[2] The FAA must take responsibility for contractor-prepared documents used by the FAA and determine that they are in compliance with this Order.

e. State Block Grant Program Responsibilities for FAA Connected Actions. The State Block Grant Program participating states must ensure that they coordinate and obtain approval from the appropriate LOB/SO for any proposed action that involves aspects that are not authorized under the State Block Grant Program. Please see FAA Order 5050.4 for more information.

f. Use of Contractors.

(1) General. When contractors assist the FAA in preparing EAs or EISs, or when contractors directly assist applicants in preparing EAs, the FAA must ensure that the contractor complies with the provisions of this Order. When an EIS is required, the FAA must select the contractor that will assist the FAA in preparing the EIS (see 40 CFR § 1506.5(c), CEQ Regulations). If "third-party contracting" is used to prepare an EIS, the FAA must select and supervise the contractor (see Paragraph 2-2.3).

[2] The FAA may use third-party contracting for an EA when there is a high potential that the action may require an EIS.

(2) Conflict of Interest. In some circumstances, the FAA may choose to contract consulting services to prepare environmental documents for its direct Federal actions. Under FAA Acquisition Management System policy, procurements may not be awarded to contractors who have unacceptable actual or potential organizational conflicts of interest. Organizational conflicts of interest result when, because of activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance to the agency, or the person's objectivity in performing the contract work is or might be impaired, or the person has an unfair competitive advantage (the term "person" includes any legal entity including a partnership, corporation, limited liability company, or association). For example, a contractor selected to prepare an EA or EIS would have a potential conflict of interest if also selected to conduct final design work when the final design work is part of the construction contract. "Final design work" means a bid-ready, site-specific design package containing drawings, design data handbook, and construction cost estimate. The FAA may select a contractor to prepare an EA or EIS and preliminary design work provided the design work is conceptual in nature. "Preliminary design work" means design to local criteria based on a national facility design. When an actual or potential conflict of interest is identified by either the contractor or the agency official, the agency official must consult with AGC or Regional Counsel to determine whether there is a conflict and, if so, whether the conflict can be avoided, mitigated, or waived at the FAA's discretion. Such determinations are made on a case-by-case basis (see the FAA's Procurement Toolbox Guidance, Section T3.1.7 Organizational Conflict of Interest, dated April 4, 2006).

(3) EIS Disclosure Statement. Before a contractor enters into a contract for preparation of an EIS, the FAA must obtain a "disclosure statement" from the NEPA contractor and subcontractors verifying that they have no financial interest in the outcome of the action (see 40 CFR § 1506.5(c), CEQ Regulations).

2-2.2. Responsibilities of Applicants. When an applicant seeks FAA approval for an action that does not require an EIS, the FAA may request that the applicant provide the required environmental analysis to the FAA or the FAA may hire a contractor to provide the analysis. Applicants and contractors may provide data and analysis to assist the FAA in determining whether a CATEX applies (including whether an extraordinary circumstance exists); however, applicants and contractors may not determine the applicability of CATEXs or approve CATEX documentation. Applicants may prepare EAs, but may not prepare EISs. However, applicants may fund preparation of EISs through third-party contracting. In such cases, the FAA must select the contractor and supervise the contractor's duties and responsibilities. For applications to the FAA requiring an EA or EIS, preparation of the EA or EIS must begin immediately after the FAA receives the application or proposal. If required by the responsible FAA official, applicants must provide sufficient environmental information or analysis to ensure the environmental analysis meets the requirements of this Order. In a third-party contracting situation, the role of the applicant is limited to providing planning information, environmental studies (including studies to obtain incomplete information that the FAA finds to be required under the standards of 40 CFR § 1502.22, CEQ Regulations), other FAA-requested information, and financing for the EIS consultant's costs. For the FAA's role in applicant actions, see Paragraph 2-2.1.d.

2-2.3. Responsibilities of Contractors. Contracted consulting services may be used to prepare environmental documents, technical reports, and other information. Contractors may also prepare background or supplemental material or otherwise assist in preparing draft or final environmental documents for the FAA. When a contractor assists the FAA in preparing an EA or EIS, the contractor must ensure that the EA or EIS meets the requirements of the CEQ Regulations, this Order, other FAA requirements applicable to contractors, and all other appropriate Federal, state, tribal, and local laws. The contractor for an EIS must also execute a disclosure statement specifying that it has no financial or other interest in the outcome of the action (see 40 CFR § 1506.5(c), CEQ Regulations). The disclosure statement must be prepared by the FAA or, where appropriate, a cooperating agency (e.g., where the contractor prepares a portion of an EIS for a cooperating agency under 40 CFR § 1501.6(b), CEQ Regulations).

2-3. Planning and Integration.

2-3.1. Early Planning. Environmental issues should be identified and considered early in a proposed action's planning process to ensure efficient, timely, and effective environmental review. Initiating the appropriate level of environmental review at the earliest possible time facilitates the NEPA process. Preparation for any applicable permit application and other review process requirements should be part of the planning process to ensure that necessary information is collected and provided to the permitting or reviewing agencies in a timely manner. The FAA or applicant, as applicable, should identify known environmental impact categories that the proposed action and the alternatives could affect, including specially protected resources. These tasks should be completed at the earliest possible time during project planning to ensure full consideration of all environmental impact categories and facilitate the FAA's NEPA process. Sufficient planning and project justification should be available to support the environmental review.

If the FAA is considering a request from an applicant, and the FAA is aware that the applicant is about to take an action within the agency's jurisdiction that would have an adverse environmental impact or limit the choice of reasonable alternatives, the responsible FAA official will promptly notify the applicant that the FAA will take appropriate action to ensure that the objectives and procedures of NEPA are achieved (see number 11 in CEQ's *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *Federal Register* 18026 (March 23, 1981)). However, this does not preclude development by applicants of plans or designs or performance of other work necessary to support an application for Federal, state, or local permits or assistance.

2-3.2. Initial Environmental Review.

a. Review Proposed Action. The responsible FAA official should initially review whether the proposed action:

(1) Is within the scope of a CATEX;

(2) Has been addressed in an existing NEPA document, such as a broad system, program, or regional assessment (see Paragraph 3-2) or a NEPA document prepared by another Federal agency (see Paragraph 8-2);

(3) Could significantly affect the quality of the human environment with respect to noise; land; air; water; wildlife (e.g., threatened and endangered species, migratory

birds); energy supply and natural resources; or cultural, historic, or archeological resources;

(4) Would be located in wetlands; floodplains; coastal zones; prime or important farmlands; habitat of federally listed endangered, threatened, or other protected species; wild and scenic river areas; areas protected under Section 4(f), 49 U.S.C. § 303,[3] or Section 6(f) of the Land and Water Conservation Fund Act (16 U.S.C. §§ 460l-8(f)(3)); or in or adjacent to minority or low income populations (Executive Order 12898 and DOT Order 5610.2(a)); or

(5) Would be highly controversial on environmental grounds (see Paragraph 5-2.b.(10)).

b. Scope of Proposed Action. To determine the scope of an EA or EIS, the responsible FAA official must consider:

(1) Connected actions. Connected actions are closely related actions that: (a) automatically trigger other actions; (b) cannot or will not proceed unless other actions are taken previously or simultaneously; or (c) are interdependent parts of a larger action and depend on the larger action for their justification (see 40 CFR § 1508.25(a)(1), CEQ Regulations). Connected actions and other proposed actions or parts of proposed actions that are related to each other closely enough to be, in effect, a single course of action must be evaluated in the same EA or EIS (see 40 CFR §§ 1502.4(a) and 1508.25(a)(1), CEQ Regulations). A proposed action cannot be segmented by breaking it down into small component parts to attempt to reduce impacts (see 40 CFR § 1508.27(b)(7), CEQ Regulations).

(2) Cumulative actions. Cumulative actions, when viewed with other proposed actions, have cumulatively significant impacts. Cumulative actions should be discussed in the same EIS (see 40 CFR § 1508.25(a)(2), CEQ Regulations). (See Paragraph 4-2.d(3) for a discussion of cumulative impacts).

(3) Similar actions. Similar actions, such as those with common timing or geography, should be considered in the same environmental document when the best way to assess their combined impacts or reasonable alternatives to such actions is in a single document (see 40 CFR §§ 1502.4(b) through (c) and 1508.25(a)(3), CEQ Regulations).

c. Special Purpose Laws and Requirements. In addition to NEPA compliance, the FAA must comply with all other applicable special purpose laws and requirements. The FAA and applicants must involve other agencies during the NEPA process and meet the public involvement needs specified in all applicable special purpose laws and requirements.

d. Permits and Consultations. Environmental permits, licenses, and other forms of approval, concurrence, consultation, or cooperation may be required from other agencies. Pertinent permit application and other review processes must be included in the planning process to ensure that the necessary supporting information is collected and provided to

[3] 49 U.S.C. § 303 was originally enacted as Section 4(f) of the Department of Transportation Act of 1966 and is still commonly referred to as "Section 4(f)".

the permitting or reviewing agencies in a timely manner, especially if the applicable special purpose laws and requirements specify timeframes for these processes.

2-3.3. Environmental Management System Approach. EMSs provide a proactive systematic approach for managing and improving environmental performance and stewardship. Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management,* 72 *Federal Register* 3919 (January 26, 2007), requires Federal agencies to use EMS as the primary management approach for addressing environmental aspects of agency operations and activities, including environmental aspects of transportation functions. The most common framework for an EMS is a plan-do-check-act process, with the goal of continual improvement in environmental performance. A strategic EMS approach provides the foundation for integrating environmental objectives into NextGen and other FAA initiatives in furtherance of the goal of environmental protection that allows sustained aviation growth.

The EMS approach may be used to support the early identification and consideration of potential environmental impacts and concerns in a proposed action's planning phase. EMS data collection, tracking, and analysis may also be useful in the preparation of NEPA documentation, including providing input to the affected environment, assessment of potential impacts, and consideration of appropriate mitigation measures. An EMS approach may also be used for tracking and monitoring mitigation commitments. An EMS approach can produce projects that are better tailored to site-specific circumstances, can benefit from expedited reviews due to reduced impacts (and therefore less NEPA documentation), and experience less public controversy.

CEQ has recognized the potential benefits of aligning EMS with NEPA in the guide *Aligning National Environmental Policy Act Processes with Environmental Management Systems – A Guide for NEPA and EMS Practitioner* (April 2007). The CEQ guide includes examples of ways that an EMS can complement the NEPA process and support the various phases of NEPA review.

2-3.4. Reducing Paperwork. The CEQ Regulations (see 40 CFR § 1500.4, CEQ Regulations) encourage the reduction of excessive paperwork by, among other things:

a. Reducing the length of EISs;

b. Preparing analytic rather than encyclopedic EISs;

c. Discussing only briefly issues other than significant issues;

d. Writing EISs in plain language;

e. Following a clear format for EISs;

f. Emphasizing portions of EISs that are useful to decisionmakers and the public and reducing emphasis on background material;

g. Using the scoping process to identify significant environmental issues deserving of study and de-emphasize insignificant issues, narrowing the scope of the EIS accordingly;

h. Incorporating material by reference;

i. Integrating NEPA requirements with other environmental review and consultation requirements; and

j. Eliminating duplication with (1) state and local procedures by providing for joint document preparation, and (2) with other Federal procedures by providing for joint preparation, incorporation by reference, or adoption of appropriate environmental documents prepared by another agency.

The FAA will apply these concepts to all NEPA reviews (analyses and documents).

2-3.5. Reducing Delay. The CEQ Regulations (see 40 CFR § 1500.5) encourage the reduction of delay while allowing for public involvement and interagency and intergovernmental consultation by, among other things:

a. Integrating the NEPA process into early planning;

b. Emphasizing interagency cooperation before an EIS is prepared;

c. Ensuring the swift and fair resolution of lead agency disputes;

d. Using the scoping process for early identification of what are and what are not the real issues;

e. Integrating NEPA requirements with other environmental review and consultation requirements; and

f. Eliminating duplication with state and local procedures and with other Federal procedures.

The FAA will apply these concepts to all NEPA reviews (analyses and documents).

2-3.6. Mitigation.

a. Incorporation into Project Design. Throughout the environmental analysis process, the responsible FAA official is encouraged to incorporate mitigation into project design (e.g., by modifying the project) to avoid and minimize environmental impacts. Appropriate mitigation incorporated into project design can also have the advantage of reducing the level of required environmental review from an EIS to an EA and FONSI, or avoiding extraordinary circumstances that would preclude application of a CATEX. Mitigation incorporated into project design should be consistent with the project's purpose and need and must be clearly described in the appropriate alternatives. For projects involving an applicant, the FAA will coordinate proposed mitigation with the applicant for purposes of ascertaining the feasibility of the proposed mitigation and alternative mitigations. For further information on mitigation of project impacts see Paragraphs 4-4, 6-2.3, and 7-1.1.h.

b. Expertise. When identifying mitigation measures for specific environmental impact categories, the responsible FAA official must coordinate with subject matter experts that have expert knowledge, training, and experience related to the resource(s) potentially impacted by the proposed action.

2-4. Coordination.

2-4.1. Internal Federal Aviation Administration Coordination. The FAA's internal review process is a means of coordinating NEPA reviews among appropriate management levels and across LOB/SOs. Internal review ensures effective coordination to (1) address the concerns of other offices in addition to the NEPA lead; (2) to include relevant actions of

other offices within the purview of the NEPA review; (3) to confirm any requirements or commitments of other offices; and (4) to provide for appropriate legal review. Additional information on the internal review and approval of NEPA documents is provided in Chapter 10 of this Order.

2-4.2. Lead and Cooperating Agencies. The CEQ Regulations describe (1) the role of the lead agency in preparing EISs when more than one agency is involved in a proposed action; (2) the relationship of the lead agency with cooperating agencies; and (3) the role of the lead agency in the scoping process and in setting time limits (see 40 CFR §§ 1501.5-1501.8, CEQ Regulations). The regulations also allow for joint lead agencies (see 40 CFR § 1501.6(b)).

a. Lead Agency. When the FAA acts as the lead agency, the FAA has the primary responsibility for preparation of an EA or EIS (see 40 CFR §1501.5, CEQ Regulations and CEQ Memorandum, *Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act* (January 30, 2002)). If more than one FAA office is involved in the same action, the approving FAA officials of the FAA offices involved in the action should determine the lead FAA office responsible for the NEPA process. The other FAA offices should assist the FAA NEPA lead as that office deems necessary to prepare the document.

b. Cooperating Agency Invitation. The FAA NEPA lead should invite Federal, state, tribal, and local agencies with special expertise or jurisdiction by law to be cooperating agencies (see 40 CFR §§ 1501.6 and 1508.5, CEQ Regulations, and CEQ Memorandum, *Designation of Non-Federal Agencies to be Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act* (July 28, 1999)).

c. Role as a Cooperating Agency. If the FAA is acting as a cooperating agency, the responsible FAA official should ensure that the FAA's views are adequately reflected in the environmental document (see Paragraph 8-1.b). This should be facilitated by actively communicating with the lead agency early and often in the NEPA process.

2-4.3. Intergovernmental and Interagency Coordination. The responsible FAA official, when appropriate, must consult affected Federal and state agencies, tribes, and local units of government early in the NEPA process. Early coordination should include coordinating with operators of facilities (e.g., airport sponsors) affected by proposed FAA actions. Applicants may also engage in intergovernmental and interagency coordination, subject to protocols for government-to-government consultation with tribes. Consultation comments on the potential environmental impacts of the proposed action must be considered in determining whether the proposed action requires an EA or EIS, and can aid in the preparation of the EA or EIS. See Paragraphs 2-3.2.c and 2-3.2.d and the 1050.1F Desk Reference regarding requirements for coordination and consultation that may apply under special purpose laws and requirements.

In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs,* 47 *Federal Register* 30959 (July 16, 1982) (as supplemented by Executive Order 13132, *Federalism,* 64 *Federal Register* 43255 (August 10, 1999), and 49 CFR part 17, *Intergovernmental Review of Department of Transportation Programs and Activities*), the responsible FAA official must provide the opportunity for state and local officials to review and comment on Federal actions for Federal assistance or actions affecting them. A few states have established a point of contact, often within the governor’s office, to coordinate

comments by state agencies. Otherwise, the responsible FAA official should contact appropriate state agencies directly.

2-4.4. Tribal Consultation. Government-to-government consultation must be conducted in accordance with the requirements of FAA Order 1210.20, *American Indian and Alaska Native Tribal Consultation Policy and Procedures*. In accordance with Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*, 65 *Federal Register* 67249 (November 9, 2000), the Federal government continues to work with tribes on a government-to-government basis to address issues concerning tribal self-government, trust resources, and tribal treaty and other rights. For regulations, legislative comments, or proposed legislation, and other policy statements or actions that have substantial direct effects on Federally Recognized Tribes, the appropriate FAA official should initiate consultation with the recognized leader of the Tribe and seek advice on how to proceed based on the tribal culture and the tribal organization as discussed in FAA Order 1210.20. Sources of information for addresses to contact tribes include, for example, State Historic Preservation Offices, the Bureau of Indian Affairs, the FAA's Federal Historic Preservation Officer, and the FAA's National or Regional Tribal Consultation Officials. (See also Paragraph 2-4.3, Intergovernmental and Interagency Coordination).

2-5. Public Involvement. NEPA and the CEQ Regulations, in describing the public involvement process, require Federal agencies to: consider environmental information in their decision-making process; solicit appropriate information from the public; fully assess and disclose potential environmental impacts resulting from the proposed action and alternatives; and provide the public with this information and allow it to comment on these findings. Public involvement is also required when the FAA revises its rules, or proposes substantial changes to its NEPA implementing instructions. Strategic planning is needed to successfully integrate public involvement and NEPA. Failure to complete public participation can delay the process and, therefore, the proposed action.

2-5.1. Timing and Extent of Public Involvement. The FAA, or when applicable, the applicant, must provide pertinent information to the affected communities and agencies and consider their comments at the earliest appropriate time and early in the process of preparing an EIS. The extent of early coordination will depend on the complexity, sensitivity, degree of Federal involvement, and anticipated environmental impacts. Comments received during early coordination/scoping and during public review of a draft NEPA document on the potential impacts of the proposed action and any reasonable alternatives identified must be considered. Additional information regarding public involvement is discussed in Paragraphs 6-2.2 for EAs and 7-1.2 for EISs. The length of public comment periods is discussed in Paragraphs 6-2.2.g and 7-1.2.d.

2-5.2. Federal Aviation Administration Requirements for Public Involvement. The FAA's *Community Involvement Policy Statement* (April 17, 1995) affirms the FAA's commitment to make complete, open, and effective public participation an essential part of its actions, programs, and decisions.

a. Special Purpose Laws and Requirements. The FAA and applicant must involve, and are encouraged to work cooperatively with, other agencies during the NEPA process and meet the public involvement needs specified in all the special purpose laws and requirements applicable to a proposed FAA action. The FAA and applicant should use

available information technologies to inform the public about the progress of environmental reviews, the availability of draft environmental documents for review and the duration of public comment periods, where applicable, and the availability of final environmental documents. NEPA also serves as a framework statute for environmental compliance and the required public notice and comment period should, whenever possible, be completed in alignment with the public notice and participation requirements specified in other applicable special purpose laws and requirements, e.g., Section 106 of the National Historic Preservation Act, 54 U.S.C. § 36108, 36 CFR part 800, *Protection of Historic Properties*, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* 59 *Federal Register* 7629 (February 16, 1994) and DOT Order 5610.2(a), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

b. Environmental Justice. The responsible FAA official must, to the extent practicable, make every effort to notify potentially affected minority populations and low-income populations of proposed actions and their impacts. The FAA should make direct contact with minority and low-income community groups, organizations, and/or leaders in communities affected by the activity. If direct contact is not practicable, the responsible FAA official must take steps to provide the public, including members of minority populations and low-income populations, access to public information concerning the human health or environmental impacts of the proposed action, including information that will address the concerns of minority and low income populations regarding the health and environmental impacts of the proposed action. The responsible FAA official should notify the public at the earliest stages of project planning. The FAA will provide public involvement opportunities and consider the results thereof, including soliciting input from affected minority and low-income populations on the proposed action and any alternatives. The FAA can hold public hearings, meetings, or workshops on NEPA documents to involve the public in the process. Provisions should be made to ensure that non-English speaking populations receive proper notification of the proposed action and any public hearings, meetings or workshops that are held. (See Executive Order 12898 and DOT Order 5610.2(a)).

c. Other Agency Public Involvement Requirements. When another Federal agency disposing of land is the lead agency pursuant to NEPA, the FAA should defer to the public involvement requirements of the agency having jurisdiction over those lands when those requirements do not curtail the FAA requirements.

d. Rulemaking. When the FAA prepares a draft EIS for a rulemaking activity that could cause significant environmental impacts, the responsible FAA official should consult with the Office of Rulemaking (ARM-1) and AGC to coordinate public involvement.

e. Classified Information. When dealing with classified information, the responsible FAA official must consult FAA Order 1600.2, *Safeguarding Classified National Security Information*.

2-5.3. Public Meetings, Workshops, and Hearings.

a. Holding Public Meetings, Workshops, and Hearings. The FAA should hold public meetings, workshops, or hearings, when appropriate. Such events can provide timely opportunities to discover potential controversial issues. Some factors that are helpful in deciding if a hearing, workshop, or meeting is appropriate include:

(1) The proposed action's magnitude in terms of environmental impact, environmental controversy, cost, and/or extent of the affected geographical area;

(2) The degree of interest that Federal, state, tribal, or local authorities or the public exhibit; and

(3) The complexity of issues.

The CEQ Regulations also contain criteria for determining whether to hold public meetings or hearings (see 40 CFR § 1506.6(c), CEQ Regulations).

b. Obtaining Comments on a Draft EIS or EA. If the FAA conducts a public meeting or hearing for the purpose of obtaining public comment on a draft EIS or EA, the FAA should ensure that the draft document is available for public review at least 30 days before the event occurs. A public hearing is a formal process that has a designated public hearing officer who presides over the meeting and a court reporter present to compile a transcript of all oral comments. Notice of a public meeting or hearing (including a scoping meeting, see Paragraph 7-1.2.c) should be published (e.g., in local, general circulation newspapers) at least 30 days prior to the event. Notice of actions having national implications must be published in the *Federal Register* and mailed to national organizations having an interest in the matter. The notice should provide the following:

(1) Date, time, place, and interval during which written comments will be accepted;

(2) Description of the proposed action;

(3) Location and availability of the NEPA document; and

(4) Name and contact information of the responsible FAA official.

c. Accommodations. When holding a public meeting or hearing, accommodations must be made for the needs of the elderly, disabled, non-English speaking, minority, and low-income populations in accordance with the Americans with Disabilities Act of 1990, 42 U.S.C. §§ 12101-12213, Executive Order 12898, and DOT Order 5610.2(a).

2-6. Plain Language. The CEQ Regulations at 40 CFR §§ 1500.4(d), 1502.1, 1502.2(c), and 1502.8, Paragraph 14 of DOT Order 5610.1C, and the Executive Orders on environmental justice and intergovernmental consultation encourage the availability of information to the public in a manner that will facilitate public involvement in decisions affecting the human environment. FAA NEPA documentation should be written in plain language and use appropriate graphics so that decisionmakers and the public can readily understand them. The FAA has plain language guidance in FAA Order 1000.36, *FAA Writing Standards*.

2-7. Limitations on Actions Involving Real Property Prior to Completing National Environmental Policy Act Review.

a. Restrictions on Acquisitions of Property. The transfer of title or other interests in real property, including land, may occur prior to the completion of the environmental review for a proposed project unless the acquisition of land is inextricable to the proposed project or effectively limits the choice of reasonable alternatives. The acquisition of land is inextricable to the proposed project where the acquisition is part of one continuous project leading inevitably to the proposed Federal action.

b. Other Circumstances. If the proposed action is not categorically excluded under this Order and acquisition of property is inextricable to the proposed action, no formal action to acquire the property, including any offer, may be taken prior to filing a final EIS or issuance of a FONSI, except for:

(1) emergency situations (see Paragraph 8-7);

(2) obtaining rights-of-way for purposes such as preparation for site testing, obtaining data, property surveys, etc.; and

(3) those cases where the NEPA review process indicates that the proposed site warrants further engineering study. In such cases, the FAA may obtain an option for future purchase of the property. No transfer of title occurs as a result of the option, but the option ensures the availability of the property pending completion of the environmental review. In this event, the environmental document should state that: the FAA has entered into an option and the reason for the option; that alternative sites are being considered; and that a decision whether to exercise the option will not be made until completion of the environmental review.

c. FAA Review. The FAA will review a proposed action by an applicant that has acquired land or constructed a facility for operation by the FAA, but without prior approval by the FAA, to determine whether the action was consistent with the policies of this Order and whether it has limited full and objective consideration of alternatives.

2-8. -2-50. Reserved.

Chapter 3: Levels of National Environmental Policy Act Review

3-1. Three Levels of National Environmental Policy Act Review. Once the FAA determines that NEPA applies to a proposed action, it needs to decide on the appropriate level of review. The three levels of NEPA review are Categorical Exclusion (CATEX), Environmental Assessment (EA), and Environmental Impact Statement (EIS). Each of the three levels of review is briefly described in the following paragraphs.

3-1.1. Categorically Excluded Actions. A CATEX refers to a category of actions that do not individually or cumulatively have a significant effect on the human environment, and for which, neither an EA nor an EIS is required. A CATEX is not an exemption or waiver of NEPA review; it is a level of NEPA review. If a proposed action falls within the scope of a CATEX (see Paragraph 5-6, The Federal Aviation Administration's Categorical Exclusions), and there are no extraordinary circumstances (see Paragraph 5-2, Extraordinary Circumstances), an EA or EIS is not required. The FAA may, at its discretion, decide to prepare an EA in order to assist agency planning and decision-making even if a proposed action fits within a CATEX and extraordinary circumstances do not exist, except for actions subject to categorical exclusion under Section 213 of the FAA Modernization and Reform Act (see Paragraphs 5-6.5.q and 5-6.5.r).

3-1.2. Actions Normally Requiring an Environmental Assessment. The purpose of an EA is to determine whether a proposed action has the potential to significantly affect the human environment (see Paragraph 4-3 for more information on determining significance). An EA is a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI. An EA may facilitate the preparation of an EIS, when one is necessary.

a. Environmental Assessments. An EA, at a minimum, must be prepared when the proposed action does not normally require an EIS (see Paragraph 3-1.3, Actions Normally Requiring an Environmental Impact Statement) and:

(1) does not fall within the scope of a CATEX (see Paragraph 5-6, The Federal Aviation Administration's Categorical Exclusions); or

(2) falls within the scope of a CATEX, but there are one or more extraordinary circumstances (see Paragraph 5-2, Extraordinary Circumstances).

b. Examples. The following FAA actions normally require an EA:

(1) Acquisition of land greater than three acres for, and the construction of, new office buildings and essentially similar FAA facilities.

(2) Issuance of certificates for new, amended, or supplemental aircraft types for which (a) environmental regulations have not been issued; or (b) new, amended, or supplemental engine types for which emission regulations have not been issued; or (c) where a NEPA analysis has not been prepared in connection with a regulatory action.

(3) Establishment of aircraft/avionics maintenance bases to be operated by the FAA.

(4) Authorization to exceed Mach 1 flight under 14 CFR § 91.817, *Civil Aircraft Sonic Boom*.

(5) Establishment of FAA housing, sanitation systems, fuel storage and distribution systems, and power source and distribution systems.

(6) Establishment or relocation of facilities such as Air Route Traffic Control Centers (ARTCC), Airport Traffic Control Towers (ATCT), and off-airport Air Route Surveillance Radars (ARSR), Air Traffic Control Beacons (ATCB), and Next Generation Radar (NEXRAD).

(7) Establishment, relocation, or construction of facilities used for communications (except as provided under Paragraph 5-6.3a) and navigation that are not on airport property.

(8) Establishment or relocation of instrument landing systems (ILS).

(9) Establishment or relocation of approach lighting systems (ALS) that are not on airport property.

(10) Unconditional Airport Layout Plan (ALP) approval of, or Federal financial participation in, the following categories of airport actions:

(a) Location of a new airport that would serve only general aviation;

(b) Location of a new commercial service airport that would not be located in a Metropolitan Statistical Area (MSA);

(c) A new runway at an existing airport that is not located in an MSA;

(d) Runway strengthening having the potential to significantly increase off-airport noise impacts (see Exhibit 4-1);

(e) Construction or relocation of entrance or service road connections to public roads that substantially reduce the level of service rating of such public roads below the acceptable level determined by the appropriate transportation agency (i.e., a highway agency); and

(f) Land acquisition associated with any of the items in (10)(a)–(f).

(11) Approval of operations specifications or amendments that may significantly change the character of the operational environment of an airport, including, but not limited to:

(a) Approval of operations specifications authorizing an operator to use aircraft to provide scheduled passenger or cargo service at an airport that may cause significant impacts to noise, air quality, or other environmental impact categories (see Exhibit 4-1); or

(b) Amendment of operations specifications authorizing an operator to serve an airport with different aircraft that may cause significant impacts to noise, air quality, or other environmental impact categories (see Exhibit 4-1).

(12) New air traffic control procedures (e.g., instrument approach procedures, departure procedures, en route procedures) and modifications to currently approved procedures that routinely route aircraft over noise sensitive areas at less than 3,000 feet above ground level (AGL) (unless otherwise categorically excluded under Paragraphs (procedures category) 5-6.5q and 5-6.5r).

(13) Establishment or modification of an Instrument Flight Rules Military Training Route (IR MTR).

(14) Special Use Airspace (SUA) (unless otherwise explicitly listed as an advisory action (see Paragraph 2-1.2.b, Advisory Actions) or categorically excluded (see Paragraph 5-6, The Federal Aviation Administration's Categorical Exclusions)).

(15) Issuance of any of the following:

(a) A commercial space launch site operator license for operation of a launch site at an existing facility on developed land where little to no infrastructure would be constructed (e.g., co-located with a Federal range or municipal airport); or

(b) A commercial space launch license, reentry license, or experimental permit to operate a vehicle to/from an existing site.

(16) Formal and informal runway use programs that may significantly increase noise over noise sensitive areas (see Exhibit 4-1).

3-1.3. Actions Normally Requiring an Environmental Impact Statement.

a. Environmental Impact Statements. Under NEPA, the FAA must prepare an EIS for actions significantly affecting the quality of the human environment (see Chapter 4 for additional information regarding significance of impacts). An EIS is a detailed written statement required under Section 102(2)(C) of NEPA when one or more environmental impacts would be significant and mitigation measures cannot reduce the impact(s) below significant levels. Direct, indirect, and cumulative impacts must be considered when determining significance (see Paragraphs 4-2.d and 4-3).

b. Examples. The following are actions that normally require an EIS:

(1) Unconditional ALP approval, or Federal financial participation in, the following categories of airport actions:

(a) Location of a new commercial service airport in an MSA;

(b) A new runway to accommodate air carrier aircraft at a commercial service airport in an MSA; and

(c) Major runway extension.

(2) Issuance of a commercial space launch site operator license, launch license, or experimental permit to support activities requiring the construction of a new commercial space launch site on undeveloped land.

3-2. Programmatic National Environmental Policy Act Documents and Tiering. A programmatic review should assist decisionmakers and the public in understanding the environmental impact from proposed large scope federal actions and activities. A programmatic EIS or EA may be prepared to cover (1) a broad group of related actions; or (2) a program, policy, plan, system, or national level proposal that may later lead to individual actions, requiring subsequent NEPA analysis. A programmatic document is useful in analyzing the cumulative impacts of a group of related actions and when the proposed actions are adequately analyzed can serve as the NEPA review for those actions. Programmatic documents may also be useful in

providing the basis for subsequent project-level specific environmental review. A programmatic EIS or EA may contain a broader, less specific, analysis than is done for a specific proposed project. If a programmatic EIS or EA is prepared, the FAA will determine whether project-specific EISs or EAs are needed for individual actions. Broad Federal actions analyzed in a programmatic EIS or EA may be evaluated geographically, generically, or by stage of technological development (see 40 CFR § 1502.4(c), CEQ Regulations).

When a programmatic EIS or EA has been prepared, any subsequent EIS or EA for proposed projects within the scope of the programmatic document only needs to incorporate by reference (40 CFR 1502.21) by summarizing the issues discussed in the programmatic document, providing access to the programmatic EIS or EA, and concentrating the subsequent project specific EIS or EA on site-specific impacts not covered by the programmatic document. The project specific document must state how to obtain a copy of the earlier programmatic document (i.e., a webpage or contact person/office).

The use of a programmatic EIS or EA, and subsequent preparation of a project specific EIS or EA is referred to as "tiering" the environmental review (see 40 CFR §§ 1502.20 and 1508.28, CEQ Regulations). Tiering can also be used to sequence environmental documents from the early stage of a proposed action (e.g., need for the action and site selection) to a subsequent stage (e.g., proposed construction) to help focus on issues that are ripe for decision and exclude from consideration issues not yet ripe or already decided. When this approach is used, the FAA must ensure that the proposed action is not being segmented by describing the independent utility of each stage. Programmatic and tiered EISs and EAs are subject to the same preparation and processing requirements as other EISs and EAs.

3-3. FAA NEPA Database. FAA LOB/SOs will whenever possible, use the FAA NEPA Database to track projects and make final documents available to others in the FAA.

3-4. -3-50. Reserved.

Chapter 4: Impact Categories, Significance, and Mitigation

4-1. Environmental Impact Categories. Environmental impact categories that may be relevant to FAA actions are listed below. These categories are alphabetized below for ease of reference, but are not intended to impose an alphabetical order on the FAA's NEPA documents. Detailed guidance on evaluating impacts in these categories is located in the 1050.1F Desk Reference.[4] Construction and secondary (induced) impacts are addressed within the relevant environmental impact category chapters of the FAA 1050.1F Desk Reference. FAA-specific requirements for assessing impacts are highlighted in Appendix B of this Order and discussed in detail in the 1050.1F Desk Reference.

- Air quality
- Biological resources (including fish, wildlife, and plants)
- Climate
- Coastal resources
- Department of Transportation Act, Section 4(f)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archeological, and cultural resources
- Land use
- Natural resources and energy supply
- Noise and compatible land use
- Socioeconomics, environmental justice, and children's environmental health and safety risks
- Visual effects (including light emissions)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

4-2. Consideration of Impacts.

a. Desk Reference. The 1050.1F Desk Reference provides details on current guidance and updated technical information for each environmental impact category that the FAA examines for its proposed actions and alternatives. The desk reference is available on the FAA website at http://www.faa.gov/about/office_org/headquarters_offices/apl /environ_policy_guidance/policy/. This includes references to current requirements; information about permits, licenses, certificates, or other forms of approval and review; an overview of specific responsibilities for gathering data, assessing impacts, consulting other

[4] The Desk Reference is available on the FAA website at http://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/

agencies, and involving the public; significance thresholds; and factors to consider in evaluating impact significance when there is no significance threshold.

b. FAA-Approved Models. The latest FAA-approved model must be used for both air quality and noise analysis. A list of approved models for each type of analysis is available in the 1050.1F Desk Reference. Prior approval from AEE is required to use other models or methodologies. At the completion of the NEPA process, all input files used in the analysis and corresponding output files must be provided to AEE. Details on requirements for noise analysis are located in Appendix B. In the event a model is updated or replaced after the environmental analysis process is underway, the updated or replacement model may be used to provide additional disclosure concerning noise or air quality impacts, but use of the updated or replacement model is not required.

c. Environmental Impact Category Not Affected. If an environmental impact category is not relevant to the proposed action or any of the reasonable alternatives identified (i.e., the resources included in the category are not present or the category is not otherwise applicable to the proposed action and alternatives), the reason why should be briefly noted and no further analysis is required. Consistent with 40 CFR § 1502.2(b), CEQ Regulations, the responsible FAA official should discuss impacts in proportion to their significance for each applicable environmental impact category.

d. Types of Impacts. Within each applicable environmental impact category, the EA or EIS must address the following types of impacts (for further details, see the 1050.1F Desk Reference):

(1) Direct impacts (see 40 CFR § 1508.8(a), CEQ Regulations);

(2) Indirect (including induced) impacts (see 40 CFR § 1508.8(b), CEQ Regulations); and

(3) Cumulative impacts (see 40 CFR §§ 1508.7, 1508.8, 1508.25, and 1508.27(b)(7), CEQ Regulations, and CEQ Guidance on *Considering Cumulative Effects Under the National Environmental Policy Act* (January 1997)). Cumulative impacts are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, whether Federal or non-Federal. If the proposed action would cause significant incremental additions to cumulative impacts, an EIS is required.

e. Multiple FAA Actions. Some FAA projects involve actions by multiple FAA LOB/SOs; impacts of such actions, when viewed together, govern whether an EA or an EIS is required. Absent independent utility, such actions must be considered in the same EA or EIS.

f. Special Purpose Laws and Requirements. The responsible FAA official should include in the EA or EIS, under appropriate impact categories, the information required to demonstrate compliance with other applicable requirements and should identify any permits, licenses, other approvals, or reviews that apply and indicate any known problems with obtaining them. The EA or EIS must report on the status of any special consultation required (e.g., under Section 7 of the Endangered Species Act, 16 U.S.C. § 1536, Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108, Section

4(f), 49 U.S.C. § 303, or the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1466). Agency consultation(s) should occur concurrently with the NEPA process.

4-3. Significance and Significance Thresholds.

4-3.1. General. An EIS is required when any of the impacts of the proposed action, after incorporating any mitigation commitments, remain significant to the human environment.

4-3.2. Context and Intensity. The CEQ Regulations state that the determination of a significant impact, as used in NEPA, requires consideration of both context and intensity (see 40 CFR § 1508.27). The significance of an impact may vary with the context and setting of a proposed action. Depending on the proposed action, the context may be society as a whole, nationwide, an affected region, affected interests, or a locality. For a site-specific action, significance would usually depend upon local impacts. Both short and long-term impacts are relevant. According to the CEQ Regulations, intensity refers to the severity of the impacts and includes, but is not limited to, consideration of the following:

- Unique characteristics of the geographic area (e.g., proximity to historic or cultural resources, parks, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas);
- Adverse impacts on properties listed or eligible for listing in the National Register of Historic Places;
- Loss or destruction of significant scientific, cultural, or historical resources;
- Adverse impacts on endangered or threatened species or critical habitat;
- Whether an action threatens a violation of Federal, state, or local law or requirements imposed for the protection of the environment;
- Impacts that may be both beneficial and adverse. A significant impact may exist even if the Federal agency believes that on balance the impact will be beneficial;
- The degree to which the effects on the quality of the human environment are likely to be highly controversial; and
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into component parts.

4-3.3. Significance Thresholds. The FAA uses thresholds that serve as specific indicators of significant impact for some environmental impact categories. FAA proposed actions that would result in impacts at or above these thresholds require the preparation of an EIS, unless impacts can be reduced below threshold levels. Quantitative significance thresholds do not exist for all impact categories; however, consistent with the CEQ Regulations, the FAA has identified factors that should be considered in evaluating the context and intensity of potential environmental impacts. If these factors exist, there is not necessarily a significant impact. Some impact categories may have both a significance threshold and significance factors to consider. In these instances, a conclusion of significance can be determined based on the factors to consider even if the impacts do not meet the significance threshold criteria. Depending on the proposed action and potential impacts, other factors may also need to be

evaluated to make a determination of significance. After consideration of all relevant factors, the FAA determines whether there would be a significant impact.

The responsible FAA official should use the most current FAA guidance on consideration of significant impacts for each applicable environmental impact category (identified below in Exhibit 4-1) in the 1050.1F Desk Reference. If the LOB/SO is uncertain whether a proposed action would have significant impacts, it should consult with AEE and AGC for guidance.

Exhibit 4-1 shows the FAA's significance thresholds and factors to consider for each relevant environmental impact category.

Exhibit 4-1. Significance Determination for FAA Actions.

Environmental Impact Category	Significance Threshold	Factors to Consider
Air Quality	*The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.*	
Biological Resources (including fish, wildlife, and plants)	*The U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species, or would result in the destruction or adverse modification of federally designated critical habitat.* The FAA has not established a significance threshold for non-listed species.	The action would have the potential for: • A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport); • Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats; • Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or • Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.

Environmental Impact Category	Significance Threshold	Factors to Consider
Climate[5]	The FAA has not established a significance threshold for Climate.	
Coastal Resources	The FAA has not established a significance threshold for Coastal Resources.	The action would have the potential to: • Be inconsistent with the relevant state coastal zone management plan(s); • Impact a coastal barrier resources system unit (and the degree to which the resource would be impacted); • Pose an impact to coral reef ecosystems (and the degree to which the ecosystem would be affected); • Cause an unacceptable risk to human safety or property; or • Cause adverse impacts to the coastal environment that cannot be satisfactorily mitigated.

[5] Please refer to the 1050.1F Desk Reference for the most up-to-date methodology for examining impacts associated with climate change.

Environmental Impact Category	Significance Threshold	Factors to Consider
Department of Transportation Act, Section 4(f)	*The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource.*[6] Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately owned land from an historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.	
Farmlands	*The total combined score on Form AD-1006, "Farmland Conversion Impact Rating," ranges between 200 and 260 points.*	The action would have the potential to convert important farmlands to non-agricultural uses. Important farmlands include pastureland, cropland, and forest considered to be prime, unique, or statewide or locally important land.

[6] A "minimal physical use" is part of the FAA's significance threshold that has been continued from FAA Order 1050.1E. It is not the same as a *de minimis* impact determination established in Section 6009 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETY-LU). A *de minimis* impact determination is described in Appendix B, B-2.2.3.

Environmental Impact Category	Significance Threshold	Factors to Consider
Hazardous Materials, Solid Waste, and Pollution Prevention	The FAA has not established a significance threshold for Hazardous Materials, Solid Waste, and Pollution Prevention.	The action would have the potential to: • Violate applicable Federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management; • Involve a contaminated site (including but not limited to a site listed on the National Priorities List). Contaminated sites may encompass relatively large areas. However, not all of the grounds within the boundaries of a contaminated site are contaminated, which leaves space for siting a facility on non-contaminated land within the boundaries of a contaminated site. An EIS is not necessarily required. Paragraph 6-2.3.a of this Order allows for mitigating impacts below significant levels (e.g., modifying an action to site it on non-contaminated grounds within a contaminated site). Therefore, if appropriately mitigated, actions within the boundaries of a contaminated site would not have significant impacts; • Produce an appreciably different quantity or type of hazardous waste; • Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or • Adversely affect human health and the environment.

Environmental Impact Category	Significance Threshold	Factors to Consider
Historical, Architectural, Archeological and Cultural Resources	The FAA has not established a significance threshold for Historical, Architectural, Archeological, and Cultural Resources.	The action would result in a finding of *Adverse Effect* through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS (i.e., a significant impact).
Land Use	The FAA has not established a significance threshold for Land Use.	There are no specific independent factors to consider for Land Use. The determination that significant impacts exist in the Land Use impact category is normally dependent on the significance of other impacts.
Natural Resources and Energy Supply	The FAA has not established a significance threshold for Natural Resources and Energy Supply.	The action would have the potential to cause demand to exceed available or future supplies of these resources.
Noise and Noise-Compatible Land Use	*The action would increase noise by DNL[7] 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe*. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.	Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the DNL 65 dB threshold does not adequately address the impacts of noise on visitors to areas within a national park or national wildlife and waterfowl refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

[7] Day-Night Average Sound Level (DNL). The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m., and between 10 p.m., and midnight, local time. The symbol for DNL is L_{dn} (See 14 CFR § 150.7).

Environmental Impact Category	Significance Threshold	Factors to Consider
Socioeconomics, Environmental Justice, and Children's Health and Safety Risks		
Socioeconomics	The FAA has not established a significance threshold for Socioeconomics.	The action would have the potential to: • Induce substantial economic growth in an area, either directly or indirectly (e.g., through establishing projects in an undeveloped area); • Disrupt or divide the physical arrangement of an established community; • Cause extensive relocation when sufficient replacement housing is unavailable; • Cause extensive relocation of community businesses that would cause severe economic hardship for affected communities; • Disrupt local traffic patterns and substantially reduce the levels of service of roads serving an airport and its surrounding communities; or • Produce a substantial change in the community tax base.
Environmental Justice	The FAA has not established a significance threshold for Environmental Justice.	The action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population, due to: • Significant impacts in other environmental impact categories; or • Impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population.
Children's Environmental Health and Safety Risks	The FAA has not established a significance threshold for Children's Environmental Health and Safety Risks.	The action would have the potential to lead to a disproportionate health or safety risk to children.

Environmental Impact Category	Significance Threshold	Factors to Consider
Visual Effects		
Light Emissions	The FAA has not established a significance threshold for Light Emissions.	The degree to which the action would have the potential to: • Create annoyance or interfere with normal activities from light emissions; and • Affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.
Visual Resources / Visual Character	The FAA has not established a significance threshold for Visual Resources / Visual Character.	The extent the action would have the potential to: • Affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources; • Contrast with the visual resources and/or visual character in the study area; and • Block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations.

Environmental Impact Category	Significance Threshold	Factors to Consider
Water Resources (including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)		
Wetlands	*The action would:* *1. Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;* *2. Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;* *3. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);* *4. Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;* *5. Promote development of secondary activities or services that would cause the circumstances listed above to occur; or* *6. Be inconsistent with applicable state wetland strategies.*	
Floodplains	*The action would cause notable adverse impacts on natural and beneficial floodplain values.* Natural and beneficial floodplain values are defined in Paragraph 4.k of DOT Order 5650.2, *Floodplain Management and Protection*.	

Environmental Impact Category	Significance Threshold	Factors to Consider
Surface Waters	*The action would:* *1. Exceed water quality standards established by Federal, state, local, and tribal regulatory agencies; or* *2. Contaminate public drinking water supply such that public health may be adversely affected.*	The action would have the potential to: • Adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values; • Adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • Present difficulties based on water quality impacts when obtaining a permit or authorization.
Groundwater	*The action would:* *1. Exceed groundwater quality standards established by Federal, state, local, and tribal regulatory agencies; or* *2. Contaminate an aquifer used for public water supply such that public health may be adversely affected.*	The action would have the potential to: • Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values; • Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • Present difficulties based on water quality impacts when obtaining a permit or authorization.

Environmental Impact Category	Significance Threshold	Factors to Consider
Wild and Scenic Rivers	The FAA has not established a significance threshold for Wild and Scenic Rivers.	The action would have an adverse impact on the values for which a river was designated (or considered for designation) through: • Destroying or altering a river's free-flowing nature; • A direct and adverse effect on the values for which a river was designated (or under study for designation); • Introducing a visual, audible, or other type of intrusion that is out of character with the river or would alter outstanding features of the river's setting; • Causing the river's water quality to deteriorate; • Allowing the transfer or sale of property interests without restrictions needed to protect the river or the river corridor (which cannot exceed an average of 320 acres per mile which, if applied uniformly along the entire designated segment, is one-quarter of a mile on each side of the river); or • Any of the above impacts preventing a river on the Nationwide Rivers Inventory (NRI) or a Section 5(d) river that is not included in the NRI from being included in the Wild and Scenic River System or causing a downgrade in its classification (e.g., from wild to recreational).

4-4. Mitigation. As defined in the CEQ Regulations at 40 CFR § 1508.20, mitigation includes avoiding the impact; minimizing the impact; rectifying the impact by repairing, rehabilitating, or restoring the environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources.

a. General. An EA may include discussion of reasonable mitigation measures. If mitigation is discussed in an EA, the discussion must be in sufficient detail to describe the impacts of the mitigation. If the responsible FAA official determines that mitigation measures can and will be used to reduce potentially significant adverse impacts below the level of significance, these mitigation measures can be used to support a mitigated FONSI. An EIS must describe mitigation measures considered or planned to minimize harm from the proposed action and any reasonable alternatives. For more detailed guidance on the use of mitigation in EAs and EISs, see Paragraphs 6-2.3 and 7-1.1.h, respectively.

b. Mitigation Incorporated into Project Design. Mitigation measures incorporated into project design (e.g., by modifying the project) must be clearly described as part of the proposed action or alternatives discussed in an EA or EIS.

c. Mitigation Made a Condition of FAA Approval**.** When specific mitigation is made a condition of project approval, the FAA or another appropriate entity must implement the mitigation. Prior to project approval, the FAA should verify that:

(1) The FAA has sufficient legal authority to implement or enforce implementation of the mitigation;

(2) Funding for implementation of the mitigation is reasonably foreseeable;

(3) The mitigation is clearly specified in terms of expected outcomes, which may include measurable performance standards;

(4) Any required mitigation has been clearly identified as a condition of approval in the EA/FONSI or ROD; and

(5) Appropriate language is used in grant agreements, licenses, contract specifications, operating specifications, directives, other project review or implementation procedures, or in other appropriate mechanisms to ensure mitigation set forth as a condition of approval is implemented.

d. Monitoring. If mitigation is a condition of project approval, then in accordance with CEQ's guidance on the *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact*, 76 *Federal Register* 3843 (January 21, 2011), the FAA will apply professional judgment and the rule of reason in determining important cases where the agency or the applicant should develop a monitoring program. The agency or entity responsible for mitigation must use the same standards of professional judgment and the rule of reason when determining the type and extent of monitoring to check on the progress made in implementing mitigation commitments as well as their effectiveness. In cases that are less important, the agency

should exercise its discretion to determine what level of monitoring, if any, is appropriate.

A monitoring program should include both implementation monitoring (i.e., whether mitigation measures are being implemented) and effectiveness monitoring (i.e., whether mitigation measures are producing expected outcomes) and must be clearly described in the decision document (e.g., ROD or FONSI/ROD). Where available and applicable, an EMS may be used for tracking and monitoring mitigation commitments. If monitoring demonstrates that mitigation commitments are not being implemented or that implemented mitigation is failing to mitigate environmental impacts as predicted, the FAA should consider taking remedial steps. If a pending FAA decision on the proposed action remains, the responsible FAA official should also consider whether the preparation of supplemental NEPA documentation is necessary. For more detailed guidance on mitigation monitoring in EAs and EISs, see Paragraphs 6-2.3 and 7-2.3 respectively.

e. Enforcement. When an entity other than the FAA fails to implement mitigation that is a condition of project approval, the FAA should consider appropriate action, as necessary, to ensure that the entity implements the mitigation. For more detailed guidance on mitigation enforcement in EAs and EISs, see Paragraphs 6-2.3 and 7-2.3 respectively.

4-5. -4-50. Reserved.

Chapter 5: Categorical Exclusions

5-1. General. The CATEXs listed in Paragraphs 5-6.1 through 5-6.6 are for types of actions that the FAA has found do not normally have the potential for individual or cumulative significant impacts on the human environment.

a. Scope of CATEX. The responsible FAA official must determine whether a proposed action is within the scope of a CATEX listed in this chapter. If a proposed action is within the scope of a CATEX, but the responsible FAA official determines that extraordinary circumstances exist, an EA or EIS must be prepared. If a proposed action is not within the scope of a CATEX, an EA or EIS must be prepared. The CATEX determination process is described in flowchart form in Exhibit D-1 of Appendix D.

b. Segmentation. A CATEX should not be used for a segment or an interdependent part of a larger proposed action.

5-2. Extraordinary Circumstances.

a. Extraordinary Circumstances. Extraordinary circumstances are factors or circumstances in which a normally categorically excluded action may have a significant environmental impact that then requires further analysis in an EA or an EIS. For FAA proposed actions, extraordinary circumstances exist when the proposed action meets both of the following criteria (see 40 CFR § 1508.4, CEQ Regulations):

(1) Involves any of the circumstances described in Subparagraph b. below; and

(2) May have a significant impact (see 40 CFR § 1508.4, CEQ Regulations).

An impact involving one or more of the circumstances described below in connection with a proposed action does not require the preparation of an EA or EIS unless the additional determination is made that the proposed action may have a significant environmental impact (i.e., that the circumstances rise to the level of extraordinary circumstances). The FAA uses screening and other analyses and consultation, as appropriate, to assist in determining extraordinary circumstances (see supporting guidance in the 1050.1F Desk Reference for information to determine the potential for significant environmental impacts and Paragraph 4-3 of this Order for the FAA's significance thresholds and factors to consider in evaluating significance). When extraordinary circumstances exist and the proposed action cannot be modified to eliminate the extraordinary circumstances, an EA or EIS must be prepared. If extraordinary circumstances do not exist or are eliminated, a CATEX may be used. If it is uncertain whether the proposed action involves an extraordinary circumstance, the LOB/SO should consult with AEE and AGC for guidance.

b. Circumstances. An extraordinary circumstance exists if a proposed action involves any of the following circumstances and has the potential for a significant impact:

(1) An adverse effect on cultural resources protected under the National Historic Preservation Act of 1966, as amended, 54 U.S.C. §300101 et seq.;

(2) An impact on properties protected under Section 4(f);

(3) An impact on natural, ecological, or scenic resources of Federal, state, tribal, or local significance (e.g., federally listed or proposed endangered, threatened, or candidate species, or designated or proposed critical habitat under the Endangered Species Act, 16 U.S.C. §§ 1531-1544);

(4) An impact on the following resources: resources protected by the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661-667d; wetlands; floodplains; coastal zones; national marine sanctuaries; wilderness areas; National Resource Conservation Service-designated prime and unique farmlands; energy supply and natural resources; resources protected under the Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271-1287, and rivers or river segments listed on the Nationwide Rivers Inventory (NRI); and solid waste management;

(5) A division or disruption of an established community, or a disruption of orderly, planned development, or an inconsistency with plans or goals that have been adopted by the community in which the project is located;

(6) An increase in congestion from surface transportation (by causing decrease in level of service below acceptable levels determined by appropriate transportation agency, such as a highway agency);

(7) An impact on noise levels of noise sensitive areas;

(8) An impact on air quality or violation of Federal, state, tribal, or local air quality standards under the Clean Air Act, 42 U.S.C. §§ 7401-7671q;

(9) An impact on water quality, sole source aquifers, a public water supply system, or state or tribal water quality standards established under the Clean Water Act, 33 U.S.C. §§ 1251-1387, and the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26;

(10) Impacts on the quality of the human environment that are likely to be highly controversial on environmental grounds. The term "highly controversial on environmental grounds" means there is a substantial dispute involving reasonable disagreement over the degree, extent, or nature of a proposed action's environmental impacts or over the action's risks of causing environmental harm. Mere opposition is not sufficient for a proposed action or its impacts to be considered highly controversial on environmental grounds. Opposition on environmental grounds by a Federal, state, or local government agency or by a tribe or a substantial number of the persons affected by the action should be considered in determining whether or not reasonable disagreement regarding the impacts of a proposed action exists. If in doubt about whether a proposed action is highly controversial on environmental grounds, consult the LOB/SO's headquarters environmental division, AEE, Regional Counsel, or AGC for assistance;

(11) Likelihood to be inconsistent with any Federal, state, tribal, or local law relating to the environmental aspects of the proposed action; or

(12) Likelihood to directly, indirectly, or cumulatively create a significant impact on the human environment, including, but not limited to, actions likely to cause a significant lighting impact on residential areas or commercial use of business properties, likely to cause a significant impact on the visual nature of surrounding land uses, likely to cause environmental contamination by hazardous materials, or

likely to disturb an existing hazardous material contamination site such that new environmental contamination risks are created.

5-3. Categorical Exclusion Documentation.

a. Simple Documentation. Some of the CATEXs listed in Paragraph 5-6 cover actions for which there are no reasonable expectations of any changes in use or other changes that could cause an environmental impact. These are designated with an asterisk (*). Many of the other CATEXs cover actions that have little or no potential for extraordinary circumstances. When using a CATEX for these actions, a LOB/SO may prepare a simple written record (which may already be included in documentation prepared during the course of normal project development) that a specific CATEX was determined to apply to a proposed action.

b. Additional Documentation. Some actions involve greater potential for one or more extraordinary circumstances or otherwise warrant additional CATEX documentation, as described in Paragraph d, below. Factors that may warrant the preparation of additional documentation include actions:

(1) Likely to affect sensitive resources sufficiently to heighten concerns regarding the potential for extraordinary circumstances;

(2) That would result in changes to the routine routing of aircraft that have the potential to result in significant increases in noise over noise sensitive areas;

(3) Involving situations in which the applicability of a CATEX is not intuitively clear;

(4) Involving known controversy or public opposition; or

(5) For which litigation is anticipated.

c. Other Situations. FAA LOB/SOs are responsible for identifying proposed actions within their purview that warrant CATEX documentation. LOB/SOs may additionally exercise professional judgment to document a project-specific CATEX that is not included in Paragraph 5-3.b above. A determination that a proposed action qualifies for a CATEX is not considered deficient due to lack of documentation provided that extraordinary circumstances have been considered.

d. Documentation. Documentation prepared for a CATEX determination in accordance with Paragraph 5-3 should be concise. The extent of documentation should be tailored to the type of action involved and the potential for extraordinary circumstances. There is no prescribed format; however, the documentation should cite the CATEX(s) used, describe how the proposed action fits within the category of actions described in the CATEX, and explain that there are no extraordinary circumstances that would preclude the proposed action from being categorically excluded. The documentation of compliance with special purpose laws and requirements may either be included in a documented CATEX or may be documented separately (see Paragraph 5-5). A CATEX determination that warrants the preparation of additional documentation in accordance with Paragraph 5-3.b should be signed by the responsible FAA official.

e. Record of Decision. The preparation of a ROD for a CATEX determination is not required and is uncommon. There may be instances where it would be advantageous for the FAA to prepare a separate formal decision document (i.e., a "CATEX/ROD") in connection with a CATEX determination. A CATEX/ROD might be advisable, for example, where there is substantial controversy regarding the applicability of a CATEX and/or the existence of extraordinary circumstances. When there is doubt whether a CATEX/ROD is appropriate, the responsible FAA official should consult with AGC-600 or Regional Counsel.

5-4. Public Notification. There is no requirement to notify the public when a CATEX is used. However, CEQ encourages agencies to determine circumstances in which the public should be engaged or notified before a CATEX is used. The FAA, as a regulatory agency, normally notifies the public when a CATEX is applied to a proposed rulemaking action. Other appropriate circumstances may be determined on a case-by-case basis.

5-5. Other Environmental Requirements. In addition to NEPA, a proposed action may be subject to special purpose laws and requirements that must be complied with before the action can be approved. The responsible FAA official must ensure, to the fullest extent possible, that the proposed action is in compliance with such requirements in addition to making the appropriate determination regarding use of a CATEX. To the extent that these other requirements are relevant to a determination of extraordinary circumstances, they must be addressed before a CATEX is used. The responsible FAA official must document compliance with applicable requirements, including any required consultations, findings, or determinations. The documentation of compliance with special purpose laws and requirements may either be included in a documented CATEX or may be documented separately from a CATEX. Special purpose laws and requirements may also have public notification requirements. Information on other environmental requirements that may apply to proposed actions is provided in the 1050.1F Desk Reference.

5-6. The Federal Aviation Administration's Categorical Exclusions. The FAA has determined that the actions listed in this paragraph normally do not individually or cumulatively have a significant effect on the human environment.

The CATEXs are organized by the following functions:

- Administrative/General: Actions that are administrative or general in nature;
- Certification: Actions concerning issuance of certificates or compliance with certification programs;
- Equipment and Instrumentation: Actions involving installation, repair, or upgrade of equipment or instruments necessary for operations and safety;
- Facility Siting, Construction, and Maintenance: Actions involving acquisition, repair, replacement, maintenance, or upgrading of grounds, infrastructure, buildings, structures, or facilities that generally are minor in nature;
- Procedural: Actions involving establishment, modification, or application of airspace and air traffic procedures; and
- Regulatory: Actions involving establishment of, compliance with, or exemptions to, regulatory programs or requirements.

To assist the responsible FAA official in identifying the applicable CATEX for a proposed action, the FAA LOB/SO that most commonly uses a CATEX is provided in parentheses following the description of the CATEX. For example, if ATO and the AST are the two LOB/SOs that most commonly use a CATEX, the parenthetical reference (ATO, AST) will follow the description of the CATEX. If a given CATEX is used with equal frequency by all FAA LOB/SOs, the parenthetical reference "(All)" will follow the description of the CATEX. This information is presented for reference only, and must not be construed to limit the use of a CATEX to only the listed LOB/SO.

5-6.1. Categorical Exclusions for Administrative/General Actions. This category includes the list of CATEXs for FAA actions that are administrative or general in nature. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before deciding to categorically exclude a proposed action.*

a. Implementation of measures to respond to emergency air or ground safety needs, accidents, or natural events with no reasonably foreseeable significant long-term adverse impacts. (All)

b. Release of an airport sponsor from Federal obligations incurred when the sponsor accepted: (1) an Airport Improvement Grant; or (2) Federal surplus property for airport purposes. (NOTE: FAA consent to long-term leases (i.e., those exceeding 20 years) converting airport-dedicated property to non-aeronautical, revenue-producing purposes (e.g., convenience concessions such as food or personal services) has the same effect as a release and is part of this CATEX provided that the proposed and reasonably foreseeable uses of the property do not trigger extraordinary circumstances as described in Paragraph 5-2, Extraordinary Circumstances). (ARP, AST)

c. An FAA action responding to a request for conveying federally owned land, including surplus Federal property and/or joint-use facilities, provided the proposed use of the conveyed land is either unchanged or for a use that is categorically excluded. (ARP, ATO)

d. Federal funding and approval of amendments to Airport Layout Plans (ALPs) to carry out FAA-approved noise compatibility programs pursuant to 14 CFR part 150. (ARP)

e. Issuance of Notices to Airmen (NOTAMS), which notify pilots and other interested parties of interim or temporary conditions. (AVS, ATO)

f. Mandatory actions required under implementing regulation for any treaty or international agreement to which the United States is a party, or required by the decisions of international organizations or authorities in which the United States is a member or participant except when the United States has discretion over implementation of such requirements. (AGC, ARP, APL, ATO, AST, AVS)

g. Issuance of airport policy and planning documents including the National Plan of Integrated Airport Systems (NPIAS), Airport Improvement Program (AIP) priority

system, and advisory circulars on planning, design, and development that are issued as administrative and technical guidance. (ARP, AST)*

h. Approval of an airport sponsor's request solely to impose Passenger Facility Charges (PFC) or approval to impose and use PFCs for planning studies. (ARP)*

i. Actions that are tentative, conditional, and clearly taken as a preliminary action to establish eligibility under an FAA program, for example, Airport Improvement Program (AIP) actions that are tentative and conditional and clearly taken as a preliminary action to establish an airport sponsor's eligibility under the AIP. (All)*

j. Administrative and agency operating actions, such as procurement documentation, organizational changes, personnel actions, and legislative proposals not originating in the FAA. (All)*

k. Agreements with foreign governments, foreign civil aviation authorities, international organizations, or U.S. Government departments calling for cooperative activities or the provision of technical assistance, advice, equipment, or services to those parties, and the implementation of such agreements; negotiations and agreements to establish and define bilateral aviation safety relationships with foreign governments and the implementation of such agreements; attendance at international conferences and the meetings of international organizations, including participation in votes and other similar actions. (All)*

l. All delegations of authority to designated examiners, designated engineering representatives, or airmen under Section 314 of the FAA Act (49 U.S.C. §§ 44702(d) and 45303). (ATO, AVS) *

m. FAA administrative actions associated with transfer of ownership or operation of an existing airport, by acquisition or long-term lease, as long as the transfer is limited to ownership, right of possession, and/or operating responsibility. (ARP)*

n. Issuance of grants to prepare noise exposure maps and noise compatibility programs (NCPs) under 49 U.S.C. §§ 47503(2) and 47504, and FAA determinations to accept noise exposure maps and approve NCPs under 14 CFR part 150. (ARP)*

o. Issuance of grants that do not imply a project commitment, such as airport planning grants, and grants to states participating in the state block grant program. (ARP, AST)*

p. Conditional approval of an Airport Layout Plan (ALP). (ARP)*

q. Planning and development of training, personnel efficiency, and performance projects and programs. (All) *

r. Issuance of policy and planning documents and legislative proposals not intended for, or that do not cause direct implementation of, project or system actions. (All)*

s. Project amendments (for example, increases in costs) that do not alter the environmental impact of the action. (All)*

* See Paragraph 5-3.a.

* See Paragraph 5-3.a.

t. Actions related to the retirement of the principal of bond or other indebtedness for terminal development. (ARP)*

u. Approval under 14 CFR part 161, *Notice and Approval of Airport Noise and Access Restrictions*, of a restriction on the operations of Stage 3 aircraft that does not have the potential to significantly increase noise at the airport submitting the restriction proposal or at other airports to which restricted aircraft may divert. (ARP)

5-6.2. Categorical Exclusions for Certification Actions. This category includes the list of CATEXs for FAA actions concerning issuance of certificates or compliance with certification programs. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before deciding to categorically exclude a proposed action.*

a. Approvals and findings pursuant to 14 CFR part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*, and acoustical change provisions under 14 CFR § 21.93. (ATO, AVS, APL)

b. Approvals of repairs, parts, and alterations of aircraft, commercial space launch vehicles, and engines not affecting noise, emissions, or wastes. (All)

c. Issuance of certificates such as the following: (1) new, amended, or supplemental aircraft types that meet environmental regulations; (2) new, amended, or supplemental engine types that meet emission regulations; (3) new, amended, or supplemental engine types that have been excluded by the EPA (see 14 CFR § 34.7, *Exemptions*); (4) medical, airmen, export, manned free balloon type, glider type, propeller type, supplemental type certificates not affecting noise, emission, or waste; (5) mechanic schools, agricultural aircraft operations, repair stations, and other air agency ratings; and (6) operating certificates. (ATO, AVS)

d. Operating specifications and amendments that do not significantly change the operating environment of the airport. "That do not significantly change the operating environment of the airport" refers to minor operational changes at an airport that do not have the potential to cause significant impacts to noise, air quality, or other environmental impact categories. These would include, but are not limited to, authorizing use of an alternate airport, administrative revisions to operations specifications, or use of an airport on a one-time basis. The use of an airport on a one-time basis means the operator will not have scheduled operations at the airport, or will not use the aircraft for which the operator requests an amended operations specification, on a scheduled basis. (ATO, AVS)

e. Issuance of certificates and related actions under the Airport Certification Program (see 14 CFR part 139). (ARP)

f. Issuance of Airworthiness Directives (ADs) to ensure aircraft safety. (ATO, AVS)*

* See Paragraph 5-3.a.

5-6.3. Categorical Exclusions for Equipment and Instrumentation. This category includes the list of CATEXs for FAA actions involving installation, repair, or upgrade of equipment or instruments necessary for operations and safety. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before deciding to categorically exclude a proposed action.*

a. Construction of the following facilities on designated airport property or commercial space launch sites, co-located with other FAA facilities, co-located at a location currently used for similar facilities or equipment, or replacement with essentially similar facilities or equipment: Remote Communications Outlet (RCO), Remote Transmitter/Receiver (RT/R), or Remote Center-Air Ground Communication Facility (RCAG), or essentially similar facilities or equipment identified in, and designed and constructed in accordance with FAA Order 6580.3, *The Remote Communications Facilities Installation Standards Handbook*. These facilities are typically located within a 150 feet by 150 feet parcel with antenna towers reaching approximately 40 feet in height. (ATO)

b. Establishment, installation, upgrade, or relocation of any of the following on designated airport or FAA property: airfield or approach lighting systems, visual approach aids, beacons, and electrical distribution systems as described in FAA Order 6850.2, *Visual Guidance Lighting Systems*, and other related facilities. (ATO, ARP)

c. Federal financial assistance for, or Airport Layout Plan (ALP) approval of, or FAA installation or upgrade of facilities and equipment, other than radars, on designated airport or FAA property or commercial space launch sites. Facilities and equipment means FAA communications, navigation, surveillance, and weather systems. Weather systems include hygrothermometers, Automated Weather Observing System (AWOS), Automatic Surface Observation System (ASOS), Stand Alone Weather Sensors (SAWS), Runway Visual Range (RVR), and other essentially similar facilities and equipment that provide for modernization or enhancement of the service provided by these facilities. Navigational aids include Very High Frequency Omnidirectional Range (VOR), VOR Test facility (VOT), co-located VORs and Tactical Aircraft Control and Navigation (TACAN) (VORTAC), Low Power TACAN, Instrument Landing System (ILS) equipment or components of ILS equipment (establishment or relocation of an ILS is not included; an EA is normally required; see Paragraph 3-1.2.b(8)), Wide Area Augmentation System (WAAS), Local Area Augmentation System (LAAS), other essentially similar facilities and equipment, and equipment that provides for modernization or enhancement of the service provided by that facility, such as conversion of VOR to VORTAC, conversion to Doppler VOR (DVOR), or conversion of ILS to category II or III standards. FAA Order 6820.10, *VOR, VOR/DME and VORTAC Siting Criteria* governs the installation of VOR/VOT/VORTAC-type equipment. These facilities are typically located within a 150 feet by 150 feet parcel, with a total structure height reaching approximately 50 feet in height. (ATO, ARP, AST)

d. Federal financial assistance for, or Airport Layout Plan (ALP) approval of, or FAA installation, repair, replacement, relocation, or upgrade of radar facilities and equipment on designated airport or FAA property or commercial space launch sites, that conform to the current American National Standards Institute/Institute of Electrical and Electronic

Engineers (ANSI/IEEE) guidelines for maximum permissible exposure to electromagnetic fields. Radar facilities and equipment include Terminal Doppler Weather Radar (TDWR), Next Generation Weather Radar (NEXRAD), Precision Runway Monitor (PRM), Airport Surface Detection Equipment (ASDE), Air Route Surveillance Radar (ARSR), Airport Surveillance Radar (ASR), Air Traffic Control Beacon Interrogator (ATCBI), and other essentially similar facilities and equipment. In addition, this includes equipment that provides for modernization or enhancement of the service provided by these facilities, such as Radar Bright Display Equipment (RBDE) with Plan View Displays (PVD), Direct Access Radar Channel (DARC), adding a beacon system onto existing radar, and calibration equipment. (ATO, ARP)

e. Federal financial assistance for, Airport Layout Plan (ALP) approval of, or FAA installation, repair, relocation, replacement, removal, or upgrade of minor miscellaneous items such as Low Level Wind Shear Alert System (LLWAS), wind indicators, wind measuring devices, landing directional equipment, segmented circles (visual indicators providing traffic pattern information at airports without airport traffic control towers (ATCTs)), mobile ATCTs, Mobile Emergency Radar Facilities (MERF), and associated fencing and calibration equipment. (ARP, ATO)

f. Installation or replacement of engine generators used in emergencies. (ATO, AST)

g. Replacement or upgrade of power and control cables for existing facilities and equipment, such as airfield or approach lighting systems (ALS), commercial space launch site lighting systems, visual approach aids, beacons, and electrical distribution systems as described in FAA Order 6850.2, *Visual Guidance Lighting Systems*, or airport surveillance radar (ASR), commercial space launch site surveillance radar, Instrument Landing System (ILS), and Runway Visual Range (RVR). (ATO)

h. Acquisition of equipment required for the safety or security of personnel and property on the airport or commercial space launch site, including safety equipment required by rule or regulation for certification of an airport (see 14 CFR part 139, *Certification and Operation: Land Airports Serving Certain Air Carriers*), or licensing the operation of a commercial space launch site (see 14 CFR part 420, *License to Operate a Launch Site*) and acquisition of snow removal equipment. (ARP, AST)

i. Approval of an Airport Layout Plan (ALP), Federal financial assistance for, or FAA projects for: the installation of solar or wind-powered energy equipment, provided the installation does not involve more than three total acres of land (including the land needed for easements and rights-of-way associated with building and installing the equipment, and any trenching and cabling that would connect the installed solar or wind equipment to other parts of the airport or an existing electrical grid) and would not have the potential to cause significant impacts on bird or bat populations. Construction contracts or leases for this equipment must include requirements to control dust, sedimentation, storm water, and accidental spills. (ARP, ATO)

5-6.4. Categorical Exclusions for Facility Siting, Construction, and Maintenance. This category includes the list of CATEXs for FAA actions involving acquisition, repair, replacement, maintenance, or upgrading of grounds, infrastructure, buildings, structures, or facilities that generally are minor in nature. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before finalizing a decision to categorically exclude a proposed action.*

a. Access road construction, and construction, relocation, or repair of entrance and service roadways that do not reduce the level of service on local traffic systems below acceptable levels. (ATO, ARP, AST)

b. Acquisition of land and relocation associated with a categorically excluded action. (ATO, ARP)

c. Installation, modification, or repair of radars at existing facilities that conform to the current American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) guidelines for maximum permissible exposures to electromagnetic fields and do not significantly change the impact on the environment of the facility. (All)

d. Federal financial assistance, Airport Layout Plan (ALP) approval, or FAA installation of de-icing/anti-icing facilities that comply with National Pollutant Discharge Elimination System (NPDES) permits or other permits protecting the quality of receiving waters, and for which related water detention or retention facilities are designed not to attract wildlife hazardous to aviation, as defined in FAA Advisory Circular 150/5200-33, *Hazardous Wildlife Attractants on or Near Airports*. (ATO, ARP)

e. Federal financial assistance, licensing, or Airport Layout Plan (ALP) approval for the following actions, provided the action would not result in significant erosion or sedimentation, and will not result in a significant noise increase over noise sensitive areas or result in significant impacts on air quality.

- Construction, repair, reconstruction, resurfacing, extending, strengthening, or widening of a taxiway, apron, loading ramp, or runway safety area (RSA), including an RSA using Engineered Material Arresting System (EMAS); or
- Reconstruction, resurfacing, extending, strengthening, or widening of an existing runway.

This CATEX includes marking, grooving, fillets and jet blast facilities associated with any of the above facilities. (ARP, AST)

f. Federal financial assistance, licensing, Airport Layout Plan (ALP) approval, or FAA construction or limited expansion of accessory on-site structures, including storage buildings, garages, hangars, t-hangars, small parking areas, signs, fences, and other essentially similar minor development items. (ATO, ARP, AST)

g. Construction of Remote Transmitter/Receiver (RT/R), or other essentially similar facilities and equipment, to supplement existing communications channels installed in the Airport Traffic Control Tower (ATCT) or Flight Service Station (FSS). (ATO)

h. Federal financial assistance, licensing, or Airport Layout Plan (ALP) approval for construction or expansion of facilities—such as terminal passenger handling and parking facilities or cargo buildings, or facilities for non-aeronautical uses at existing airports and commercial space launch sites—that do not substantially expand those facilities (see the FAA's presumed to conform list (72 *Federal Register* 41565 (July 30, 2007))). (All)

i. Demolition and removal of FAA buildings and structures, or financial assistance for or approval of an Airport Layout Plan (ALP) for the demolition or removal of non-FAA owned, on-airport buildings and structures, provided no hazardous substances or contaminated equipment are present on the site of the existing facility. This CATEX does not apply to buildings and structures of historic, archaeological, or architectural significance as officially designated by Federal, state, tribal or local governments. (ATO, AST, ARP)

j. Removal or extension of water, sewage, electrical, gas, or other utilities of temporary duration to serve construction. (ATO, AST)

k. Placing earthen fill into previously excavated land with material compatible with the natural features of the site, provided the land is not delineated as a wetland; or minor dredging or filling of wetlands or navigable waters for any categorically excluded action, provided the fill is of material compatible with the natural features of the site, and the dredging and filling qualifies for an U.S. Army Corps of Engineers nationwide or a regional general permit. (ATO, AST, ARP)

l. Federal financial assistance for, licensing or approval of the grading of land, the removal of obstructions to air navigation, or erosion control measures, provided those activities occur on and only affect airport property, a commercial space launch site, or FAA-owned or leased property. (ATO, ARP, AST)

m. Lease of space in buildings or towers. (ATO, AST)

n. Minor expansion of facilities, including the addition of equipment such as telecommunications equipment, on an existing facility where no additional land is required, or when expansion is due to remodeling of space in current quarters or existing buildings. Additions may include antennas, concrete pad, and minor trenching for cable. (ATO, AST)

o. Minor trenching and backfilling where the surface is restored and the excavated material is protected against erosion and run-off during the construction period. (ATO, ARP, AST)

p. New gardening, landscaping, and/or maintenance of existing landscaping that does not cause or promote the introduction or spread of invasive species that would harm the native ecosystem; use of landscape practices that reflect recommendations provided in *Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds*, 60 *Federal Register* 40837 (August 10, 1995); and that do not attract wildlife that is hazardous to aviation. (ATO, ARP, AST)

q. Construction and installation, on airports or commercial space launch sites, of noise abatement measures, such as noise barriers to diminish aircraft and commercial space

launch vehicle engine exhaust blast or noise, and installation of noise control materials. (All)

r. Purchase, lease, or acquisition of three acres or less of land with associated easements and rights-of-way for new facilities. (ATO)

s. Repairs and resurfacing of existing access to remote facilities and equipment such as Air Route Surveillance Radar (ARSR), Remote Center Air/Ground Communications Facility (RCAG), Remote Communications Outlet (RCO), and VHF Omnidirectional Range (VOR) with Ultra-High Frequency Tactical Air Navigation Aid (VORTAC). (ATO)

t. Federal financial assistance for, or Airport Layout Plan (ALP) approval of, a new heliport on an existing airport or commercial space launch site that would not significantly increase noise over noise sensitive areas. (ARP, AST)

u. Approval of an Airport Layout Plan (ALP) for installation of on-airport, aboveground storage tanks or underground storage tanks (USTs) on airport property or FAA installation, repair, or replacement of USTs and aboveground storage tanks at FAA facilities. These actions must comply with FAA Order 1050.15, *Fuel Storage Tanks at FAA Facilities*, and EPA regulations, 40 CFR parts 112, 280, and 281, as applicable. This CATEX includes the closure and removal of a fuel storage tank, and remediation of contaminants resulting from a fuel storage tank at an FAA facility or on an airport, provided those actions occur in accordance with the order and the regulations noted above. The establishment of bulk fuel storage and associated distribution systems is not within the scope of this CATEX. Those actions are subject to Paragraph 3-1.2.b.(5) of this Order. (ATO, ARP)

v. Replacement or reconstruction of a terminal, structure, or facility with a new one of similar size and purpose, where location will be on the same site as the existing building or facility. (ATO, ARP, AST)

w. Repair and maintenance of existing roads, rights-of-way, trails, grounds, parking areas, and utilities, including, for example, snow removal, vegetation control, and erosion control work. (All)

x. Routine facility decommissioning, exclusive of disposal. (ATO, AST)

y. Takeover of non-Federal facilities by the FAA. (ATO)

z. Federal financial assistance, licensing, Airport Layout Plan (ALP) approval, or FAA action related to topping or trimming trees to meet 14 CFR part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, standards for removing obstructions which can adversely affect navigable airspace. (All)

aa. Upgrading of building electrical systems or maintenance of existing facilities, such as painting, replacement of siding, roof rehabilitation, resurfacing, or reconstruction of paved areas, and replacement of underground facilities. (ATO, AST)

bb. Airport Layout Plan (ALP) approval and/or Federal financial assistance for actions related to a fee-simple purchase of land or the purchase of an avigation easement to establish a runway protection zone (RPZ) or for other aeronautical purposes provided

there is no land disturbance and does not require extensive business or residential relocations. (ARP)

cc. Approval of an Airport Layout Plan (ALP) and/or Federal financial assistance to permanently close a runway and use it as a taxiway at small, low-activity airports, provided any changes to lights or pavement would be on previously developed airport land. (ARP)

dd. FAA construction, reconstruction, or relocation of a non-Radar, Level 1 airport traffic control tower (a tower that does not use radar) at an existing visual flight rule airport, or FAA approval of an Airport Layout Plan (ALP) and/or Federal funding to do so, provided the action would occur on a previously disturbed area of the airport and not: (1) cause an increase in the number of aircraft operations, a change in the time of aircraft operations, or a change in the type of aircraft operating at the airport; (2) cause a significant noise increase in noise sensitive areas; or (3) cause significant air quality impacts. (ARP, ATO)

ee. Environmental investigation of hazardous waste or hazardous substance contamination on previously developed airport or FAA-owned, leased, or operated sites including temporary activities such as minor excavation, soil test borings, and installation of groundwater testing and monitoring wells, piezometers and other groundwater well monitoring devices impacting approximately one acre in aggregate surface area. The work plan or Sampling and Analysis Plan (SAP) for the project must integrate current industry best practices and address, as applicable, surface restoration, well and soil boring decommissioning, and the collection, storage, handling, transportation, minimization, and disposal of investigation-derived wastes. The work plan or SAP must also address these matters for other Federal or state regulated wastes generated by the investigation. The work plan or SAP must be coordinated with and, if required, approved by the appropriate or relevant governmental agency or agencies prior to commencement of work. (ATO, ARP)

ff. Remediation of hazardous wastes or hazardous substances impacting approximately one acre or less in aggregate surface area, including siting, site preparation, construction, equipment repair or replacement, operation and maintenance, remote or on-site monitoring, and removal of remediation-related equipment and facilities, on previously developed FAA-owned, leased, or operated sites. Remedial or corrective actions must be performed in accordance with an approved work plan (i.e., remedial action plan, corrective action plan, or similar document) that documents applicable current industry best practices and addresses, as applicable, permitting requirements, surface restoration, well and soil boring decommissioning, and the minimization, collection, any necessary associated on-site treatment, storage, handling, transportation, and disposal of Federal or state regulated wastes. The work plan must be coordinated with, and if required, approved by, the appropriate governmental agency or agencies prior to the commencement of work. Examples of covered activities include:

- Minor excavation (less than one acre of surface area, or less than 25,000 cubic yards) for removal of contaminated soil or containers (drums, boxes, or other articles);

- Ongoing operation of remedial and removal on-site monitoring and cleanup systems in accordance with an approved work plan (i.e., remedial action plan, corrective action plan, or similar document); and
- Installation, operation and maintenance, and removal of in-situ remediation systems and appurtenances, including (1) groundwater wells for treatment and monitoring of soil and water contamination; or (2) on-site vapor extraction systems. (ATO)

5-6.5. Categorical Exclusions for Procedural Actions. This category includes the list of CATEXs for FAA actions involving establishment, modification, or application of airspace and air traffic procedures. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before finalizing a decision to categorically exclude a proposed action.*

a. Rulemaking actions that designate or modify classes of airspace areas, airways, routes, and reporting points (see 14 CFR part 71, *Designation of Class A, B, C, D, and E Airspace Areas; Air Traffic Service Routes; and Reporting Points*). (ATO)

b. Actions regarding establishment of jet routes and Federal airways (see 14 CFR § 71.15, *Designation of jet routes and VOR Federal airways*); operation of civil aircraft in a defense area, or to, within, or out of the United States through a designated Air Defense Identification Zone (ADIZ) (14 CFR part 99, *Security Control of Air Traffic*); authorizations for operation of moored balloons, moored kites, amateur rockets, and unmanned free balloons (see 14 CFR part 101, *Moored Balloons, Kites, Amateur Rockets and Unmanned Free Balloons*); and, authorizations of parachute jumping and inspection of parachute equipment (see 14 CFR part 105, *Parachute Operations*). (ATO)

c. Actions to return all or part of special use airspace (SUA) to the National Airspace System (NAS), such as revocation of airspace, a decrease in dimensions, or a reduction in times of use (e.g., from continuous to intermittent, or use by a Notice to Airmen (NOTAM)). (ATO)

d. Modification of the technical description of special use airspace (SUA) that does not alter the dimensions, altitudes, or times of designation of the airspace (such as changes in designation of the controlling or using agency, or correction of typographical errors). (ATO)

e. Designation of controlled firing areas. (ATO)

f. Actions to increase the altitude of special use airspace. (ATO)

g. Establishment of Global Positioning System (GPS), Flight Management System (FMS), Area Navigation/Required Navigation Performance (RNAV/RNP), or essentially similar systems that use overlay of existing flight tracks. For these types of actions, the Noise Integrated Routing System (NIRS) Noise Screening Tool (NST) or other FAA-approved environmental screening methodology should be applied. (ATO, AVS)

h. Establishment or modification of helicopter routes that channel helicopter activity over major thoroughfares and do not have the potential to significantly increase noise over noise sensitive areas. (ATO, AVS)

i. Establishment of new or revised air traffic control procedures conducted at 3,000 feet or more above ground level (AGL); procedures conducted below 3,000 feet AGL that do not cause traffic to be routinely routed over noise sensitive areas; modifications to currently approved procedures conducted below 3,000 feet AGL that do not significantly increase noise over noise sensitive areas; and increases in minimum altitudes and landing minima. For modifications to air traffic procedures at or above 3,000 feet AGL, the Noise Screening Tool (NST) or other FAA-approved environmental screening methodology should be applied. (ATO, AVS)

j. Implementation of procedures to respond to emergency air or ground safety needs, accidents, or natural events with no reasonably foreseeable long-term adverse impacts. (ATO)

k. Publication of existing air traffic control procedures that do not essentially change existing tracks, create new tracks, change altitude, or change concentration of aircraft on these tracks. (ATO, AVS)

l. Federal financial assistance and/or Airport Layout Plan (ALP) approval or other FAA action to establish or remove a displaced threshold on an existing runway, provided the action does not require establishing or relocating an approach light system that is not on airport property (see Paragraph 3-1.2.b(9)) or an instrument landing system (see Paragraph 3-1.2.b(8)). This CATEX does not apply to displaced thresholds that require runway extensions. (ARP)

m. Short-term changes in air traffic control procedures, not to exceed six months, conducted under 3,000 feet above ground level (AGL) to accommodate airport construction. (ARP, ATO)

n. Tests of air traffic departure or arrival procedures conducted under 3,000 feet above ground level (AGL), provided that: (1) the duration of the test does not exceed six months; (2) the test is requested by an airport or launch operator in response to mitigating noise concerns, or initiated by the FAA for safety or efficiency of proposed procedures; and (3) the test data collected will be used to assess the operational and noise impacts of the test. (ATO)

o. Procedural actions requested by users on a test basis to determine the effectiveness of new technology and/or possible impacts to the environment. (ATO)

p. Establishment of new procedures that routinely route aircraft over non-noise sensitive areas. (ATO, AVS)

q. The following procedures taken in accordance with Section 213 of the *FAA Modernization and Reform Act of 2012*, conducted at, above, or below 3,000 feet above ground level (AGL), unless there is a determination that extraordinary circumstances exist: [8]

(1) Area Navigation/Required Navigation Performance (RNAV/RNP) procedures proposed for core airports and any medium or small hub airports located within the same metroplex area considered appropriate by the Administrator;[9] and

(2) RNP procedures proposed at 35 non-core airports selected by the Administrator.[10] (ATO)

r. Any navigation performance or other performance based navigation procedure that, in the determination of the Administrator, would result in measurable reductions in fuel consumption, carbon dioxide emissions, and noise, on a per flight basis, as compared to aircraft operations that follow existing instrument flight rules procedures in the same airspace. This CATEX may be used irrespective of the altitude of such procedures. [11] (ATO)

5-6.6. Categorical Exclusions for Regulatory Actions. This category includes the list of CATEXs for FAA actions involving compliance with, or exemptions to, regulatory programs or requirements. *An action included within this list of categorically excluded actions is not automatically exempted from environmental review under NEPA. The responsible FAA official must also review Paragraph 5-2, Extraordinary Circumstances, before finalizing a decision to categorically exclude a proposed action.*

a. All FAA actions to ensure compliance with Environmental Protection Agency aircraft emissions standards. (AEE)

b. Authorizations and waivers for infrequent[12] or one-time actions, such as an air show or aviation-related exposition (to include an aerobatic practice area containing one aerobatic practice box or aerobatic contest box) or parachuting or skydiving events, that may result in some temporary impacts that revert back to original conditions upon action completion. (ATO, AVS)

---

[8] This is a legislative CATEX established in Section 213(c) of the *FAA Modernization and Reform Act of 2012*.

[9] See the Guidance Memorandum for this CATEX in the Order 1050.1F Desk Reference for review, notification, and approval processes that are required when utilizing this CATEX.

[10] See the Guidance Memorandum for this CATEX in the Order 1050.1F Desk Reference for review notification, and approval processes when utilizing this CATEX.

[11] This is a legislative CATEX established in Section 213(c) of the *FAA Modernization and Reform Act of 2012*.

[12] See the guidance memo on Aerobatic Practice Areas in the Order 1050.1F Desk Reference titled "Clarification of FAA Order 1050.1 CATEX 312b for Aerobatic Actions" when utilizing this CATEX. For low-weight pistons, mid-weight pistons, high-weight pistons and high weight radials, "infrequent" is defined as 18,000 or fewer annual operations. For aircraft that are categorized as mid-power jets and high-power radials ("warbirds"), "infrequent" is defined as 1,800 or fewer annual operations. Finally, for high-power jets, "infrequent" is defined as 300 or fewer annual operations. In circumstance in which an aerobatic practice box or the aerobatic contest box will be used by more than one aircraft group (i.e., mixed use).

c. Denials of routine petitions for: (1) exemption; (2) reconsideration of a denial of exemption; (3) rulemaking; (4) reconsideration of a denial of a petition for rulemaking; and (5) exemptions to technical standard orders (TSOs). (AEE, AVS, AST, ATO)

d. Issuance of regulatory documents (e.g., Notices of Proposed Rulemaking and issuance of Final Rules) covering administrative or procedural requirements. (Does not include air traffic procedures; specific air traffic procedures that are categorically excluded are identified under Paragraph 5-6.5 of this Order). (All)

e. Issuance of special flight authorizations controlled by operating limitations, specified in the following: 14 CFR § 21.199, *Issue of Special Flight Permits*; 14 CFR § 91.319, *Aircraft Having Experimental Certificates: Operating Limitations*; 14 CFR § 91.611, *Authorization for Ferry Flight with One Engine Inoperative*; and 14 CFR § 91.859, *Modification to Meet Stage 3 or Stage 4 Noise Levels*. (ATO, AVS, AEE)

f. Regulations, standards, and exemptions (excluding those that if implemented may cause a significant impact on the human environment). (All)

5-7. -5-50. Reserved.

Chapter 6: Environmental Assessments and Findings of No Significant Impact

6-1. General.

a. Level of Analysis. EA documents should be concise and prepared with a level of analysis sufficient to:

(1) understand the purpose and need for the proposed action, identify reasonable alternatives, including a no action alternative, and assess the potential environmental impacts;

(2) allow the responsible FAA official to determine if:

(a) an EIS is needed because the proposed action's environmental impacts would be significant;

(b) a FONSI can be issued because the proposed action's environmental impacts, with no additional mitigation, would not be significant; or

(c) a mitigated FONSI can be issued because the proposed action's environmental impacts, with additional mitigation, would not be significant (see Paragraph 6-2.3.a);

(3) identify and comply with applicable special purpose laws and requirements in an efficient manner. Although the NEPA process does not preclude separate compliance with these other requirements, the responsible FAA official should integrate applicable environmental review, consultation, and public involvement requirements under special purpose laws and requirements into its NEPA planning and documentation to reduce paperwork and delay, in accordance with 40 CFR §§ 1500.4(k) and 1500.5(g), CEQ Regulations; and

(4) identify any permits, licenses, other approvals, or reviews that apply.

b. Tiering. FAA LOB/SOs are encouraged to build upon prior EAs or EISs, to the extent that data and analysis in those documents remain valid, and to incorporate FAA experience in the EA process. Whenever a broad EA or EIS has been prepared (i.e., a programmatic EA or EIS), the responsible FAA official may use the tiering process to prepare subsequent EAs for actions (e.g., site-specific actions) covered by the programmatic EA or EIS. Through the tiering process, the subsequent EA may summarize the impacts analyzed in the broader document, incorporate discussions from the broader document by reference, and focus on the issues specific to the subsequent action (see 40 CFR §§ 1502.20 and 1508.28, CEQ Regulations). The purpose of tiering is to eliminate repetition and facilitate the analysis of issues at the appropriate level of detail. Tiered and programmatic EAs are prepared, circulated, and filed using the same procedures applicable to other EAs (see Paragraph 3-2 for more information on programmatic and tiered NEPA documents).

6-2. Preparing Environmental Assessments.

6-2.1. Environmental Assessment Format. An EA must contain the following:

a. Cover Page. This page, labeled "Environmental Assessment," identifies the proposed action and its geographic location. When an applicant or contractor for an applicant prepares EAs, the following notification must be located at the bottom: "This Environmental Assessment becomes a Federal document when evaluated, signed and dated by the responsible FAA official."

b. Proposed Action. This section describes the proposed action with sufficient detail in terms that are understandable to individuals who are not familiar with aviation or commercial aerospace activities.

c. Purpose and Need. This section briefly describes the underlying purpose and need for the Federal action. It presents the problem being addressed and describes what the FAA is trying to achieve with the proposed action. The purpose and need for the proposed action must be clearly explained and stated in terms that are understandable to individuals who are not familiar with aviation or commercial aerospace activities. To provide context while keeping this section of the EA brief, the FAA may incorporate by reference any supporting data, inventories, assessments, analyses, or studies.

d. Alternatives (Including the Proposed Action). The alternatives discussed in an EA must include those that the approving official will consider. There is no requirement for a specific number of alternatives or a specific range of alternatives to be included in an EA. An EA may limit the range of alternatives to the proposed action and no action when there are no unresolved conflicts concerning alternative uses of available resources. Alternatives are to be considered to the degree commensurate with the nature of the proposed action and agency experience with the environmental issues involved. Generally, the greater the degree of impacts, the wider the range of alternatives that should be considered. The preferred alternative, if one has been identified, should be indicated. For alternatives considered but eliminated from further study, the EA should briefly explain why these were eliminated. For more information on alternatives, see Paragraph 7-1.1.e.

e. Affected Environment. This section succinctly describes the environmental conditions of the potentially affected geographic area or areas. The discussion of the affected environment will be no longer than is necessary to understand the impacts of the alternatives; data and analyses should be presented in detail commensurate with the importance of the impact. This section may be combined with the Environmental Consequences section. The FAA may incorporate by reference background data to support the analysis (for more guidance on incorporation by reference, see Paragraph 7-1.c). For more information on data that may be relevant to the affected environment, see Paragraph 7-1.1.f.

f. Environmental Consequences. The EA must discuss, in comparative form, the reasonably foreseeable environmental impacts of the proposed action, the no action alternative, and any other alternatives being considered in detail. This analysis should be conducted for the same timeframe. The discussion of environmental impacts must focus on substantive issues and provide sufficient evidence and analysis for determining

whether to prepare an EIS or a FONSI (see 40 CFR § 1508.9(a)(1), CEQ Regulations). This section must include analysis necessary to address the significance factors in Paragraph 4-3 and 40 CFR § 1508.27, CEQ Regulations. The focus of this analysis is on resources that would be directly, indirectly, and cumulatively affected. The analysis should include consideration of possible conflicts with the objectives of Federal, regional, state, tribal, and local land use plans, policies, and controls for the area concerned, as well as any other unresolved conflicts concerning alternative uses of available resources. To avoid excessive length, the environmental consequences section may incorporate by reference background data to support its effects analysis (for more guidance on incorporation by reference, see Paragraph 7-1.c).

The EA should include the information required to demonstrate compliance with other applicable requirements and should identify any permits, licenses, other approvals, or reviews that apply. To reduce paperwork and delay, and to ensure that the necessary approvals and permits will be issued with or immediately following issuance of the EA and FONSI, the responsible FAA official should: (1) coordinate timeframes for review with the oversight agency; (2) identify with the oversight agency the information needed for its review; and (3) integrate these into the EA process. For more information on environmental consequences, see Paragraph 7-1.1.g.

g. List of Preparers. The EA must include a list of the names and qualifications of personnel who prepared the EA. Contractors will be identified as having assisted in, or having prepared, the EA.

h. List of Agencies and Persons Consulted. The EA must include a list of agencies and persons consulted.

i. Appendices (if any). The EA may include the following appendices, if applicable:

(1) Any documentation that supports statements and conclusions in the body of the EA, including methodologies and references used. Proper citations to reference materials should be provided;

(2) Evidence of coordination or required consultation with affected Federal, state, tribal, and local officials and copies or a summary of their comments or recommendations and the responses to such comments and recommendations; and

(3) A summary of public involvement, including evidence of the opportunity for a public hearing, if required under applicable Federal laws (e.g., the Airport and Airway Improvement Act of 1982, 49 U.S.C. § 47106(c)), regulations, and orders, and a summary of issues raised at any public hearing or public meeting as well as responses to substantive comments.

6-2.2. Environmental Assessment Process. The following Environmental Assessment process is described in flowchart form in Exhibit D-2 of Appendix D.

a. Initial Steps. The FAA or applicant (if the FAA has requested that the applicant prepare the EA) formulates the proposed action and reasonable alternatives to achieve the project's purpose and need. The FAA or applicant then gathers data and begins the analysis. If the FAA determines that the proposed action would significantly affect the human environment as the analysis proceeds, the FAA can make a decision to prepare an EIS without first completing the EA.

b. Public Involvement. The FAA or applicant must involve the public, to the extent practicable, in preparing EAs (see 40 CFR § 1501.4(b) and 1506.6, CEQ Regulations). The appropriate level of public involvement for an EA is determined on a case-by-case basis and will vary based on the proposed action and the potential impacts. Beyond the required notice of availability (see Paragraph 6-3.d and 40 CFR § 1506.6(b), CEQ Regulations), examples of some optional public involvement methods for EAs that should be considered in appropriate circumstances include: (1) scoping (see Paragraph 6-2.2.c); (2) circulation of a draft EA for public comment (see Paragraph 6-2.2g); and (3) public meetings, workshops, and hearings (see Paragraph 2-5.3).

c. Scoping. Scoping, as described in 40 CFR § 1501.7, CEQ Regulations, is optional for EAs. Scoping can be particularly useful when an EA deals with uncertainty or controversy regarding potential conflicts over the use of resources or the environmental impacts of the proposed actions. The scoping process can provide a transparent way to identify environmental issues, focusing the analysis on the most pertinent issues and impacts.

d. Consultation and Coordination. The FAA or applicant determines issues and alternatives to be addressed and coordinates or consults with other agencies. Consultation includes contacting appropriate Federal, state, tribal, and local officials to obtain information concerning potential environmental impacts and maintaining contact with these parties for the remainder of the NEPA process. Formal consultation with tribes may be required for specific projects (see Paragraph 2-4.4 for further information on government-to-government consultation).

e. Impact Analysis. The FAA or applicant analyzes potential impacts and prepares the EA. The EA must present a detailed analysis, to the satisfaction of the responsible FAA official, commensurate with the level of impact of the proposed action and alternatives, to determine whether any impacts will be significant. If the FAA has experience that includes monitoring of the implementation of actions similar to the proposed action and alternatives, the monitoring information may be useful for an assessment of the potential environmental impacts. EMS data collection, tracking, and analysis may also be useful in the preparation of EAs, including providing input on the affected environment, assessment of potential impacts, and consideration of appropriate mitigation measures. The EA must also include a discussion of any connected or similar actions (see 40 CFR §§ 1508. 25(a)(1), 1508.25 (3), and 1508.27(b)(7), CEQ Regulations). If the proposed action and alternatives would not cause significant impacts within specific categories of environmental impacts, a brief description of the factual basis for this conclusion with respect to each applicable impact category is sufficient.

f. Internal Review. Internal review of the EA is conducted by potentially affected LOB/SOs having an interest in the proposed action or reasonable alternatives identified in the EA to ensure that all FAA concerns have been addressed (see Paragraph 10-2 for more information on Review and Approval of EAs and FONSIs and FONSI/RODs).

g. Public Comments on a Draft EA. Circulation of a draft EA for public comment should be considered but is optional at the discretion of the responsible FAA official. In determining whether to circulate a draft EA, the responsible FAA official should consider the type of proposed action, potential for impacts, and community controversy.

Examples of situations where circulation of a draft EA may be appropriate include draft EAs prepared for projects involving special purpose laws and requirements that necessitate public input (e.g., Section 106 of the National Historic Preservation Act; Executive Order 11988, *Floodplain Management*, as amended in Executive Order 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*; Executive Order 11990, *Protection of Wetlands*, etc.) and projects that are highly controversial on environmental grounds (see Paragraph 5-2.b.(10)). If a draft EA is circulated, the responsible FAA official, or applicant as directed by the FAA, must circulate the draft EA to interested agencies and parties, including any who submitted comments on the proposed action. There is no set time limit on public comment periods for EAs; however, they are normally 30-45 days. Public meetings or hearings are not required for EAs, but may be considered in some situations (see Paragraph 2-5.3). Applicants who prepare an EA may not circulate a draft EA until the FAA has reviewed the document and notified the applicant that the FAA is satisfied with the draft. The FAA or applicant must publish a notice of the draft EA's availability in local newspapers, other media, and/or on the Internet. This notice must include the following statement:

> Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment –including your personal identifying information –may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

h. Response to Comments. If a draft EA is prepared, the FAA or applicant must then revise the draft EA, as necessary, in response to internal and external comments received on the draft document, and prepare the final EA. Although the FAA is not required to formally respond to public comments concerning EAs, EAs should reflect the FAA's consideration of such comments.

i. Use of Errata Sheet. If the modifications to the draft EA in response to comments are minor and are confined to factual corrections or explanations of why the comments do not warrant additional agency response, the FAA or applicant may prepare an errata sheet in lieu of a final EA. In this situation, the comments, responses, and errata sheet may be considered the final EA. Use of errata sheets is subject to the condition that the errata sheets:

(1) cite the sources, authorities, or reasons that support the position of the FAA; and

(2) if appropriate, indicate the circumstances that would trigger agency reappraisal or further response.

j. Special Purpose Laws and Requirements. When an action involves resources protected by special purpose laws and requirements, EAs should be coordinated, as appropriate, with agencies outside the FAA. Agencies with special expertise may also be consulted. Special purpose laws and requirements may require opportunities for public involvement. The responsible official should consider coordinating these requirements with the NEPA process so that public and agency review periods for these special purpose laws and requirements may run concurrently with any review period provided for an EA.

k. FAA Determination. Upon review of the final EA, public comments, and applicable interagency and intergovernmental consultation (see Paragraph 2-4.3, Intergovernmental and Interagency Coordination), the responsible FAA official determines whether any environmental impacts analyzed in the EA are significant.

(1) If, the responsible FAA official concludes that the proposed action would not result in significant impacts to the human environment, the responsible FAA official may prepare a FONSI for the signature of the approving official (see Paragraph 6-3, Finding of No Significant Impact). A FONSI may also be prepared if the responsible FAA official determines that mitigation will reduce impacts below significant levels (see Paragraph 6-2.3.a for more information on "mitigated" FONSIs).

(2) If, based on the EA, the responsible FAA official concludes that the proposed action would significantly affect the human environment, and mitigation would not reduce the potential impact(s) below significant levels, the responsible FAA official must publish a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* and begin the EIS process (see Paragraph 7-1.2, Environmental Impact Statement Process).

6-2.3. Mitigation Considerations for Environmental Assessments. An EA may include discussion of reasonable mitigation measures. If mitigation is discussed in an EA, the discussion must be in sufficient detail to describe the impacts of the mitigation. EMS data collection, tracking, and analysis may be useful in the consideration of appropriate mitigation measures. An EMS may also be useful for tracking and monitoring mitigation commitments.

Environmental impacts resulting from mitigation should be considered in the EA and FONSI, when applicable. Mitigation and other conditions established in the EA and FONSI, or during their review, and included as a condition of the project approval or licensing, must be implemented and/or monitored by the FAA or other entity responsible for implementing and/or monitoring mitigation (see Paragraph 4-4.d regarding mitigation monitoring).[13] Proposed changes in, or deletion of, a mitigation measure that was included as a condition of approval of the FONSI must be reviewed by the same FAA LOB/SO that reviewed the original FONSI and must be approved and signed by the approving official. If the responsible FAA official determines that changes in mitigation would result in significant impacts and the FAA wants to pursue these changes, the responsible FAA official must initiate the EIS process by issuing an NOI to prepare an EIS unless actions can be taken to reduce the impact(s) below the level of significance.

a. Mitigated FONSIs. If the responsible FAA official determines that mitigation measures can reduce potentially significant adverse impacts below the level of significance, these mitigation measures can be used to support a FONSI, provided that:

(1) The agency took a "hard look" at the problem;

(2) The agency identified the relevant areas of environmental concern;

[13] CEQ issued a guidance memorandum on mitigation entitled *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact*, 76 *Federal Register* 3843 (January 21, 2011). The salient points of the CEQ guidance have been incorporated in this Order.

(3) The EA supports the agency's determination that the potential impacts will be insignificant; and

(4) The agency has identified mitigation measures that will be sufficient to reduce potential impacts below applicable significance thresholds and has ensured commitments to implement these measures.

Mitigation that is used to support a mitigated FONSI must be included as a condition of project approval (see Paragraph 4-4, Mitigation). In these cases, if the FAA's decision to act is not otherwise evidenced by a final decision document such as a rule, license, or approval, the responsible FAA official must use a FONSI/ROD to document the decision (see Paragraph 6-4, Decision Documents for Findings of No Significant Impact). The FONSI/ROD or other decision document must identify those mitigation measures the FAA is adopting and identify any monitoring and enforcement program applicable to such measures (see Paragraph 4-4, Mitigation). If the responsible FAA official determines that a mitigation measure has not been implemented or the implemented mitigation is failing to mitigate environmental impacts as predicted, and as a result a significant impact may occur, the responsible FAA official must initiate the EIS process by issuing a NOI to prepare an EIS if there remains discretionary FAA action to be taken related to the project.

6-3. Finding of No Significant Impact.

a. Purpose. The purpose of a FONSI is to document the FAA determination that a proposed action does not have the potential for significant environmental impacts. If none of the potential impacts assessed in the EA are determined to be significant, the responsible FAA official prepares a FONSI, which briefly presents, in writing, the reasons why an action, not otherwise categorically excluded, would not have a significant impact on the human environment. The FONSI documents the basis for the FAA's determination that the proposed action would not have significant environmental impacts. It does not represent the FAA's decision to implement the proposed action.

b. Content. There is no specified format for FONSIs. The FONSI may be attached to an EA, or the EA and FONSI may be combined into a single document. If the FONSI is attached or combined with the EA, it need not repeat the discussion in the EA. If the FONSI is not attached or combined with the EA, the FONSI must include a summary of the EA and note any other environmental documents related to it. The FONSI must:

(1) Briefly describe the proposed action, the purpose and need, and the alternatives considered (including the no action alternative); and assess and document all relevant matters necessary to support the conclusion that the proposed action would not significantly affect the quality of the human environment;

(2) Determine the proposed action's consistency or inconsistency with community planning, and document the basis for the determination;

(3) Present any mitigation measures that are a condition of project approval. The FONSI should also reflect coordination of mitigation commitments (including any applicable monitoring program) with, and consent and commitment from, those entities with the authority to implement specific mitigation measures committed to in the FONSI; and

(4) Reflect compliance with all applicable environmental requirements, including interagency and intergovernmental coordination and consultation, public involvement, and documentation requirements. Findings and determinations required under special purpose laws and requirements, regulations, and orders, if not made in the EA, must be included in the FONSI.

c. Adoption. If the FONSI is prepared following adoption of all or part of another agency's NEPA document, the FONSI must identify the part(s) of the document being adopted and include documentation of the FAA's independent evaluation of the document.

d. Public Availability. The responsible FAA official must make FONSIs and associated EAs available to interested or affected persons or agencies (see 40 CFR § 1506.6(b), CEQ Regulations). Methods of providing notice of the availability of a FONSI, such as publication in a local newspaper or notice through local media, are also described in 40 CFR § 1506.6(b), CEQ Regulations. The notice will indicate locations where the FONSI and its associated EA are available. The responsible FAA official will provide copies of FONSIs and associated EAs on request, free of charge or at a fee commensurate with the cost of reproduction.

(1) In limited circumstances that are identified below, the responsible FAA official will make the EA and FONSI available for public review for 30 days before the final determination is made whether or not to prepare an EIS and before the action may begin (see 40 CFR § 1501.4(e)(2), CEQ Regulations). The 30-day public review period may run concurrently with any other Federal review. These circumstances are:

(a) The proposed action is, or is closely similar to, one normally requiring the preparation of an EIS; or

(b) The nature of the proposed action is one without precedent.

(2) Certain special purpose laws and requirements require public notice of specific findings or determinations, apart from the FONSI made under NEPA. Examples include the following: Section 2(a)(4) of Executive Order 11988, *Floodplain Management*, 42 *Federal Register* 26951 (May 24, 1977); Section 2(b) of Executive Order 11990, *Protection of Wetlands*, 42 *Federal Register* 26961 (May 24, 1977); Section 7 of the Endangered Species Act, 16 U.S.C. § 1536; and Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108.

e. Approval. All FONSIs must include the following approval statement:

> After careful and thorough consideration of the facts contained herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101 of NEPA and other applicable environmental requirements and will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102(2)(C) of NEPA.
>
> APPROVED:_____ DATE:_____

Following preparation of the FONSI, the approving official, who may also be the responsible FAA official, reviews and signs the FONSI (see Paragraph 10-2 for more

information on Review and Approval of EAs and FONSIs). Issuance of a FONSI signifies that the FAA will not prepare an EIS and has completed the NEPA process for the proposed action. Following the approval of a FONSI, the FAA decisionmaker may decide whether to take or approve the proposed action. Mitigation measures that were made as a condition of approval of the FONSI must be incorporated in the decision to implement the action.

f. Distribution. A copy of the FONSI and EA must be sent to reviewing agencies and organizations or individuals who made substantive comments or specifically requested copies. When a project involves a resource protected under a special purpose law or requirement, or administrative directive (see Paragraph 6-2.2.j), the responsible FAA official should send a signed copy of the FONSI and the EA supporting it to the agency(ies) with whom the FAA consulted to comply with the applicable law or directive and to any party requesting copies of those documents.

6-4. Decision Documents for Findings of No Significant Impact.

a. FONSI/RODs. If the FAA decides to proceed with the proposed Federal action, then the decision may be documented in a formal decision document called a ROD, which can be combined with the FONSI (otherwise known as a FONSI/ROD) or prepared separately. A ROD is optional for a FONSI at the discretion of the responsible FAA official because the FAA's decision to act may be evidenced by other documents such as rules, licenses, or approvals. The responsible FAA official should prepare a FONSI/ROD or separate ROD for:

(1) Actions that have been redefined to include mitigation measures necessary to reduce potentially significant impacts below significant levels (see Paragraph 6-2.3.a, Mitigated FONSIs);

(2) Actions that are highly controversial;

(3) Actions that are, or are closely similar to, those normally addressed in an EIS (see Paragraph 6-3.d.(1)(a); or

(4) Actions that have no precedent (see Paragraph 6-3.d.(1)(b)).

In cases of doubt, the responsible FAA official should consult AGC-600 or Regional Counsel.

b. FONSI/ROD Format. The FAA FONSI/ROD or separate ROD has the same general content and format as a ROD that would be prepared following an EIS, as described in Paragraphs 7-2.1 and 7-2.2, while also describing the FAA's FONSI and its required contents. It also includes a paragraph that identifies the document as a decision or order that is, in most cases, subject to exclusive judicial review in the U.S. Courts of Appeals pursuant to 49 U.S.C. § 46110. The FONSI and other findings must be supported by documentation in the project file.

6-5. -6-50. Reserved.

Chapter 7: Environmental Impact Statements and Records of Decision

7-1. Preparation of Environmental Impact Statements.

a. General. LOB/SOs must prepare an EIS when one or more environmental impacts of a proposed action would be significant and mitigation measures would not reduce the impact(s) below significant levels. Direct, indirect, and cumulative impacts must be considered when determining significance (see Paragraph 4-2.d for more information on direct, indirect, and cumulative impacts).

Although the FAA may use an EA as the basis to prepare an EIS when potentially significant impacts are likely to occur but cannot be mitigated, an EIS is generally prepared without a previous EA. If an EA has been prepared, the analysis and documentation in the EA should be used to the maximum extent practicable in the EIS and is likely to be sufficient to describe the impacts that are not significant. The EIS should focus in detail on those impacts that are significant. The depth of analysis and documentation should be in direct proportion to the significance of the impacts.

b. Tiering. When preparing EISs, FAA LOB/SOs are encouraged to build upon prior programmatic or other EISs to the extent that data and analysis in those documents remain valid, and to incorporate FAA experience in the EIS process. Whenever a broad document has been prepared (such as a programmatic EA or EIS), the responsible FAA official may use the tiering process to prepare subsequent EAs or EISs for actions covered by the programmatic EA or EIS (such as site-specific actions). Through the tiering process, any subsequent EA or EIS only need summarize the impacts analyzed in the broader document, incorporate impact discussions from the broader document by reference, and focus on the issues specific to the subsequent action (see 40 CFR § 1502.20, CEQ Regulations). The purpose of tiering is to eliminate repetition and facilitate the analysis of issues at the appropriate level of detail. Tiered and programmatic EISs are prepared, circulated, and filed using the same procedures for draft and final EISs (see Paragraph 3-2 for more information on programmatic and tiered NEPA documents).

c. Incorporation by Reference. The responsible FAA official should incorporate material into an EIS by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material must be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment must not be incorporated by reference.

d. Limitation on Actions. Until any required EIS has been completed and a ROD has been issued, no FAA action may be taken, or irretrievable and irreversible commitment of resources made, that would have an adverse environmental impact or limit the choice of reasonable alternatives (see 40 CFR §§ 1502.2(f) and 1506.1(a), CEQ Regulations) except as provided in 40 CFR § 1506.1(c) (relating to programmatic EISs).

e. Action Taken Prior to Completion of NEPA. If the FAA is considering an application from a non-Federal entity, and the FAA is aware that the applicant is about to take an action within the agency's jurisdiction that would have an adverse environmental impact

or limit the choice of reasonable alternatives, the responsible FAA official must promptly notify the applicant that the FAA will take appropriate action to ensure that the objectives and procedures of NEPA are achieved. However, this does not preclude development by applicants of plans or designs or performance of other work necessary to support an application for Federal, state, or local permits or assistance.

7-1.1. Environmental Impact Statement Format. The FAA's standard EIS format, which follows the format prescribed in CEQ Regulations (see 40 CFR § 1502.10), is outlined below.

a. Cover Page. This single page will include:

(1) A list of the responsible lead and cooperating agencies (identifying the lead agency);

(2) The title of the proposed action (together with the state(s) and county(ies) where the action is located);

(3) The name, address, and telephone number of the responsible FAA official;

(4) The designation of the statement as draft, final, or supplement;

(5) A one paragraph abstract of the EIS with a heading as follows: DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION; and

(6) For draft EISs, a statement that this EIS is submitted for review pursuant to the following public law requirements and list those that are applicable, such as Section 102(2)(C) of the National Environmental Policy Act of 1969, and Section 4(f).

b. Executive Summary. An executive summary will be included to adequately and accurately summarize the EIS. The summary describes the proposed action, stresses the major conclusions, areas of controversy (including issues raised by agencies and the public), and the issues to be resolved (including the choice among alternatives). It also discusses major environmental considerations and how these have been addressed, summarizes the analysis of alternatives, and identifies the agency preferred alternative (and sponsor preferred alternative if it differs). If the agency has identified an environmentally preferred alternative, it may also be included. It discusses mitigation measures, including planning and design to avoid or minimize impacts. It identifies interested agencies, lists permits, licenses, and other approvals that must be obtained, and reflects compliance with other applicable special purpose laws and requirements.

c. Table of Contents. The table of contents lists the chapters and exhibits (including figures, maps, and tables) presented throughout the EIS. It will also list the appendices, if any, and the acronym list, glossary, references, and index.

d. Purpose and Need. This section briefly describes the underlying purpose and need for the Federal action. It presents the problem being addressed and describes what the FAA is trying to achieve with the proposed action. It provides the parameters for defining a reasonable range of alternatives to be considered. The purpose and need for the proposed action must be clearly explained and stated in terms that are understandable to individuals who are not familiar with aviation or commercial aerospace activities. Where appropriate, the responsible FAA official should initiate early coordination with cooperating agencies in developing purpose and need.

e. Alternatives (Including the Proposed Action). This section is the heart of the EIS (see 40 CFR §§ 1502.10(e) and 1502.14, CEQ Regulations). It presents a comparative analysis of the no action alternative, the proposed action, and other reasonable alternatives to fulfill the purpose and need for the action, to sharply define the issues, and provide a clear basis for choice among options by the approving official. Whether a proposed alternative is reasonable depends, in large part, upon the extent to which it meets the purpose and need for the proposed action. Reasonable alternatives not within the jurisdiction of the lead agency should be considered (see 40 CFR § 1502.14(c), CEQ Regulations). The FAA may include alternatives proposed by the public or another agency. However, they must meet the basic criteria for any alternative: it must be reasonable, feasible, and achieve the project's purpose. The extent of active participation in the NEPA process by the proponent of the alternative also bears on the extent to which a proffered alternative deserves consideration. Charts, graphs, and figures, if appropriate, may aid in understanding the alternatives, for example, to depict alternative runway configurations. To provide a clear basis of choice among the alternatives, graphic or tabular presentation of the comparative impact is recommended. This section also presents a brief discussion of alternatives that were not considered reasonable (e.g., because they do not meet the purpose and need for the proposed action). The draft EIS must identify the preferred alternative or alternatives, if one or more exists at the time the draft EIS is issued. The final EIS must specifically and individually identify the preferred alternative (see 40 CFR § 1502.14 (e), CEQ Regulations). Criteria other than those included in the affected environment and environmental consequences sections of the EIS may be applied to identify the preferred alternative. Although CEQ encourages Federal agencies to identify the environmentally preferred alternatives in the EIS (see number 6 in CEQ's *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *Federal Register* 18026 (March 23, 1981)), the CEQ Regulations do not require that discussion until the ROD.

f. Affected Environment. This section describes the environmental conditions of the potentially affected geographic area or areas. The discussion of the affected environment should be no longer than is necessary. It should include detailed discussion of only those environmental impact categories affected by the proposed action or any reasonable alternatives to demonstrate the likely impacts; data and analyses should be presented in detail commensurate with the importance of the impact. This discussion may highlight important background material. To ensure that this section emphasizes the important aspects of the impacts on the environment, the discussion should summarize and incorporate by reference information or analysis that is reasonably available to the public. This section describes other relevant activities (past, present, and reasonably foreseeable future actions), their interrelationships, and cumulative impacts. It may include such items as action by the community or citizen groups pertinent to, or any other unique factors associated with, the proposed action or any reasonable alternatives. The discussion of the affected environment may include the following, if appropriate:

(l) Location map, vicinity map, project layout plan, and photographs;

(2) Existing and planned land uses and zoning, including: industrial and commercial growth characteristics in the affected vicinity; affected residential areas, schools, places of outdoor assemblies of persons, churches, and hospitals; public parks,

wildlife and waterfowl refuges; federally listed or proposed candidate, threatened, or endangered species or federally designated or proposed critical habitat; wetlands; national and state forests; floodplains; farmlands; coastal zones, coastal barriers, or coral reefs; recreation areas; wilderness areas; wild and scenic rivers; Native American cultural sites, and historic and archeological sites eligible for or listed on the National Register of Historic Places;

(3) State or local jurisdictions affected by the proposed action or any reasonable alternatives;

(4) Population estimates and other relevant demographic information for the affected environment, including a census map where appropriate; and

(5) Past, present, and reasonably foreseeable future actions, whether Federal or non-Federal, including related or connected actions (see 40 CFR §§ 1501.7(a), 1502.4(a), 1508.25(a)(1), and 1508.27(b)(7), CEQ Regulations), to show the cumulative effects (see 40 CFR § 1508.7) of these actions on the affected environment (see CEQ Guidance on *Considering Cumulative Effects Under the National Environmental Policy Act* (January 1997) and EPA Guidance on *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (May 1999)).

g. Environmental Consequences.

(1) This section forms the scientific and analytical basis for comparing the proposed action, the no action alternative, and other alternatives retained for detailed analysis. The discussion of environmental consequences will include the environmental impacts of the alternatives including the proposed action; any adverse environmental impacts that cannot be avoided should the proposed action or any of the reasonable alternatives be implemented; the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity; any irreversible or irretrievable commitments of resources that would be involved in the proposed action or any reasonable alternatives should they be implemented; and mitigation (see Paragraph 7-1.1.h). This analysis should be conducted for the same timeframe. This section should not duplicate discussions in the alternatives section. It must include considerations of direct, indirect, and cumulative impacts and their significance and possible conflicts with the objectives of Federal, regional, state, tribal, and local land use plans, policies, and controls for the area concerned and other unresolved conflicts (see 40 CFR § 1501.2(c)). (Also see Question 23 in CEQ's *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *Federal Register* 18026 (March 23, 1981)). To avoid excessive length, the environmental consequences section may incorporate by reference background data to support the impacts analysis. Section 1502.22 of the CEQ Regulations sets forth requirements for addressing situations in which information is incomplete or unavailable.

(2) Specific environmental impact categories listed in Paragraph 4-1 must be discussed to the level of detail necessary to support the comparisons of impacts of each alternative retained for detailed analysis, including the no action alternative. The 1050.1F Desk Reference describes laws, regulations, and orders in addition to NEPA that must be complied with for different impact areas before a proposed

Federal action is approved. The section should include the information required to demonstrate compliance with other applicable requirements and should identify any permits, licenses, other approvals, or reviews that apply to the proposed action or any reasonable alternatives, and indicate any known problems with obtaining them. This section should also provide the status of any interagency or intergovernmental consultation required, for example, under the National Historic Preservation Act, 54 U.S.C. §300101 et seq., the Endangered Species Act, 16 U.S.C. §§ 1531–1544, the Coastal Zone Management Act, 16 U.S.C. §§ 1451–1466, the American Indian Religious Freedom Act, 42 U.S.C. § 1996, Executive Order 13084, *Consultation and Coordination with Indian Tribal Governments*, 63 *Federal Register* 27655 (May 14, 1998), the Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271–1287, and the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661–667d.

h. Mitigation.

(1) An EIS must describe mitigation measures considered or planned to minimize harm from the proposed action and reasonable alternatives. The EIS must discuss mitigation in sufficient detail to disclose that the environmental consequences have been fairly evaluated. Mitigation incorporated into project design must be clearly described in the proposed action and any reasonable alternatives. Environmental impacts resulting from mitigation must be considered in the EIS, when applicable. The following types of mitigation measures should be considered: design and construction actions to avoid or reduce impacts; management actions that reduce impacts during operation of the facility; and replacement, restoration (reuse, conservation, preservation, etc.), and compensation measures. EMS data collection, tracking, and analysis may be useful in the consideration of appropriate mitigation measures. An EMS may also be used for tracking and monitoring mitigation commitments.

(2) Mitigation and other conditions established in the EIS, or during review of the EIS, and that are committed to in the ROD, must be implemented by the FAA or another appropriate entity with authority to implement the identified mitigation measures or other conditions. The FAA ensures implementation of such mitigation measures through special conditions, funding agreements, contract specifications, directives, other review or implementation procedures, and other appropriate follow-up actions in accordance with 40 CFR § 1505.3, CEQ Regulations (see Paragraph 4-4, Mitigation, regarding monitoring and enforcement of mitigation commitments).

i. List of Preparers. This list includes the names, and qualifications (e.g., expertise experience, professional disciplines) of the FAA staff that were primarily responsible for preparing the EIS or significant background material, and contractors who assisted in preparing the EIS or associated environmental studies.

j. List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent. This list is included for reference and to demonstrate that the EIS is being circulated, and thus, that the public review process is being followed.

k. Index. The index reflects the key terms used throughout the EIS for easy reference. The index includes page numbers for each reference.

l. Appendices (if any). This section consists of material that substantiates any analysis that is fundamental to the EIS, but would substantially contribute to the length of the EIS or detract from the document's readability, if included in the body of the EIS. This section should contain information about formal and informal consultation conducted, and related agreement documents prepared, pursuant to other special purpose laws and requirements.

m. Comments. Comments received on the draft EIS are assessed and responded to in the final EIS. See Paragraphs 7-1.2.e and 7-1.2.g for more information on responding to comments).

n. Footnotes. Footnotes include title, author, date of document, page(s) relied upon, and footnote number used to identify where in the text, figures, and charts of the EIS the source is used.

7-1.2. Environmental Impact Statement Process. The EIS process is described in flowchart form at a high level in Exhibit D-3 of Appendix D.[14]

a. Cooperating Agencies. The FAA NEPA lead should identify and invite any affected Federal, state, or local agencies, or tribes with jurisdiction by law or special expertise regarding the FAA's proposed action or any reasonable alternatives to be a cooperating agency and participate in the development of the EIS (see Paragraph 2-4.2).

b. Notice of Intent to Prepare an EIS. The responsible FAA official must publish a Notice of Intent (NOI) in the *Federal Register* to initiate the preparation of the EIS (see 40 CFR § 1508.22, CEQ Regulations). The NOI includes an overview of the proposed action, the alternatives being considered (including no action), and the name and address of the FAA official who can answer questions about the proposed EIS. If a scoping meeting is planned and sufficient information is available at the time of the NOI, the NOI should also announce the meeting, including the meeting time and location, and other appropriate information such as availability of a scoping document. If the responsible FAA official is using the NOI to satisfy public notice and comment requirements of other environmental requirements in addition to NEPA that are applicable to the proposed action, the NOI should include a statement to that effect with a reference to the applicable laws, regulations, or Executive Orders. The responsible FAA official sends the NOI to the docket clerk in the Office of the Chief Counsel (AGC-200). All NOIs initiated in the regions should be reviewed by the Regional Counsel before being forwarded to AGC-200. The applicable division manager, designee, or other appropriate FAA official may sign the NOI for the *Federal Register*. The responsible FAA official should also consider

[14] In November 2014, DOT released guidance on implementing Section 1319 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a, which alters the EIS process for DOT actions. Section 1319(a) relates to errata sheets and reflects the CEQ regulations (see 40 CFR § 1503.4(c) and Paragraph 7-1.2(f) of this Order). Section 1319(b) requires DOT, to the maximum extent practicable, to expeditiously develop a single document that consists of a final EIS and a ROD, unless certain conditions exist. The DOT guidance is available at http://www.dot.gov/sites/dot.gov/files/docs/MAP-21_1319_Final_Guidance.pdf. The FAA is preparing additional, FAA-specific guidance on implementing-Section 1319 of MAP-21. LOBs/SOs are encouraged to work with AGC-600 and AEE-400 to ensure compliance with Section 1319(b).

publishing the NOI, notices of scoping meetings, and other information in other formats (see Paragraph 14a of DOT Order 5610.1C and 40 CFR § 1506.6(b), CEQ Regulations).

c. Scoping Process. Scoping is a required part of the EIS process. Scoping is an early and open process for determining the scope of issues to be addressed in the EIS and identifying the significant issues related to a proposed action (see 40 CFR § 1501.7, CEQ Regulations). The responsible FAA official must take the lead in the scoping process, inviting the participation of affected Federal, state, and local agencies, any potentially affected tribes, applicants, and other interested persons (including those who might oppose the proposed action). The responsible FAA official initiates scoping in order to determine the scope of issues to be addressed in the EIS and identify the significant issues related to the proposed action (see 40 CFR § 1501.7, CEQ Regulations). Through scoping, the responsible FAA official will identify the issues the EIS will analyze in depth, identify any other environmental reviews and consultation requirements necessary for the proposed action, and assign responsibilities among lead and cooperating agencies for inputs to the EIS. Scoping serves the additional purposes of identifying those issues that do not require detailed analysis or that have been covered by prior environmental review, setting the temporal and geographic boundaries of the EIS, determining reasonable alternatives, and identifying available technical information. During scoping, the FAA or other agencies may identify other EAs or EISs that are being or will be prepared that are related to but not part of the scope of the EIS under consideration.

It is important that the FAA facilitate public participation in the process. The FAA should tailor public scoping processes to match the complexity of the proposal. If appropriate, a scoping meeting(s) can be held to collect information regarding environmental concerns from agencies and the public. Scoping meetings provide the opportunity to present additional background on the proposed action and any reasonable alternatives identified, and solicit input from interested and affected parties. An NOI or other notice of a scoping meeting must be published at least 30 days prior to the meeting. However, a scoping meeting is not required. Depending on the nature and complexity of the proposed action, the scoping process may be carried out by letter, telephone, or other means. The FAA may prepare scoping materials, although these are not required. If an EA has been prepared, the FAA may use it as the vehicle for scoping. Consultation with appropriate agencies having jurisdiction by law or special expertise is also initiated at this point. Scoping may also be used to assign responsibilities among lead and cooperating agencies for inputs to the EIS.

d. Review of Draft EIS. Following the FAA's preparation of the draft EIS, the responsible FAA official must make copies of the draft EIS available for review and comment. The required comment period for a draft EIS is a minimum of 45 days (see 40 CFR § 1506.10(c), CEQ Regulations). When the FAA is the lead Federal agency, the EPA, upon a showing by another Federal agency of compelling reasons of national policy, may extend this period for up to 30 days, but no longer than 30 days without the permission of the FAA (see 40 CFR § 1506.10(d), CEQ Regulations).

(1) Public Review. The draft EIS should be available at local libraries or similar public depositories. Material used in developing or referenced in the draft EIS must be available for review at the appropriate FAA office(s) or at a designated location. Upon request, copies of the draft EIS must be made available to the public without

charge to the extent practical or at a reduced charge, which is not more than the actual cost of reproducing copies. The draft EIS may also be placed on the Internet and/or copies may be made available in digital form.

(a) The responsible FAA official should use the following standard language in press releases and notices announcing the draft EIS's availability for comment and any public meetings or hearing(s) associated with the proposed project that will occur:

> The FAA encourages all interested parties to provide comments concerning the scope and content of the draft EIS. Comments should be as specific as possible and address the analysis of potential environmental impacts and the adequacy of the proposed action or merits of alternatives and the mitigation being considered. Reviewers should organize their participation so that it is meaningful and makes the agency aware of the viewer's interests and concerns using quotations and other specific references to the text of the draft EIS and related documents. Matters that could have been raised with specificity during the comment period on the draft EIS may not be considered if they are raised for the first time later in the decision process. This commenting procedure is intended to ensure that substantive comments and concerns are made available to the FAA in a timely manner so that the FAA has an opportunity to address them.
>
> Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

(b) To ensure that local notices of the draft EIS's availability occur on the same date that the EPA publishes the Notice of Availability (NOA) in the *Federal Register*, the responsible FAA official should send a press release to local media and if the EIS is national in scope, national media outlets. The release should request that the media publish a notice of the draft EIS's availability on the same date that the EPA is expected to publish its notice. The local NOA of the draft EIS must provide the same due date for comments as that specified in the *Federal Register* notice.

(c) The FAA should hold public meetings or hearings, when appropriate. If the FAA conducts a public meeting or hearing for the purpose of obtaining public comment on a draft EIS, the FAA should ensure that the draft document is available for public review at least 30 days before the event occurs. (See Paragraphs 2-5.3 for more information on public meetings and hearings.)

(d) Certain special purpose laws and requirements require public notice of specific findings or determinations. Examples include Section 2(a)(4) of Executive Order 11988, *Floodplain Management*, 42 *Federal Register* 26951 (May 24, 1977); Section 2(b) of Executive Order 11990, *Protection of Wetlands*, 42 *Federal Register* 26961 (May 24, 1977); Section 7 of DOT Order 5650.2, *Floodplain Management and Protection* (April 23, 1979); Section 7.b of DOT Order 5660.1A, *Preservation of the Nation's Wetlands* (August 24, 1978); Section 7 of the Endangered Species Act, 16 U.S.C. § 1536; and Section 106 of the National Historic Preservation Act, 54 U.S.C. §306108.

(2) Filing with EPA. Concurrently, the responsible FAA official must file the draft EIS with the EPA (see 40 CFR § 1506.9, CEQ Regulations) through the e-NEPA electronic filing system at: http://www.epa.gov/oecaerth/nepa/submiteis/index.html. As part of the draft EIS filing process, the EPA publishes the official *Federal Register* NOA for the draft EIS. This starts the official comment period for the draft EIS. The responsible FAA official also has the option to publish a more detailed NOA in the *Federal Register*. The FAA must notify EPA if the FAA approves an extension of the public comment period, so that EPA may provide an update in its *Federal Register* notice.

(3) Intergovernmental Coordination. The responsible FAA official must request comments on the draft EIS from appropriate Federal, state, and local agencies (see 40 CFR §§ 1501.2(d)(2) and 1501.7(a)(1), CEQ Regulations), and from tribes when the impacts may be on a reservation or affect tribal interests (see 40 CFR §§ 1502.16(c), 1503.1(a)(2)(ii), 1506.6(b)(3)(ii), CEQ Regulations). See Paragraphs 2-4.3 and 2-4.4 for further information on Intergovernmental and Interagency Coordination.

(a) Federal Agencies. Draft EISs must be coordinated with the appropriate regional offices of other Federal agencies having jurisdiction by law or special expertise. However, draft EISs that are coordinated with any component of the U.S. Department of Commerce (DOC), U.S. Department of Energy (DOE), or U.S. Department of the Interior (DOI) must be coordinated with the Washington, D.C., headquarters of those departments (see details below).

1. Washington, D.C., headquarters of the DOC (one copy) and Ecology and Conservation Division of the National Oceanographic and Atmospheric Administration (one copy).

2. Washington, D.C., headquarters of the DOE, if the project has major energy-related consequences.

3. DOI, Office of Environmental Policy and Compliance (One copy of the document(s) in electronic format (CD/DVD, or any other widely used electronic storage media) and the URL for review documents available on the Internet. If no electronic version is available, then 12 to 18 copies of the draft EIS depending on the proposed action's geographic location and scope) at the following address: Director, Office of Environmental Policy and Compliance, U.S. Department of the Interior, Main Interior Building, MS 2462, 1849 C Street, N.W., Washington, D.C. 20240.

4. Advisory Council on Historic Preservation (ACHP) only if they have been invited and have agreed to participate in the Section 106 process.

5. EPA regional office of interest (one copy).

(b) State and Local Agencies. Draft EISs must be coordinated with appropriate state and local agencies including cooperating agencies, agencies that commented substantively on the Intergovernmental Review of Federal Programs, affected cities and counties, and others known to have an interest in the action.

(c) Tribal Governments. Draft EISs must be coordinated with appropriate tribal governments when the impacts may be on a reservation or affect tribal interests. Various laws, regulations, and orders in addition to NEPA, may also require coordination with tribes that are not federally recognized, and with traditional cultural leaders. Consult with AEE, AGC, and ACR for more information. See Paragraph 2-4.4, Tribal Consultation, for additional information on consultation with tribes.

e. Responses to Comments. The responsible FAA official must take into consideration all comments received on the draft EIS and comments recorded during public meetings or hearings, and respond to the substantive comments in the final EIS. All substantive comments received on the draft EIS (or summaries where the comments are voluminous) must be attached to the final EIS (see 40 CFR § 1503.4(b), CEQ Regulations) and must accompany the final EIS through the FAA's internal review process. Comments must be responded to in one or more of the following ways:

(1) Written into the text of the final EIS;

(2) Stated in an errata sheet attached to the final EIS; or

(3) Included or summarized and responded to in an attachment to the final EIS, and if voluminous, may be compiled in a separate supplemental volume for reference.

f. Errata Sheets. In lieu of preparing a final EIS, the FAA may, subject to the conditions set forth below, attach errata sheets to the draft EIS. If the modifications to the draft EIS in response to comments are minor and are confined to factual corrections or explanations of why the comments do not warrant additional agency response, then only the comments, responses, and errata sheet need be circulated and the draft EIS and errata sheet may be filed as the final EIS as set out in 40 CFR § 1503.4(c), CEQ Regulations. Use of errata sheets is subject to the condition that the errata sheets:

(1) cite the sources, authorities, or reasons that support the position of the FAA; and

(2) if appropriate, indicate the circumstances that would trigger agency reappraisal or further response.

The draft EIS must be reviewed and approved as designated in Paragraph 7-1.2.h.

g. Final EIS. In preparing the final EIS, the draft EIS must be revised to reflect comments received, issues raised through the public involvement and public meeting or hearing process, and other considerations. The final EIS must identify and discuss any unresolved environmental issues and efforts to resolve them through further consultation. The FAA has discretion to solicit additional comments on all or portions of final EISs that would then be addressed in any final decision (see 40 CFR § 1503.1, CEQ Regulations). The preferred alternative must be identified in the final EIS. The final EIS must reflect compliance with the requirements of all applicable special purpose laws and requirements, including Section 4(f). If such compliance is not possible by the time of final EIS preparation, the final EIS must reflect consultation with the appropriate agencies and provide reasonable assurance that the requirements can be met. Required compliance must be completed before issuance of the ROD.

h. Review and Approval. The final EIS must be reviewed and approved in accordance with Chapter 10. The cover page or summary of the final EIS or a draft EIS with errata sheets in lieu of a final EIS must include the following declaration.

> After careful and thorough consideration of the information contained herein and following consideration of the views of those Federal agencies having jurisdiction by law or special expertise with respect to the environmental impacts described, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101(a) of the National Environmental Policy Act of 1969.

Other required environmental findings and conclusions must be included in the summary, if not included in the body or at the end of the EIS. Signature and date blocks should be provided for the decisionmaker's approval and may also be provided for the concurrences of other appropriate offices.

i. Availability of Approved Final EIS. The responsible FAA official must file the final EIS with the EPA through the e-NEPA electronic filing system at: http://www.epa.gov/oecaerth/nepa/submiteis/index.html. The EPA will issue a NOA for the final EIS in the *Federal Register*. The FAA may also publish a more detailed availability notice in the *Federal Register*, but the FAA notice cannot be substituted for the EPA *Federal Register* notice. The final EIS must be sent to:

(1) The appropriate regional office of EPA;

(2) The originating FAA LOB/SO director; Regional FAA Administrator; and AEE (one copy each);

(3) The DOT Office of the Assistant Secretary for Transportation Policy, Office of Safety, Energy, and Environment (P-30) (one copy);

(4) Each Federal, state, and local agency, tribe, and private organization that made substantive comments on the draft EIS and to individuals who requested a copy of the final EIS or who made substantive comments on the draft EIS (one copy each);

(5) DOI (One copy in electronic format (CD/DVD, or any other widely used electronic storage media) and the URL for review documents available on the Internet. If no electronic version is available, then 6 to 9 copies depending on the action's geographic location and scope, (see U.S. Department of the Interior Environmental Review Distribution Requirements dated June 6, 2012) at the following address: Director, Office of Environmental Policy and Compliance, U.S. Department of the Interior, Main Interior Building, MS 2462, 1849 C Street, N.W., Washington, D.C. 20240;

(6) DOE headquarters for projects having major energy-related consequences (one copy); and

(7) The appropriate state-designated single point of contact (or specific agency contacts when states have not designated a single contact point), unless otherwise designated by the governor (adequate number of copies [varies by state]).

Additional copies must be sent to accessible locations to be made available to the general public, including headquarters and regional offices, and state, metropolitan, and local

public libraries to facilitate accessibility. The final EIS, comments received, and supporting documents must be made available to the public without charge to the fullest extent practical or at a reduced charge, which is not more than the actual cost of reproducing copies, at appropriate agency office(s) or at a designated location.

j. Timing of Decision. Except where a combined final EIS/ROD is required under Section 1319(b) of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a(b), the FAA must wait a minimum of 30 days after the EPA NOA of the final EIS is published in the *Federal Register* (and at least 90-days after filing of the draft EIS) before making a decision on the proposed action and issuing a ROD (see 40 CFR § 1506.10, CEQ Regulations). The waiting period is not for receiving public comments (although the FAA may request comments on a final EIS, see Paragraph 7-1.2.g); rather, it provides time for the decisionmaker to consider the final EIS and other pertinent information and make a decision. At the conclusion of the waiting period, the decisionmaker issues the final decision in a ROD (see Paragraph 7-2) and implementation of the selected action may begin.

When the FAA is the lead Federal agency, the EPA, upon a showing by another Federal agency of compelling reasons of national policy, may extend prescribed periods up to 30 days, but no longer than 30 days without the permission of the FAA (see 40 CFR § 1506.10(d), CEQ Regulations). The responsible FAA official may also extend the waiting period or request the EPA to reduce this period for compelling reasons of national policy (see 40 CFR § 1506.10(d), CEQ Regulations). The 90-day waiting period after filing the draft EIS cannot be altered by the EPA.

If the FAA unilaterally approves an overall extension of the comment period, the EPA must be notified so that the EPA may provide an update in its *Federal Register* notice.

7-1.3. Decision Not to Prepare an Environmental Impact Statement. Under certain circumstances, the FAA may choose to terminate an EIS. This could occur, for example, when an applicant has decided not to go forward with the action or it is determined to be no longer needed. The FAA may also terminate an EIS and revert to an EA if the environmental analysis shows that there would not be significant impacts from the project.

The FAA should provide *Federal Register* notice of the determination to no longer conduct an EIS. The *Federal Register* notice should cite the date of the original NOI to Prepare an EIS and state the reasons why the FAA has chosen to terminate the EIS.

7-2. Environmental Impact Statement Record of Decision.

7-2.1. Record of Decision Process.

a. General. Following the time periods described in Paragraph 7-1.2.j, as applicable, the decisionmaker may make a decision on the proposed action. The FAA must prepare a ROD that contains the information referenced in Paragraph 7-2.2.

b. Internal Review. The decisionmaker must obtain concurrence in accordance with the FAA's internal review procedures before approving the ROD (see Paragraph 10-4, Review and Approval of Final EISs and Paragraph 10-6, Review and Approval of RODs). The LOB/SO must circulate the draft ROD for internal coordination and concurrence with the same FAA LOB/SOs that reviewed the final EIS. These LOB/SOs may concur without comment, concur on the condition that specific mitigation measures

be incorporated in the ROD, request that a supplement to the final EIS be prepared and circulated, or non-concur. Supplements to final EISs may be necessary and must be reviewed and approved in the same manner as the original document, and a new draft ROD should be prepared, circulated, and approved. The decisionmaker cannot approve the Federal action over a LOB/SO's non-concurrence.

c. Selection of Alternative. The decisionmaker may select any alternative within the range of alternatives analyzed in the final EIS. The selected alternative may be an alternative other than the agency's preferred alternative or the environmentally preferred alternative. The selected action may not be implemented until the decisionmaker has approved and signed the ROD.

d. Selection of Alternative Other than the Preferred Alternative. If the decisionmaker selects an alternative other than the preferred alternative in the final EIS that involves special purpose laws and requirements, such as those related to Section 4(f) land, federally listed endangered species, wetlands, or historic sites, the agency must first complete any required evaluation and consultation not already completed and make the appropriate finding prior to taking the action.

e. Public Notice. The responsible FAA official must provide public notice of availability of the ROD through appropriate means as required in 40 CFR § 1506.6(b), CEQ Regulations. Such means may include publication in the *Federal Register,* other media, and/or on the Internet (see 40 CFR § 1506.6(b), CEQ Regulations), although publication in the *Federal Register* is only required for actions of national concern.

f. Internal Distribution. A copy of the ROD should be forwarded with the final EIS to AEE-1 for their files.

7-2.2. Record of Decision Content. The ROD must:

a. Present the FAA's decision on the proposed action, and identify and discuss all factors, including any essential considerations of national policy, that were balanced by the agency in making its decision and state how those considerations entered into the decision;

b. Identify all alternatives the FAA considered and which alternative(s) is/are considered to be environmentally preferable. The FAA may discuss preferences among alternatives based on relevant factors including economic and technical considerations, and agency statutory missions;

c. Identify any mitigation measure(s) committed to as part of the decision and summarize any applicable mitigation monitoring and enforcement program. This must include any mitigation measure that was committed to as a condition of the approval of the final EIS;

d. State whether all practicable means to avoid or minimize environmental harm from the selected alternatives have been adopted, and if not, why; and

e. Include any findings required by Executive Order, regulation, or special purpose law or requirement (e.g., wetlands, Section 4(f), etc.).

As necessary, the ROD can be used to clarify and respond to issues raised on the final EIS.

If the ROD is prepared following adoption of all or part of another agency's NEPA document, the ROD must identify the part(s) of the document being adopted and include documentation of the FAA's independent evaluation of the document.

7-2.3. Environmental Commitments. Mitigation and other conditions described in the EIS and committed to in the ROD must be implemented and/or monitored by the FAA or another appropriate entity that has committed to implementing and/or monitoring mitigation. Proposed changes in, or deletion of, a mitigation measure that was included as a condition of approval of the final EIS must be reviewed by the same FAA LOB/SO that reviewed the final EIS and be approved and signed by the approving official. The FAA ensures implementation of such mitigation measures through special conditions, funding agreements, contract specifications, directives, other review or implementation procedures, and other appropriate follow-up actions in accordance with 40 CFR § 1505.3, CEQ Regulations (see Paragraph 4-4, Mitigation, regarding monitoring and enforcement of mitigation commitments).

7-3. -7-50. Reserved.

Chapter 8: Federal Aviation Administration Actions Subject to Special Procedures

8-1. Commenting on Other Agencies' National Environmental Policy Act Documents. In accordance with 40 CFR § 1503.2, CEQ Regulations, the FAA must comment on draft EISs prepared by other Federal agencies if the FAA has jurisdiction by law or special expertise with respect to any environmental impact involved or is authorized to develop and enforce environmental standards (e.g., 14 CFR part 36). In these situations, the responsible FAA official may, if appropriate, reply that the FAA has no comment. If the responsible FAA official comments on the lead agency's predictive methodology, the comments should describe any preferred alternative methodology and explain why the FAA prefers this methodology.

a. Requests from Other Agencies or Tribes. Other Federal, state, or local agencies, or tribes, may consult the FAA for assistance in analyzing environmental impacts that fall within the FAA's statutory responsibility, mission, or related program expertise. The FAA should provide its special expertise on proposals impacting aviation and other FAA responsibilities as follows:

(1) Comments should be specific in nature and organized in a manner consistent with the structure of the NEPA document and may identify alternatives or modifications that might enhance environmental quality or avoid or minimize adverse environmental impacts, and should correct inaccuracies or omissions;

(2) Any agency project that is environmentally or functionally related to the proposed action in the NEPA document should be identified so that inter-relationships can be discussed in the NEPA document. In such cases, the agency should consider serving as a joint lead agency or cooperating agency;

(3) Environmental monitoring for which the agency has special expertise may be suggested and encouraged during construction, startup, or operation phases;

(4) Other agencies will generally be requested to forward their NEPA documents directly to the appropriate FAA Regions, Centers, or Service Areas. The following types of matters, however, must be referred to the appropriate LOB/SO in Washington headquarters for comment: actions with national policy implications; proposed actions that involve natural, ecological, cultural, scenic, historic, or park or recreation resources of national significance; legislation; or regulations having national impacts, or national program proposals. Draft EISs in these categories must also be referred to Office of the Assistant Secretary for Transportation Policy (P-1) for preparation of DOT comments. In referring these matters to headquarters, the region or center is encouraged to prepare a proposed Departmental response;

(5) Regions, Centers, or Service Areas review NEPA documents that do not have national implications. Comments should be forwarded directly to the office that the originating agency designates for receipt of comments. If the FAA receiving office believes that another DOT office also has an interest or is in a better position to respond, the FAA office should transmit the NEPA document to the appropriate DOT office in a timely fashion. If the FAA and other DOT offices comment at the regional level, the Regional Administrator or designee may coordinate the comments;

(6) When appropriate, the FAA should coordinate a response with other DOT offices having special expertise in the subject matter; and

(7) Comments should be submitted within the time limits set forth in the request, unless the office responsible for submitting comments seeks and receives an extension of time. Comments must be concise and specify any changes desired either in the action proposed and/or in the NEPA document.

b. When the FAA is a Cooperating Agency. If the FAA is acting as a cooperating agency:

(1) The responsible FAA official should, if satisfied that the FAA's views are adequately reflected in the environmental document, reply that the FAA has no comment;

(2) If the responsible FAA official or AEE prepares comments that request additional information, the request should be as timely and specific as possible. The comments must specify any additional information (including information relating to other applicable environmental reviews or consultation requirements), analyses, public involvement, or consideration of alternatives or mitigation measures the FAA considers necessary; and

(3) If comments of the responsible FAA official or AEE object or express a reservation about the proposed action based on potential environmental impacts, the comments must specify what mitigation measures the responsible FAA official or AEE considers necessary to allow the LOB/SO to grant or approve applicable permit, license, or related requirements or concurrences.

8-2. Adoption of Other Agencies' National Environmental Policy Act Documents. The FAA may adopt, in whole or in part, another Federal agency's draft or final EA, the EA portion of another agency's EA/FONSI, or EIS in accordance with 40 CFR § 1506.3 of the CEQ Regulations and the following procedures:

a. FAA Independent Evaluation. The responsible FAA official must determine, based on an independent evaluation, that the document, or portion(s) thereof, to be adopted: (1) adequately address(es) the relevant FAA action(s); and (2) meet(s) the applicable standards (i.e., for an EA or EIS) in the CEQ Regulations and this Order. In adopting all or part of another agency's NEPA document, the FAA takes full responsibility for the scope and content that addresses the relevant FAA action(s). To the extent that another agency's NEPA document does not adequately address the FAA's proposed action or meet the applicable standards in the CEQ Regulations and this Order, the EA or EIS must be supplemented.

b. Written Re-evaluation. If more than three years have elapsed since the other agency issued its FONSI or its EIS, the responsible FAA official must prepare a written re-evaluation of the relevant portion of the other agency's EA or EIS in accordance with the procedures of Paragraph 9-2, Written Re-evaluations.

c. Legal Review. Before the FAA adopts all or part of another agency's EA or EIS, the document or portion thereof to be adopted must be reviewed by AGC-600 (for actions approved at FAA Headquarters) or Regional Counsel to determine if it is legally sufficient for adoption purposes. This requirement applies to an EA for an airport action only if the action: (1) is opposed by a Federal, state, or local agency or a tribe on environmental grounds, or opposed by a substantial number of people the project affects;

(2) would affect resources protected under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108; or (3) involves a determination of use of resources protected under Section 4(f). When another agency requests that the FAA be a cooperating agency, or the responsible FAA official otherwise anticipates adoption of another agency's EA or EIS, the responsible FAA official should consult with AGC-600 or Regional Counsel, as appropriate, as soon as possible regarding the timing and extent of the legal review.

d. FAA Documentation. After adopting all or part of another agency's NEPA document, the FAA must issue its own FONSI or FONSI/ROD when relying upon an EA or ROD when relying upon an EIS. The FONSI, FONSI/ROD, or ROD must identify, and may summarize, the portion(s) of the document being adopted, and must comply with other applicable requirements in this order (see Paragraph 6-3 and 7-2.2). It must also include documentation of the FAA's independent evaluation of the adopted portion(s).

e. Circulation of NEPA Documents.

(1) If the FAA is a cooperating agency on another agency's EIS and concludes that its comments and suggestions on the EIS have been satisfied, it may adopt the EIS, or a portion thereof, without recirculating it (see 40 CFR § 1506.3(c), CEQ Regulations). If the FAA is not a cooperating agency, it must recirculate the adopted EIS, or portion thereof, in accordance with 40 CFR § 1506.3(b), CEQ Regulations.

(2) The FAA may adopt an EA without circulating the EA for public comment regardless of whether the FAA was a cooperating agency. Circulation of an adopted EA for public comment is optional at the discretion of the responsible FAA official (see Paragraph 6-2.2.g). Examples of situations where this may be appropriate include projects that are highly controversial on environmental grounds (see Paragraph 5-2.b.(10)) and those involving special purpose laws and requirements (e.g., Section 106 of the National Historic Preservation Act; Executive Order 11988, *Floodplain Management*; Executive Order 11990, *Protection of Wetlands*; etc.) that necessitate additional public involvement beyond that already provided by the lead agency.

f. Notice to EPA. The FAA must notify EPA when it adopts an EIS prepared by another agency (see *Amended Environmental Impact Statement Filing System Guidance for Implementing 40 CFR 1506.9 and 1506.10 of the Council on Environmental Quality's Regulations Implementing the National Environmental Policy Act*, 76 *Federal Register* 2681 (January 14, 2011)).

8-3. Rulemaking. For a rulemaking subject to an EA or EIS, the draft EA or draft EIS will normally accompany the proposed rule and be made available with the proposed rule on Regulations.gov. The EA should be issued for public comment concurrent with the public comment period on the proposed rule to the extent practicable (see 40 CFR § 1501.4(b), CEQ Regulations). The NOA of the draft EIS must be published at least 90 days or the NOA of the final EIS must be published at least 30 days, whichever is later, prior to publishing a final rule (see 40 CFR § 1506.10, CEQ Regulations). The FAA may waive the 30 day period and publish

a final rule concurrently with a NOA of the final EIS when engaged in rulemaking under the Administrative Procedure Act, 5 U.S.C. §§ 551-559, or other statute for the purpose of protecting public health or safety (see 40 CFR § 1506.10(b)(2), CEQ Regulations).

8-4. Legislative Proposals. The FAA must prepare and circulate a draft Legislative EIS (LEIS) for a legislative proposal that could cause significant environmental impacts (see 40 CFR §§ 1506.8, 1508.17, and 1508.18(a), CEQ Regulations). Unless a final LEIS is required under 40 CFR § 1506.8(b)(2), CEQ Regulations, the draft LEIS along with comments received from circulation of the draft LEIS are included in the formal transmittal of the legislative package to Congress. The draft LEIS (un-revised) and associated comments constitute the detailed statement required by Section 102(2)(C) of NEPA, 42 USC § 4332(2)(C) for legislative proposals to Congress. The office originating the legislation is responsible for preparing, circulating, and filing the draft LEIS and, if required, the final LEIS. The LEIS is prepared and processed in the same manner as an EIS except that scoping is not required (see 40 CFR § 1506.8(b)(1), CEQ Regulations).

a. The draft LEIS and any public comments received by the FAA, and the final LEIS if required, must be transmitted to Congress within 30 days after transmittal of the legislative proposal, or within sufficient time to allow review for associated hearings and debates on the proposed legislation. The responsible FAA LOB/SO must clear the draft LEIS and associated comments, and the final LEIS if required, with the Office of the Assistant Secretary for Transportation Policy (P-1) and DOT Assistant General Counsel for Legislation (C-40). C-40 will submit the environmental documents to the Office of Management and Budget for circulation in the normal legislative clearance process.

b. Questions concerning legislation should be directed to the FAA Office of Government and Industry Affairs (AGI).

8-5. Actions within the United States with Potential Transboundary Impacts. Transboundary impacts would occur when an FAA action within the United States results in impacts that extend across the border and affect another country's environment. The FAA should include analysis of any reasonably foreseeable transboundary effects in their analysis of proposed actions (see CEQ's *Guidance on NEPA Analyses for Transboundary Impacts*, July 1, 1997).

8-6. Effects of Major Federal Aviation Administration Actions Abroad. If the FAA anticipates communication with a foreign government concerning environmental studies or documentation, the responsible FAA official must consult with the appropriate headquarters LOB/SO. The LOB/SO must notify AEE-400, coordinate with the Office of International Aviation (API), and then consult with the Office of the Assistant Secretary for Transportation Policy (P-1) to coordinate communication through the State Department.

a. Consideration of Effects. In accordance with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 *Federal Register* 1957 (January 9, 1979), and DOT Order 5610.1C, Paragraph 16, the responsible FAA officials should determine whether certain FAA actions would have a significant effect outside the United States, its territories and possessions. FAA officials should consider whether the Federal action involves:

(1) Effects on the environment of the global commons outside the jurisdiction of any nation (e.g., the ocean or Antarctica);

(2) Effects on the environment of a foreign nation not participating with the United States and not otherwise involved in the action;

(3) Provision of certain products (or emissions/effluents) which in the United States are strictly prohibited or strictly regulated because their effects on the environment present a serious public health risk;

(4) A physical project which, in the United States, would be prohibited or strictly regulated by Federal law to protect the environment against radioactive substances; or

(5) Effects on natural or ecological resources of global importance designated for protection by the President or resources protected by international agreement binding on the United States designated for protection by the Secretary of State.

b. Determination. Before deciding to approve any action having potential effects in the categories described in Paragraph 8-6.a, the responsible FAA official must determine whether the proposed action would have a significant environmental effect abroad.

c. No Significant Effect. If the responsible FAA official determines that the action will not have a significant environmental effect abroad, he or she must prepare a memorandum for the record that states the underlying reasons for the determination.

d. Significant Effect. If the responsible FAA official determines that the action would have a significant effect abroad, he or she should determine what type of document must be prepared and considered in accordance with Section 2-4 of Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, 44 *Federal Register* 1957 (January 9, 1979). As determined by the agency, documents should be taken into consideration in taking actions as follows:

(1) For major FAA actions significantly affecting the global commons – an EIS (including programmatic EISs);

(2) For major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action or major Federal actions significantly affecting the environment of a foreign nation which provide to that nation products or physical projects as described in Paragraphs 8-6.a(3) or 8-6.a(4):

(a) Bilateral or multilateral environmental studies, relevant or related to the proposed action, by the United States and one or more foreign nations, or by an international body or organization in which the United States is a member or participant; or

(b) A concise review of the environmental issues involved, including EAs, summary environmental analyses, or other appropriate documents; and

(3) For major Federal actions outside the United States, its territories and possessions which significantly affect natural or ecological resources of global importance or protected by international agreements as set forth in Paragraph 8-6.a(5) -- an EIS,

bilateral or multilateral environmental studies, or a concise review of environmental issues.

e. Need for Additional Documentation. An agency need not prepare a new document to comply with Executive Order 12114 when a document described in Paragraph 8-6.d already exists.

f. Coordination of Communications. The responsible FAA official must first coordinate communications concerning environmental studies or documentation with API, followed by the State Department through the DOT Office of the Assistant Secretary for Transportation Policy (P-1).

g. Additional Coordination. With respect to requests for FAA action, after the State Department's notification, all FAA requests to a foreign applicant for information the FAA needs to prepare an environmental study or an EIS should be forwarded through the civil aviation authority of the applicant's government. Copies of the environmental study or EIS and notices of any public hearings planned on the proposed action should be furnished to the:

(1) Applicant;

(2) Appropriate foreign civil aviation authority;

(3) Washington, D.C., embassy for the country where the applicant is located or the country that the proposed action would affect;

(4) API; and

(5) AEE-400.

h. Other Requirements. Other environmental laws, regulations, and Executive Orders have specific requirements regarding consideration of potential effects of Federal actions overseas. Important examples include, but are not limited to, the following:

(1) Under Executive Order 12088, *Federal Compliance with Pollution Control Standards*, 43 *Federal Register* 47707 (October 13, 1978), the FAA must ensure that construction or operation of FAA facilities outside the United States complies with the environmental pollution control standards of general applicability in the host country or jurisdiction; and

(2) Under Section 402 of the National Historic Preservation Act (54 U.S.C. § 307101(e)), "[p]rior to the approval of any Federal undertaking outside the United States which may directly and adversely affect a property which is on the World Heritage List or on the applicable country's equivalent of the National Register [of Historic Places], the head of a Federal agency having direct or indirect jurisdiction over such undertaking shall take into account the effect of the undertaking on such property for purposes of avoiding or mitigating any adverse effect."

i. Issue Identification and Resolution. Any substantial differences arising in the course of the environmental study or EIS between the originating FAA organization and a foreign applicant or the affected foreign country should be referred to AEE (for proposed Airport actions, APP-400), which will consult with APL to resolve any problems.

8-7. Emergency Actions. Emergency circumstances may require immediate actions that preclude following standard NEPA processes. Alternative arrangements for NEPA compliance are permitted as described in this paragraph. Such alternative arrangements are limited to those actions that are necessary to control the immediate impacts of the emergency.

In the event of emergency circumstances, the LOB/SO should coordinate with AEE-400 and AGC-600 as soon as practicable. When time permits, environmental documentation should be prepared in accordance with this Order and the CEQ Regulations. Immediate emergency actions necessary to protect the lives and safety of the public or prevent adverse impacts to ecological resources and functions should never be delayed in order to comply with NEPA. These actions should be taken as soon as is necessary to ensure the protection and safety of the public and the protection of ecological resources and functions. Alternative arrangements for NEPA compliance are permitted for emergency actions pursuant to the following:

a. CATEXs. Where emergency circumstances make it necessary to determine whether an extraordinary circumstance would preclude the use of a CATEX, the responsible FAA official must make the determination as soon as practicable. If an extraordinary circumstance exists, the responsible FAA official must comply with Paragraphs 8-7.b or 8-7.c below, as applicable.

b. Environmental Assessments. Where emergency circumstances make it necessary to take an action that requires an EA before the normal EA process can be completed in accordance with this Order and the CEQ Regulations, the responsible FAA official must consult with AEE and AGC-600 to develop alternative arrangements. Alternative arrangements for such actions should focus on minimizing adverse environmental impacts of the FAA's action and the emergency. To the maximum extent practicable, the alternative arrangements should include the interagency coordination and public notification and involvement that would normally be undertaken for an EA for the action at issue. The alternative arrangements may not alter the requirements of 1508.9(a)(1) and (b), CEQ Regulations, but the level of evidence, analysis, and discussion may be limited to what is practicable under the emergency circumstances. The Director of AEE may grant alternative arrangements. Any alternative arrangements must be documented. AEE will inform CEQ of the alternative arrangements at the earliest opportunity.

c. Environmental Impact Statements. CEQ may grant alternative arrangements for, but not eliminate, NEPA compliance where emergency circumstances make it necessary to take actions with significant environmental impacts without observing other provisions of this Order and the CEQ Regulations (see 40 CFR § 1506.11, CEQ Regulations). In these situations, the processing times may be reduced or, if the emergency situation warrants, preparation and processing of EISs may be abbreviated. A request for alternative arrangements must be submitted to CEQ and notice of a potential request should be provided to CEQ at the earliest opportunity. Before making the request, the responsible FAA official must consult with AEE-400 and the AGC-600 for evaluation to ensure national consistency. For projects undertaken by an applicant, the responsible FAA official must inform AEE-400 and AGC-600 about the emergency. AEE will notify the Office of the Assistant Secretary for Transportation Policy (P-1) of any situations when alternative arrangements will be requested and will consult CEQ requesting the alternative arrangements for complying with NEPA.

8-8. Council on Environmental Quality Referrals. The CEQ may serve as a mediator in interagency disagreements over proposed FAA actions that might cause unsatisfactory environmental impacts or actions conducted by other Federal agencies that may affect FAA interests. If an agency determines that a proposed FAA action is environmentally unsatisfactory, the EPA or an agency commenting on an FAA draft and final EIS may refer the matter to CEQ by delivering the referral to CEQ no later than 25 days after publication by EPA of the notice of availability of the final EIS (unless the FAA grants an extension of time under 14 CFR § 1504.3(b), CEQ Regulations). The FAA must comply with CEQ's procedures for making referrals and responding to referrals, which are provided at 40 CFR part 1504, CEQ Regulations. The FAA-specific procedures for responding to referrals are as follows:

a. If the responsible FAA official receives a notice of intended referral from a commenting agency, the responsible FAA official must provide AEE and the Office of the Assistant Secretary for Transportation Policy (P-1) with a copy of the notice (FAA airports personnel must provide a copy of the referral notice to APP-400, which will then contact AEE and P-1).

b. Once a referral to CEQ has been made by a commenting agency, the responsible FAA official must send a proposed response to AEE within 10 days of the referral. The response must fully address the issues raised in the referral and be supported by evidence. AEE then obtains P-1's concurrence on the proposed response (APP-400 must also obtain P-1 concurrence for Airports' actions). This response then must be sent to CEQ within 25 days of receipt of the referral.

8-9. -8-50. Reserved.

Chapter 9: Time Limits, Written Re-Evaluations, and Supplemental National Environmental Policy Act Documents

9-1. Time Limits. There are established time limits for EAs and EISs consistent with time limits established in DOT Order 5610.1C. These time limits do not apply to programmatic EAs and EISs, which may be valid for longer time periods.

a. Draft EA. A draft EA may be assumed valid for a period of three years. If the approving official has not issued a FONSI within three years of receipt of the final draft EA, a written re-evaluation must be prepared in accordance with Paragraph 9-2 of this Order (unless a decision has been made to prepare a new or supplemental draft EA).

b. FONSI. For FONSIs, two time limits are established:

(1) If major steps toward implementation of the proposed action (such as the start of construction, substantial acquisition, or relocation activities) have not commenced within three years from the date of issuance of the FONSI, a written re-evaluation must be prepared in accordance with Paragraph 9-2 of this Order (unless a decision has been made to prepare a new or supplemental EA); or

(2) If the proposed action is to be implemented by the FAA in stages or an action implemented by an applicant requires successive FAA approvals, a written re-evaluation of the continued adequacy, accuracy, and validity of the EA must be made at each major stage or approval point that occurs more than three years after issuance of the FONSI and a new or supplemental EA prepared, if necessary.

c. Draft EIS. A draft EIS may be assumed valid for a period of three years. If the proposed final EIS is not submitted to the approving official within three years from the date of the draft EIS circulation, a written re-evaluation must be prepared in accordance with Paragraph 9-2 of this Order (unless a decision has been made to prepare a new or supplemental draft EIS).

d. Final EIS. For final EISs, two time limits are established:

(1) If major steps toward implementation of the proposed action (such as the start of construction, substantial acquisition, or relocation activities) have not commenced within three years of approval of the final EIS, a written re-evaluation must be prepared in accordance with Paragraph 9-2 of this Order (unless a decision has been made to prepare a new or supplemental EIS); or

(2) If the proposed action is to be implemented by the FAA in stages or an action implemented by an applicant requires successive FAA approvals, a written re-evaluation of the continued adequacy, accuracy, and validity of the EIS must be made at each major stage or approval point that occurs more than three years after approval of the final EIS.

9-2. Written Re-evaluations. A written re-evaluation is a document used to determine whether the contents of a previously prepared environmental document (i.e., a draft or final EA or EIS) remain valid or a new or supplemental environmental document is required. There is no specified format for a written re-evaluation. A written re-evaluation should be concise and the

level of analysis should be commensurate with the potential for environmental impacts of a nature or extent not evaluated in the EA or EIS.

a. Written Re-evaluation Required. Unless a decision has been made to prepare a new or supplemental EA or EIS, the responsible FAA official must prepare a written re-evaluation:

(1) If required under Paragraph 8-2.b or 9-1 of this Order; or

(2) Before further FAA approval may be granted for an action if, after the FAA has approved an EA or EIS for the action:

(a) There are changes to the action, or new circumstances or information, that could trigger the need for a supplemental EA or EIS (see Paragraphs 9-2.c and 9-3); or

(b) All or part of the action is postponed beyond the time period analyzed in the EA or EIS.

b. Other Circumstances. The responsible FAA official may also prepare a written re-evaluation in other circumstances, including, for example, where there is a lack of clear and convincing evidence that major steps toward implementation of the proposed action have commenced.

c. Supplemental EA or EIS Not Required. A new or supplemental EA or EIS need not be prepared if a written re-evaluation indicates that:

(1) The proposed action conforms to plans or projects for which a prior EA and FONSI have been issued or a prior EIS has been filed and there are no substantial changes in the action that are relevant to environmental concerns;

(2) Data and analyses contained in the previous EA and FONSI or EIS are still substantially valid and there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts; and

(3) Pertinent conditions and requirements of the prior approval have been, or will be, met in the current action.

d. Process. The responsible FAA official must sign the written re-evaluation. Written re-evaluations should be reviewed internally and may be made public at the discretion of the responsible FAA official.

e. Decision Document. There may be instances where it would be appropriate for the responsible FAA official to issue a separate formal decision document in connection with a written re-evaluation (i.e., a “WR/ROD”). A WR/ROD might be appropriate, for example, where there is substantial controversy regarding the need for a supplemental EA or EIS. A WR/ROD may also be appropriate when the written re-evaluation involves an action covered in an EA where any of the factors listed in Paragraphs 6-4.a.(1)-(4) apply. When there is doubt whether a WR/ROD is appropriate, the responsible FAA official should consult with AGC-600 or Regional Counsel.

9-3. Supplemental Environmental Assessments and Environmental Impact Statements. The responsible FAA official must prepare a supplemental EA, draft EIS, or final EIS if either of the following occurs: (1) there are substantial changes to the proposed action that are relevant to environmental concerns, or (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts (see 40 CFR § 1502.9(c)(1), CEQ Regulations). Significant information is information that paints a dramatically different picture of impacts compared to the description of impacts in the EA or EIS. The FAA also may prepare supplements when the purposes of NEPA will be furthered by doing so (see 40 CFR § 1502.9(c)(2), CEQ Regulations). If a supplement changes a FONSI or a ROD, the FAA must issue a new FONSI or ROD. If a new ROD is required, it must be combined with the supplemental final EIS if a combined final EIS/ROD would be required under Section 1319(b) of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a(b).

a. Process. The FAA prepares, circulates, issues, and files, as appropriate, a supplement to an EA, draft EIS, or final EIS in the same fashion as the original EA, draft EIS, or final EIS, unless CEQ approves alternative procedures. If, however, there are compelling reasons of national policy to shorten time periods, the FAA must consult with the EPA (see Paragraph 7-1.2.d). Scoping may be considered, but is not required.

b. Timing. Except where a combined final EIS/ROD is required under Section 1319(b) of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a(b), if a new ROD is required, it cannot be issued sooner than 30 days after the NOA of the supplemental EIS has been published in the *Federal Register*.

9-4. -9-50. Reserved.

Chapter 10: Review and Approval of National Environmental Policy Act Documents

10-1. General. The FAA's internal review process is a means of coordinating the review of NEPA documents among appropriate management levels and across LOB/SOs. Internal review is to ensure that: (1) NEPA documents are technically and legally sufficient; (2) the concerns of other FAA offices and any related foreseeable agency actions by other FAA offices are properly discussed in NEPA documents; and (3) any commitments that are the responsibility of other FAA offices are coordinated with the appropriate action office so that these commitments will be implemented. LOB/SOs should have in place processes to provide evidence of appropriate coordination and legal sufficiency review. The responsible FAA official must contact affected LOB/SOs for guidance on program-specific coordination procedures. This Order establishes special instructions for proposed actions that cross regional boundaries or LOBs, and for final EISs that are highly controversial (see Paragraph 10-4.c).

10-2. Review and Approval of Environmental Assessments, Findings of No Significant Impact, and Findings of No Significant Impact/Records of Decision.

a. EAs and FONSIs Originating and Approved in FAA Regions, Centers, or Service Areas. The NEPA lead in the Region, Center, or Service Area must coordinate review of the EA and FONSI with affected LOB/SOs. The NEPA lead must also coordinate legal sufficiency review of the EA and FONSI with applicable Regional or Center Counsel; however, for airport actions, Regional Counsel legal sufficiency review is only required if the action: (1) is opposed by a Federal, state, or local agency or a tribe on environmental grounds or opposed by a substantial number of people the project affects; (2) would affect resources protected under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108; or (3) involves a determination of use of resources protected under Section 4(f). Following coordination with interested LOB/SOs and any required legal sufficiency review, the approving official may approve and sign the FONSI.

b. EAs and FONSIs Originating or Approved in Washington, D.C. Headquarters. The NEPA lead LOB/SO must coordinate review of the EA and FONSI with affected LOB/SOs. The NEPA lead must also coordinate legal sufficiency review of the EA and FONSI with Headquarters AGC; however, for airport actions, legal sufficiency review is only required if the action: (1) is opposed by a Federal, state, or local agency or a tribe on environmental grounds or opposed by a substantial number of people the project affects; (2) would affect resources protected under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108; or (3) involves a determination of use of resources protected under Section 4(f). Following coordination and any required legal sufficiency review by AGC, the approving official may approve and sign the FONSI.

c. Supplemental EAs. For supplemental EAs, the NEPA lead should follow the coordination procedures described in Paragraphs 10-2.a and 10-2.b.

d. FONSI/RODs. The NEPA lead must coordinate review of the FONSI/ROD with affected LOB/SOs and Headquarters AGC (or Regional or Center Counsel for FONSI/RODs originating and approved in FAA Regions, Centers, or Service Areas**)**; however, for airport actions, legal sufficiency review is only required if the action: (1) is opposed by a Federal, state, or local agency or a tribe on environmental grounds or opposed by a substantial number of people the project affects; (2) would affect resources

protected under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108; or (3) involves a determination of use of resources protected under Section 4(f). Following coordination and review for legal sufficiency, the decisionmaker may approve and sign the FONSI/ROD. When the FAA prepares a FONSI/ROD for a proposed action meeting the criteria described in Paragraph 6-4.a and where the proposed action crosses regional boundaries or involves more than one LOB, the Regional Administrator, Center Director, or Service Area Director must sign the decision documents. When the FAA prepares a FONSI/ROD for a proposed action that crosses regional boundaries or involves more than one LOB, but that does not meet the criteria described in Paragraph 6-4.a, the decisionmaker for the NEPA lead in the Region, Center, or Service Area may sign the decision document provided that the decisionmaker for any other office with an action covered by the FONSI also signs the grid indicating concurrence.

e. Request to Waive Review. Regional Counsel and/or Headquarters AGC review of an EA and FONSI can be waived for LOBs other than ARP as long as the proposed action is not opposed on environmental grounds by a Federal, state, or local government, or by a tribe. At the regional level, a Division Manager may request a waiver of Regional Counsel's legal sufficiency review. Such requests must be submitted to AGC-600, as only AGC-600 may waive Regional Counsel's review of an EA and FONSI. At the headquarters level, AGC may waive its review of an EA and FONSI upon request by a Program or Office Director.

10-3. Review and Approval of Draft Environmental Impact Statements.

a. Draft EISs Originating in Regions, Centers, or Service Areas (Except Those Having National Interest or Involving Section 4(f) Determinations). The NEPA lead Region, Center, or Service Area must coordinate review of the preliminary draft EIS or its relevant parts with affected LOB/SOs, with the appropriate LOB/SO (e.g., APP-400 for airport program draft EISs), and with Regional or Center Counsel for legal sufficiency review. Following coordination and legal sufficiency review, the responsible FAA official may publish, distribute, and file the draft EIS with EPA.

b. Draft EISs Originating in Washington, D.C. Headquarters, Having National Interest, or Involving Section 4(f) Determinations. The NEPA lead LOB/SO must coordinate review of the preliminary draft EIS or its relevant parts with affected LOB/SOs and with Headquarters AGC for legal sufficiency review. Following coordination and legal sufficiency review, the responsible FAA official may publish, distribute, and file the draft EIS with EPA.

10-4. Review and Approval of Final Environmental Impact Statements.

a. Final EISs Originating in Regions, Centers, or Service Areas.

(1) Where authority to approve the final EIS is in the Region, Center, or Service Area. The NEPA lead Region, Center, or Service Area must coordinate review of the final EIS with affected LOB/SOs and Regional or Center Counsel for legal sufficiency review. Following coordination and review for legal sufficiency, the approving official may approve, sign, and file the final EIS with EPA. If

headquarters concurrence is required by an LOB/SO on a final EIS, the NEPA lead must obtain that concurrence prior to approval.

(2) Where authority to approve the final EIS is retained in Washington, D.C. Headquarters. The NEPA lead must coordinate the final EIS with affected LOB/SOs and Headquarters AGC for legal sufficiency review and concurrence. Unless specifically requested, coordination with AEE is not required; however, the responsible FAA official must provide AEE with a copy of the final EIS for informational purposes. Following AGC legal sufficiency review and concurrence, the approving official may approve and sign the final EIS, and the responsible FAA official may file the final EIS with EPA.

b. Final EISs Originating in Washington, D.C. Headquarters**.** The NEPA lead LOB/SO must coordinate the final EIS with affected LOB/SOs and Headquarters AGC for legal sufficiency review. Unless specifically requested, coordination with AEE is not required; however, the responsible FAA official must provide AEE with a copy of the final EIS for informational purposes. Following Headquarters AGC legal sufficiency review, the approving official may approve and sign the final EIS, and the responsible FAA official may file the final EIS with the EPA.

c. Highly Controversial Final EISs. If a final EIS is highly controversial, AEE must notify P-1 and the DOT Office of General Counsel (C-1) that the final EIS is under review and must provide each with a copy of the summary section of the final EIS. P-1 and C-1 must also be given at least two weeks' notice before approval of the highly controversial final EIS.

10-5. Review and Approval of Supplemental Environmental Impact Statements. For supplemental EISs, the NEPA lead should follow the coordination procedures described in Paragraphs 10-4.a, and 10-6.a, as applicable.

10-6. Review and Approval of Records of Decision.

a. RODs originating in Regions, Centers, or Service Areas.

(1) Where authority to approve the ROD is in the Region, Center, or Service Area. The NEPA lead Region, Center, or Service Area must coordinate review of the ROD with affected LOB/SOs and Regional or Center Counsel for legal sufficiency review. Following coordination and review for legal sufficiency, the decisionmaker may approve and sign the ROD. If headquarters concurrence is required by an LOB/SO on a ROD, the NEPA lead must obtain that concurrence prior to approval of the ROD. For proposed actions that cross regional boundaries or involves more than one LOB, the Regional Administrator is responsible for signing the ROD.

(2) Where authority to approve the ROD is retained in Washington, D.C. Headquarters. The NEPA lead must coordinate the ROD with affected LOB/SOs and Headquarters AGC for legal sufficiency review. Unless specifically requested, coordination with AEE is not required; however, the responsible FAA official must provide AEE with a copy of the ROD for informational purposes. Following legal sufficiency review, the decisionmaker may approve and sign the ROD.

b. RODs originating in Washington, D.C. Headquarters. The NEPA lead LOB/SO must coordinate the ROD with affected LOB/SOs and Headquarters AGC for legal sufficiency

review. Unless specifically requested, coordination with AEE is not required; however, the responsible FAA official must provide AEE with a copy of the ROD for informational purposes. Following legal sufficiency review, the decisionmaker may approve and sign the ROD.

10-7. -10-50. Reserved.

Chapter 11: Administrative Information

11-1. Distribution. Notice of promulgation and availability of this Order is distributed to the FAA Assistant or Associate Administrators and their office and service directors, the Chief Operating Officer and vice-presidents of ATO, and the Chairs of the Environmental Network. This Order should be forwarded to all division and facility managers and NEPA practitioners.

A member of the public may obtain an electronic copy of this Order using the Internet by:

a. Visiting the FAA's Regulations and Policies website at http://www.faa.gov/regulations_policies/;

b. Searching the Federal eRulemaking Portal at http://www.regulations.gov; or

c. Accessing the Government Printing Office's website at http://www.gpo.gov/fdsys/.

A member of the public who does not have access to the Internet or is not able to use an electronic version may obtain a CD or hard copy of this Order, for a fee, by sending a request to the FAA, Office of Rulemaking (ARM-1), 800 Independence Avenue S.W., Washington, DC 20591, or by calling (202) 267-9680. Requestors should identify the docket number, notice number, or change number of this Order.

A member of the public may also access all documents the FAA considered in developing this Order through the Internet via the Federal eRulemaking Portal referenced in Paragraph 11-1.b.

11-2. Authority to Change This Order.

a. FAA Administrator. The Administrator reserves the authority to establish or change policy, delegate authority, or assign responsibility.

b. Executive Director of the Office of Environment and Energy (AEE-1). AEE-1 has the authority to add new chapters or appendices or change existing chapters or appendices after appropriate coordination with internal stakeholder organizations. AEE-1 also has the authority to update and amend the 1050.1F Desk Reference.

c. Organizational Elements. Changes proposed by an organizational element within the FAA must be submitted to AEE-1, who will evaluate, or assign a designee to evaluate the changes for incorporation. The LOB/SO must provide AEE with a memorandum describing the proposed change, a detailed justification for the change, and comments from other program offices if the proposed changes or revisions affect them.

11-3. Process for Changing This Order. AEE must, in addition to the formal clearance procedures prescribed in FAA Order 1320.1, *FAA Directives Management*, formally coordinate with AGC, the Office of the Assistant Secretary for Transportation Policy (P-1), and the Office of the General Counsel (C-1), consult with CEQ, and then publish the proposed changes or revisions to this Order in the *Federal Register* for public comment. After receiving all required FAA and DOT concurrences and after a finding of conformity is made by CEQ in accordance with 40 CFR § 1507.3(a), CEQ Regulations, the FAA may publish the final change or revision in the *Federal Register* and implement the revised Order.

11-4. Explanatory Guidance. FAA LOB/SOs may develop program-specific explanatory guidance (e.g., orders, guidance documents, handbooks, training) consistent with the CEQ Regulations and this Order (see 40 CFR § 1507.3, CEQ Regulations). All FAA LOB/SOs that have previously issued such explanatory guidance must update those documents to be consistent with this Order. This Order supersedes any inconsistent explanatory guidance.

a. Development of Explanatory Guidance. A LOB/SO must consult with AEE-400 and AGC-600 in developing explanatory guidance related to this Order. During consultation, AGC and AEE will determine the extent and type of review.

b. Review. If required, the LOB/SO must submit its proposed explanatory guidance to AEE and AGC for a 60-day review period. If AEE-1 finds the explanatory guidance to be consistent with this Order, after joint consultation with AGC for legal sufficiency, when appropriate, AEE will notify the LOB/SO and the LOB/SO may adopt its final explanatory guidance.

c. Federal Register. LOB/SOs are encouraged to publish an NOA and request for comment on proposed explanatory guidance in the *Federal Register*, and take other steps to seek public input during the development of explanatory guidance. If an LOB/SO chooses to publish its explanatory guidance in the *Federal Register*, that office must notify the parties with whom it has consulted and publish availability of that explanatory guidance in the *Federal Register*.

11-5. Definitions.

a. The definitions in 40 CFR part 1508 of the CEQ Regulations and in Title 49 and Title 51 of the U.S.C. are applicable to this Order. In the event of any differences between the definitions in the CEQ Regulations and this Order, the CEQ Regulations will be applied.

b. In addition, this paragraph defines basic terms used throughout this Order, as follows:

(1) Applicant. A person, entity, organization, or government agency seeking the FAA's approval of a major Federal action. Examples include, but are not limited to, airport sponsors, grant applicants, airlines, and commercial space license and permit applicants.

(2) Approving Official. The FAA official with authority to approve and sign FONSIs or EISs. LOB/SOs should designate approving officials consistent with FAA Order 1100.154, *Delegations of Authority,* and any other applicable FAA directives.

(3) Commercial Space Launch Site. The location on earth from which a commercial space launch takes place (as defined in a license the Secretary of Transportation issues or transfers under FAA Commercial Space Transportation Regulations, 14 CFR parts 400-460) and necessary facilities at that location.

(4) Decisionmaker. The FAA official with authority to approve and sign a ROD or other type of formal decision document for the FAA. LOB/SOs should designate decisionmakers consistent with Chapter 10 of this Order, FAA Order 1100.154, *Delegations of Authority,* and any other applicable FAA directives.

(5) Environmental Studies. The investigation of potential environmental impacts.

(6) Extraordinary Circumstances. Factors or circumstances that raise the potential for a proposed action included in a CATEX (see Paragraphs 5-6.1 through 5-6.6) to have a significant environmental impact and therefore require further analysis in an EA or an EIS (see Paragraph 5-2).

(7) Human Environment. Includes the natural and physical environment and the relationship of people with that environment. This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an EIS is prepared and economic or social and natural or physical environmental effects are interrelated, then the EIS will discuss all of these effects on the human environment (see 40 CFR § 1508.14, CEQ Regulations).

(8) Major Federal Actions. This term is defined in 40 CFR § 1508.18 of the CEQ Regulations. Federal action is defined in 40 CFR § 1508.18(a) and (b) of the CEQ Regulations.

(9) NEPA Lead. The FAA LOB/SO, Regional Operating Division, Center, or Service Area that has primary responsibility for complying with NEPA, including preparation and approval of NEPA documents.

(10) Noise Sensitive Area. An area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites. For example, in the context of noise from airplanes and helicopters, noise sensitive areas include such areas within the DNL 65 dB noise contour. Individual, isolated, residential structures may be considered compatible within the DNL 65 dB noise contour where the primary use of land is agricultural and adequate noise attenuation is provided. Also, transient residential use such as motels should be considered compatible within the DNL 65 dB noise contour where adequate noise attenuation is provided. A site that is unacceptable for outside use may be compatible for use inside of a structure, provided adequate noise attenuation features are built into that structure (see table 1 in Appendix A of 14 CFR part 150, *Airport Noise Planning, Land Use Compatibility Guidelines*). The FAA recognizes that there are settings where the DNL 65 dB standard may not apply. In these areas, the responsible FAA official should determine the appropriate noise assessment criteria based on specific uses in that area (see also the 1050.1F Desk Reference for further guidance). In the context of facilities and equipment, such as emergency generators or explosives firing ranges, but not including aircraft, noise sensitive areas may include such sites in the immediate vicinity of operations, pursuant to the Noise Control Act of 1972, 42 U.S.C. §§ 4901–4918 (see state and local ordinances, which may be used as guidelines for evaluating noise impacts from operation of such facilities and equipment).

(11) Responsible FAA Official. The FAA employee designated with overall responsibility to independently evaluate the environmental issues, furnish guidance and participate in the preparation of NEPA documents, and evaluate and take responsibility for the scope and content of the documents.

(12) Special Purpose Laws and Requirements. Federal laws, regulations, Executive Orders and DOT and FAA administrative directives that protect certain aspects of the environment (e.g., air quality, water quality, wetlands, endangered species, and historic sites). The FAA must comply with applicable special purpose laws and requirements in addition to NEPA. The 1050.1F Desk Reference provides more information on these items and how to address their requirements for all FAA organizations.

(13) Traditional Cultural Property. A traditional cultural property as used in this Order is a property that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

(14) Tribe. An American Indian or Alaska Native Tribe, Band, Nation, Pueblo, Village, or Community the Secretary of the Interior recognizes as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. § 479a. A Federally Recognized Tribe is eligible for the programs, services, and other government-to-government relationships established by the United States for Indians because of their status as Indian Tribes. The DOI, Bureau of Indian Affairs, annually publishes a list of Federally Recognized Tribes in the *Federal Register* and maintains this list on its website. The term "tribe" may also refer to state-recognized tribes under specific authorities for certain DOT programs, especially related to surface transportation that may be associated with a particular FAA project.

11-6. -11-50. Reserved.

Appendix A. Acronym List

ABU - Office of Budget
ACHP - Advisory Council on Historic Preservation
ACR - Office of Civil Rights
ADs - Airworthiness Directives
ADIZ - Air Defense Identification Zone
AEDT - Aviation Environmental Design Tool
AEE - Office of Environment and Energy
AEE-1 - Director of the Office of Environment and Energy
AGC - Office of Chief Counsel
AGC-200 - Dockets
AGC-600 - Office of Chief Counsel, Airports and Environmental Law Division
AGI - Office of Government and Industry Affairs
AGL - Above Ground Level
AHD - Office of Talent Development
AHR - Office of Human Resource Management
AIP - Airport Improvement Program
ALP - Airport Layout Plan
ALS - Approach lighting systems
ANG - Office of NextGen
ANSI/IEE - American National Standards Institute/Institute of Electrical and Electronic Engineers
AOC - Office of Communications
APA - Aerobatic Practice Area
API - Office of International Aviation
APL - Office of Policy, International Affairs, and Environment
APP-400 - Office of Airports, Airport Planning and Environmental Division
ARM-1 - Office of Rulemaking
ARP - Office of Airports
ARSR - Air Route Surveillance Radar
ARTCC - Air Route Traffic Control Centers
ASDE - Airport Surface Detection Equipment
ASH - Office of Security and Hazardous Materials

ASOS - Automatic Surface Observing System
ASR - Airport Surveillance Radar
AST - Office of Commercial Space Transportation
ATCB - Air Traffic Control Beacons
ATCBI - Air Traffic Control Beacon Interrogator
ATCT - Airport Traffic Control Towers
ATO - Air Traffic Organization
AVS - Office of Aviation Safety
AWOS - Automated Weather Observing System
C-1 - Department of Transportation Office of the General Counsel
C-40 - Department of Transportation Office of the Assistant General Counsel for Legislation
CATEX - Categorical Exclusion
CEQ - Council on Environmental Quality
CFR - Code of Federal Regulations
DARC - Direct Access Radar Channel
dB - Decibel
DNL - Day-Night Average Sound Level
DOC - U.S. Department of Commerce
DOE - U.S. Department of Energy
DOI - U.S. Department of the Interior
DOT - U.S. Department of Transportation
DVOR - Doppler VOR
EA - Environmental Assessment
EIS - Environmental Impact Statement
EMAS - Engineered Material Arresting System
EMS - Environmental Management System
EPA - U.S. Environmental Protection Agency
FAA - Federal Aviation Administration
FHWA - Federal Highway Administration
FICON - Federal Interagency Committee on Noise
FMS - Flight Management System
FONSI - Finding of No Significant Impact

FONSI/ROD - Finding of No Significant Impact/Record of Decision
FTA - Federal Transit Administration
FSS - Flight Service Station
GPS - Global Positioning System
ILS - Instrument Landing System
INM - Integrated Noise Model
IR MTR - Instrument Flight Rules Military Training Route
LAAS - Local Area Augmentation System
LEIS - Legislative Environmental Impact Statement
LLWAS - Low Level Wind Shear Alert System
LOB/SO - Line(s) of Business/Staff Office(s)
MERF - Mobile Emergency Radar Facilities
MMAC - Mike Monroney Aeronautical Center
MOU - Memorandum of Understanding
MSA - Metropolitan Statistical Area
NAAQS - National Ambient Air Quality Standards
NAS - National Airspace System
NCP - Noise Compatibility Programs
NEPA - National Environmental Policy Act
NEXRAD - Next Generation Radar
NextGen - Next Generation Air Transportation System
NIRS - Noise Integrated Routing System
NOA - Notice of Availability
NOI - Notice of Intent
NOTAMs - Notices to Airmen
NPDES - National Pollutant Discharge Elimination System
NPIAS - National Plan of Integrated Airport Systems
NPS - National Park Service
NRHP - National Register of Historic Places
NST - Noise Screening Tool
P-1 - Office of the Assistant Secretary for Transportation Policy
P-30 - Office of Safety, Energy, and Environment
PFC - Passenger Facility Charge

PRM - Precision Runway Monitor
PVD - Plan View Displays
RBDE - Radar Bright Display Equipment
RCAG - Remote Center Air/Ground Communication Facility
RCO - Remote Communications Outlet
RFP - Request for Proposal
RNAV/RNP - Area Navigation/Required Navigation Performance
ROD - Record of Decision
RPZ - Runway protection zone
RSA - Runway safety area
RT/R - Remote Transmitter/Receiver
RVR - Runway Visual Range
SAP - Sampling and Analysis Plan
SAWS - Stand Alone Weather Sensors
SHPO - State Historic Preservation Officer
SUA - Special Use Airspace
TACAN - Tactical Aircraft Control and Navigation
TDWR - Terminal Doppler Weather Radar
THPO - Tribal Historic Preservation Officer
TSOs - Technical standard orders
U.S.C. - United States Code
UST - Underground storage tank
VOR - Very High Frequency Omnidirectional Range
VORTAC - Co-located VOR and TACAN (See VOR and TACAN)
VOT - VOR Test Facility (See VOR)
WAAS - Wide Area Augmentation System
WR - Written Re-evaluation
WR/ROD - Written Re-evaluation/Record of Decision

Appendix B. Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303)

This appendix contains the Federal Aviation Administration (FAA) requirements for Noise and Noise-Compatible Land Use as well as compliance with Section 4(f), and describes related requirements to provide appropriate context. These requirements are also included in the 1050.1F Desk Reference[15], which provides comprehensive guidance regarding the analysis of impacts in specific environmental impact categories. Practitioners should use the 1050.1F Desk Reference in analyzing these impacts.

B-1. Noise and Noise-Compatible Land Use

For aviation noise analyses, the FAA has determined that the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of Yearly Day Night Average Sound Level (DNL), the FAA's primary noise metric. The Community Noise Equivalent Level (CNEL) may be used in lieu of DNL for FAA actions in California. The compatibility of existing and planned land uses with proposed aviation actions is usually determined in relation to the level of aircraft noise. Federal compatible land use guidelines for a variety of land uses are provided in Table 1 in Appendix A of 14 Code of Federal Regulations (CFR) part 150, *Land Use Compatibility with Yearly Day-Night Average Sound*. These guidelines are included in the Noise and Noise-Compatible Land Use Chapter of the 1050.1F Desk Reference.

No noise analysis is needed for projects involving Design Group I and II airplanes (wingspan less than 79 feet) in Approach Categories A through D (landing speed less than 166 knots) operating at airports whose forecast operations in the period covered by the NEPA document do not exceed 90,000 annual propeller operations (247 average daily operations) or 700 annual jet operations (2 average daily operations). Also, no noise analysis is needed for projects involving existing heliports or airports whose forecast helicopter operations in the period covered by the NEPA document do not exceed 10 annual daily average operations with hover times not exceeding 2 minutes.

B-1.1. Aircraft Noise Screening.

Aircraft noise screening may rule out the need for more detailed noise analysis and provide documented support for a Categorical Exclusion (CATEX) if screening shows no potential for significant noise impacts. The FAA has multiple noise screening tools (NSTs) and methodologies. A list of available FAA screening tools is provided in the 1050.1F Desk Reference. To use screening tools or equivalent screening methodologies that are not listed in the 1050.1F Desk Reference, prior written approval from the Office of Environment and Energy (AEE) is required.

[15] The Desk Reference is available on the FAA website at http://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/

B-1.2. Federal Aviation Administration Approved Models for Detailed Noise Analysis.

AEE has approved models for use for detailed noise analysis. Prior written approval from AEE is required to use another equivalent methodology or computer model. When requesting the use of an alternative model, justification of appropriateness of the use of that model over the use of the models listed in the 1050.1F Desk Reference is required. Unless it can be justified, all noise analyses must be performed using the standard and default data. Modification to standard or default data in FAA-approved models requires prior written approval from AEE. Guidance for submitting changes to the standard or default data is included in the 1050.1F Desk Reference.

Input documentation for the noise analysis with one copy of the input data files and corresponding output files used in the noise analysis should be provided to the responsible FAA official on electronic media specified by that official. If other equivalent methodologies or the use of non-standard or non-default data are approved, a description of the methodology or additional, non-standard or non-default data must be submitted along with a copy of AEE's approval to the responsible FAA official.

Noise monitoring data is not required for FAA noise analyses, but may optionally be included in a National Environmental Policy Act (NEPA) document. Noise monitoring data should not be used to calibrate the noise model.

B-1.3. Affected Environment.

The study area for noise is the three dimensional geographic area with the potential to be impacted by noise from the proposed project. The study area can vary in size from an airport's environs to a larger scale airspace redesign that includes multiple airports. An airport environs study area must be large enough to include the area within the DNL 65 decibels (dB) contour, and may be larger. The study area for the noise analysis of a proposed change in air traffic procedures or airspace redesign may extend vertically from the ground to 10,000 feet above ground level (AGL), or up to 18,000 feet AGL if the proposed action or alternative(s) are over a national park or wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

Noise compatibility or non-compatibility of land use is determined by comparing the aircraft DNL values at a site to the values in the land use compatibility guidelines in 14 CFR part 150, Appendix A, Table 1. Special consideration needs to be given to noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the land use categories in the guidelines are not sufficient to determine the noise compatibility of areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

Local land use jurisdictions may have noise and land use compatibility standards that differ from the FAA's land use compatibility guidelines with respect to DNL 65 dB in 14 CFR part 150, Appendix A, Table 1. Such local standards must be disclosed to the extent required under 40 CFR 1502.16(c) and 1506.2(d), the CEQ Regulations. However, the FAA does not use local land use compatibility standards to determine the significance of noise impacts. Pertinent land use plans and a general overview of existing and planned uses of the land should be described.

The description of current noise conditions includes:

- DNL contours or noise grid points showing existing aircraft noise levels. Noise exposure contours must include DNL 65, 70, and 75 dB levels (additional contours may be provided on a case-by-case basis). Noise grids are sized to cover the study area for noise analysis. Multiple grids may be created, but at least one grid consists of population centroids from the U.S. Census blocks. The differences in noise analysis for proposed airport development and other actions in the immediate vicinity of an airport and for air traffic airspace and procedure actions in a larger study area are described more fully in the 1050.1F Desk Reference under the Environmental Consequences paragraph (section 11.3);
- The number of residences or people residing within each noise contour where aircraft noise exposure is at or above DNL 65 dB; or for a larger scale air traffic airspace and procedure action, the population within areas exposed at or above DNL 65 dB, at or above DNL 60 but less than DNL 65 dB, and at or above DNL 45 dB but less than DNL 60 dB;
- The location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) that could be significantly impacted by noise; and
- Maps and other means to depict land uses within the noise study area. The addition of flight tracks may be helpful. Illustrations should be sufficiently large and clear to be readily understood.

The description of current noise conditions is usually confined to aircraft noise. However, the inclusion of other noise data, such as background or ambient noise or notable levels of noise in the study area from other sources (e.g., highways, industrial uses) is appropriate where such noise data is pertinent to understanding the affected environment and to considering the environmental impacts of the proposed action and alternative(s).

B-1.4. Environmental Consequences.

The environmental consequences section of the NEPA document will include the analysis of the potential noise impacts of the proposed action and alternative(s) for each timeframe evaluated. The noise analysis will include DNL contours, grid point, and/or change-of-exposure analysis for the proposed action and each alternative compared to the no action alternative for the same future timeframe.

For proposed airport development and other actions in the immediate vicinity of an airport, the AEDT is used to provide noise exposure contours at the DNL 65, 70, and 75 dB levels (additional contours may be provided on a case-by-case basis). For all comparisons analyzed, the analysis will identify noise increases of DNL 1.5 dB or more over noise sensitive areas that are exposed to noise at or above the DNL 65 dB noise exposure level, or that would be exposed at or above the DNL 65 dB level due to a 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.

For actions in the immediate vicinity of an airport, the following information must be disclosed for each modeled scenario that is analyzed:

- The number of residences or people residing within each noise contour where aircraft noise exposure is at or above DNL 65 dB and the net increase or decrease in the number of people or residences exposed to that level of noise;
- The location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) exposed to DNL 65 dB or greater;
- The identification of noise sensitive areas within the DNL 60 dB contour that are exposed to aircraft noise at or above DNL 60 dB but below DNL 65 dB and are projected to experience a noise increase of DNL 3 dB or more, only when DNL 1.5 dB increases are documented within the DNL 65 dB contour;
- Discussion of the noise impact on noise sensitive areas within the DNL 65 dB contour; and
- Maps and other means to depict land uses within the noise study area. The addition of flight tracks is helpful. Illustrations should be sufficiently large and clear to be readily understood.

For air traffic airspace and procedure actions where the study area is larger than the immediate vicinity of an airport, incorporates more than one airport, and/or includes actions above 3,000 feet AGL, an FAA-approved model must be used. The noise analysis will focus on a change-in-exposure analysis, which examines the change in noise levels as compared to population and demographic information at population points throughout the study area. This is normally a noise grid analysis. Multiple grids may be created, but at least one grid must consist of population centroids from the U.S. Census blocks. Discrete receptor points[16] can also represent select noise sensitive area(s) or comprise a general receptor grid over the study area, either densely or sparsely spaced. Noise contours may be created at the FAA's discretion; however, noise contours are not required and are not normally used for the analysis of larger scale air traffic airspace and procedure actions. If the study encompasses a large geographical area, it is not recommended that contours be created for the representation of results below DNL 55 dB due to fidelity of receptor sets needed to create an accurate representation of the contour.

For air traffic airspace and procedure actions evaluated as described above, change-of-exposure tables and maps at population centers are provided to identify where noise will change by the following specified amounts:

- For DNL 65 dB and higher: $\pm$1.5 dB
- For DNL 60 dB to <65 dB: $\pm$3 dB[17]
- For DNL 45 dB to <60 dB: $\pm$5 dB[18]

[16] Receptors are locations where noise is modeled. A collection of receptors are known as receptor sets. Grid points are an example of a receptor set.

[17, 19] The FAA refers to noise changes meeting these criteria as "reportable."

The location and number of noise sensitive uses (e.g., schools, churches, hospitals, parks, recreation areas, etc.) exposed to DNL 65dB or greater must be disclosed for each modeling scenario that is analyzed.

The noise compatibility of land use is determined by comparing the aircraft DNL values at a site to the values in the land use compatibility guidelines in 14 CFR part 150, Appendix A, Table 1. EAs and EISs must disclose newly non-compatible land use regardless of whether there is a significant noise impact (see Paragraph B-1.5). Special consideration needs to be given to noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the land use categories in the guidelines are not sufficient to determine the noise compatibility of areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

B-1.5. Significance Determination.

Exhibit 4-1 of FAA Order 1050.1F provides the FAA's significance threshold for noise: *The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.* For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB. The determination of significance must be obtained through the use of noise contours and/or grid point analysis along with local land use information and general guidance contained in Appendix A of 14 CFR part 150.

Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the DNL 65 dB threshold does not adequately address the impacts of noise on visitors to areas within a national park or national wildlife and waterfowl refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

When the proposed action or alternative(s) would result in a significant noise increase and the proposed action or alternative is highly controversial on this basis, the EIS should include, as appropriate in light of the specific proposal under analysis, information on the human response to noise. Inclusion of data on background or ambient noise, as well as other noise in the area, may be helpful.

Compatible or non-compatible land use is determined by comparing the aircraft DNL values at a site to the values in the part 150 land use compatibility guidelines (see Appendix A of 14 CFR part 150). The part 150 guidelines include uses that may be protected under Section 4(f). The part 150 guidelines may be used to determine the significance of noise impacts on properties protected under Section 4(f) to the extent that the land uses specified in the guidelines bear relevance to the value, significance, and enjoyment of the lands in question. Special consideration needs to be given to noise sensitive areas within Section 4(f) properties (including,

but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the part 150 land use categories are not sufficient to determine the noise compatibility of areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute, or to address noise impacts on wildlife. When instances arise in which aircraft noise is a concern with respect to wildlife impacts, established scientific practices, including review of available studies dealing with specific species of concern, should be used in the analysis. With respect to historic sites, the FAA may rely upon the part 150 guidelines to determine noise impacts on historic properties that are in use as residences. However, the part 150 guidelines may not be sufficient to determine the impact of noise on historic properties where a quiet setting is a generally recognized purpose and attribute, such as a historic village preserved specifically to convey the atmosphere of rural life in an earlier era or a traditional cultural property.

If the noise and noise-compatible land use analysis concludes that there is no significant impact, usually a similar conclusion may be drawn with respect to land use in general. However, if the proposal would result in other impacts that have land use ramifications, for example, disruption of communities, relocation, or induced socioeconomic impacts, the impacts on land use should be analyzed in this context and described accordingly under the appropriate impact category.

B-1.6. Supplemental Noise Analysis.

DNL analysis may optionally be supplemented on a case-by-case basis to characterize specific noise impacts. There is no single supplemental methodology that is preferable in all situations and these metrics often do not reflect the magnitude, duration, or frequency of the noise events under study.

In addition, the FAA will consider the use of appropriate supplemental noise analysis when it identifies, within the study area of a proposed action or alternative(s), one or more Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites including traditional cultural properties) where a quiet setting is a generally recognized purpose and attribute. In considering the use of supplemental noise analysis for such properties, the FAA will consult with the officials having jurisdiction over the properties. Such supplemental noise analysis is not, by itself, a measure of adverse aircraft noise or significant aircraft noise impact. The Line(s) of Business/Staff Office(s) (LOB/SOs) within the FAA must consult with and receive approval from AEE in determining the appropriate supplemental noise analysis for use in such cases.

Potential metrics for supplemental noise analyses are listed in the 1050.1F Desk Reference.

B-1.7. Noise from Sources Other than Aircraft Departures and Arrivals.

For some noise analyses, it may be necessary to include noise sources other than aircraft departures and arrivals in the noise analysis. Some examples are engine run-ups, aircraft taxiing, construction noise, and noise from related roadway work and roadway noise. The inclusion of these sources should be considered on a case-by-case basis, as appropriate.

If engine run-ups or aircraft taxiing noise are analyzed as part of the study, an FAA-approved model must be used. If an alternative model or methodology is desired, prior AEE approval is needed. If appropriate, an analysis of surface transportation impacts, including construction

noise, should be conducted using accepted methodologies from the appropriate modal administration, such as the Federal Highway Administration for highway noise. Further guidance on acceptable methodologies for surface transportation projects is provided in the 1050.1F Desk Reference.

For information on facility and equipment noise emissions see Paragraph B-1.11 below. For noise associated with commercial space actions see Paragraph B-1.10 below.

B-1.8. 14 CFR Part 150 Noise Proposals.

If the proposal requiring an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is the result of a recommended noise mitigation measure included in an FAA-approved part 150 noise compatibility program (NCP), the noise analysis developed in the program will normally be incorporated in the EA or EIS. The responsible FAA official must determine whether this is sufficient for EA or EIS noise analysis purposes.

B-1.9. Airport Actions.

For airport actions, documentation must be included to support the required airport sponsor's assurance under 49 United States Code (U.S.C.) § 47107(a)(10), formerly Section 511(a)(5) of the Airport and Airway Improvement Act of 1982, that appropriate action, including the adoption of zoning laws, has been or will be taken, to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including takeoff and landing of aircraft. The assurance must be related to existing and planned land uses. The NEPA document should address what is being done by the jurisdiction(s) with land use control authority, including an update on any prior assurance.

B-1.10. Commercial Space.

If the project involves commercial space launch vehicles reaching supersonic speeds, the potential for sonic boom impacts should be discussed.[19]

B-1.11. Facility and Equipment Noise Emissions.

For facility and equipment noise emissions, the provisions of the Noise Control Act of 1972 (42 U.S.C. §§ 4901-4918), as amended, apply. State and local standards can be used as a guide for particular activities if these standards are at least as stringent as Federal standards.

B-1.12. Flight Standards.

B-1.12.1. Operations Specifications.

In preparing a noise analysis, the Flight Standards District Office (FSDO) personnel normally will collect information from the operator that includes the airport, types of aircraft and engines, number of scheduled operations per day, and the number of day/night operations. The information should also include the operator's long-range plans and operation assumptions that are sufficiently conservative to encompass reasonably foreseeable changes in operations.

[19] Please note that part 91 prohibits supersonic flight for civil aircraft. Part 91, Appendix B provides guidance for applying for a special flight authorization to exceed Mach 1.

If the carrier declines to furnish the information, or if the furnished information on operations at the airport does not realistically address night operations (in view of the carrier's proposal and pattern of activity at that airport), or if the information otherwise patently understates the potential operations (when compared with carrier's operations at other airports or with other carrier's operations at that airport), the responsible FAA official will develop an operational assumption that includes night operations and is otherwise consistent with the typical operations of similar carriers at similar airports. This operational assumption will be used in the NEPA review after coordination with the affected air carrier. If the air carrier objects to the use of this operational assumption in the NEPA review, the carrier may specify that a lesser level of operations be used in the analysis, provided that the carrier agrees that this lesser level will serve as a limit on the operations specifications. If the carrier refuses such a limitation, the FAA will include all reasonably foreseeable operations in the analysis. In this situation, the NEPA review should state that the operational assumption was developed solely for the purpose of environmental analyses and that it is not to be viewed as a service commitment by the carrier.

If an EIS is required, the affected operator should be advised as soon as possible and should be requested to provide any additional required information. District Office personnel will coordinate, as necessary, any activity with the operator. The operations specifications will not be approved until all issues and questions associated with the EIS are fully resolved and the regional Flight Standards Division manager has concurred with the approval.

B-1.12.2. Aerobatic Practice Areas.

Due to the unique nature of the practice routines used in aerobatic practice areas (APA), the standard and default data in the Integrated Noise Model (INM) is not appropriate for use when modeling the noise consequences of the aircraft performing in the APA. For guidance on performing noise analysis for APAs, see the October 17, 2012 FAA guidance memorandum titled, "Approval of Aerobatic Practice Area (APA) noise equivalent methodology."

B-1.13. Noise Mitigation.

Common measures to mitigate noise are listed in the 1050.1F Desk Reference.

Local land use actions are within the purview of local governments. The FAA encourages local governments to take actions to reduce and prevent land uses around airports that are not compatible with airport operation and aircraft noise. Airports receiving grant funding have a compatible land use obligation.

When a noise analysis in the immediate vicinity of an airport identifies noise sensitive areas that would have an increase of DNL 3 dB or more from DNL 60 dB up to DNL 65 dB noise exposure, the potential for mitigating noise in those areas should be considered, including consideration of the same range of mitigation options available at DNL 65 dB and higher and eligibility for Federal funding. This is not to be interpreted as a commitment to fund or otherwise implement mitigation measures in any particular area.[20]

[20] Federal Interagency Committee On Noise: Federal Agency Review of Selected Airport Noise Analysis Issues (August 1992), page 3-7.

B-2. Section 4(f), 49 U.S.C. § 303

Section 4(f) of the U.S. Department of Transportation Act of 1966 (now codified at 49 U.S.C. § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land from any publicly or privately owned historic site of national, state, or local significance, only if there is no feasible and prudent alternative to the use of such land and the program or project includes all possible planning to minimize harm resulting from the use.

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) issued Section 4(f) implementing regulations in 23 CFR part 774 that are not binding on the FAA. However, the FAA may use them as guidance to the extent relevant to aviation.

Section 4(f) applies only to agencies within the U.S. Department of Transportation (DOT). Following consultation and assessment of potential impacts, the FAA is solely responsible for Section 4(f) applicability and determinations for projects within its purview. If the FAA is engaged with a non-DOT agency on the NEPA review of a proposed project involving Section 4(f), the FAA must take the lead on Section 4(f) compliance.

B-2.1. Affected Environment.

The FAA should identify as early as practicable in the planning process section 4(f) properties that implementation of the proposed action and alternative(s) could affect.

A property must be a significant resource for Section 4(f) to apply. Any part of a Section 4(f) property is presumed to be significant unless there is a statement of insignificance relative to the entire property by the Federal, state, or local official having jurisdiction over the property. Any statement of insignificance is subject to review by the FAA.

Section 4(f) protects only those historic or archeological properties that are listed, or eligible for inclusion, on the National Register of Historic Places (NRHP), except in unusual circumstances. Historic sites are normally identified during the process required under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108, and its implementing regulations (36 CFR part 800). If an official formally provides information to indicate that a historic site not on or eligible for inclusion on the NRHP is significant, the responsible FAA official may determine that it is appropriate to apply Section 4(f). If the responsible FAA official finds that Section 4(f) does not apply, the NEPA document should include the basis for this finding (which may be based on reasons why the property was not eligible for the NRHP).

Where Federal lands are administered for multiple uses, the Federal official having jurisdiction over the lands shall determine whether the lands are in fact being used for park, recreation, wildlife, waterfowl, or historic purposes. National wilderness areas may serve similar purposes and shall be considered subject to Section 4(f) unless the controlling agency specifically determines that the lands are not being used for Section 4(f) purposes.

When a property is owned by and currently designated for use by a transportation agency and a park or recreation use of the land is being made only on an interim basis, the property would not ordinarily be considered to be subject to Section 4(f). The responsible FAA official or applicant should ensure that any lease or agreement includes specific terms clarifying that the use of the

property for a park or recreational purpose is temporary. A use that extends over a period of years may be sufficiently long that it would no longer be considered to be interim or temporary, if challenged.

Where the use of a property is changed by a state or local agency from a Section 4(f) type use to a transportation use in anticipation of a request for FAA approval, Section 4(f) will be considered to apply, even though the change in use may have taken place prior to the request for approval or prior to any FAA action on the matter. This is especially true where the change in use appears to have been undertaken in an effort to avoid the application of Section 4(f).

B-2.2. Environmental Consequences.

An initial assessment should be made to determine whether the proposed action and alternative(s) would result in the use of any of the properties to which Section 4(f) applies. If physical use or constructive use of a Section 4(f) property is involved, as further described in B-2.2.1 and B-2.2.2 below, the potential impacts of the proposed action and alternative(s) on the Section 4(f) property must be described in detail. The description of the affected Section 4(f) property should include the location, size, activities, patronage, access, unique or irreplaceable qualities, relationship to similarly used lands in the vicinity, jurisdictional entity, and other factors necessary to understand and convey the extent of the impacts on the resource. Maps, plans, photos, or drawings may assist in describing the property and understanding the potential use, whether physical taking or constructive use. Any statements regarding the property's significance by officials having jurisdiction should be documented and attached.

B-2.2.1. Physical Use of Section 4(f) Property.

A Section 4(f) use would occur if the proposed action or alternative(s) would involve an actual physical taking of Section 4(f) property through purchase of land or a permanent easement, physical occupation of a portion or all of the property, or alteration of structures or facilities on the property.

A temporary occupancy of a Section 4(f) property for project construction-related activities is usually so minimal that it does not constitute a use within the meaning of Section 4(f). However, a temporary occupancy would be considered a use if:

- The duration of the occupancy of the Section 4(f) property is greater than the time needed to build a project and there is a change in ownership of the land;
- The nature and magnitude of changes to the 4(f) property are more than minimal;
- Anticipated permanent adverse physical impacts would occur and a temporary or permanent interference with Section 4(f) activities or purposes would occur;
- The land use is not fully returned to existing condition; or
- There is no documented agreement with appropriate agencies having jurisdiction over the Section 4(f) property.

If a project would physically occupy an NRHP-listed or eligible property containing archeological resources that warrant preservation in place, there would be a Section 4(f) use. However, although there may be some physical taking of land, Section 4(f) does not apply to NRHP-listed or eligible archeological properties where the responsible FAA official, after consultation with the State Historic Preservation Officer (SHPO)/Tribal Historic Preservation

Officer (THPO), determines that the archeological resource is important chiefly for data recovery and is not important for preservation in place.

B-2.2.2. Constructive Use of Section 4(f) Property.

Use, within the meaning of Section 4(f), includes not only the physical taking of such property, but also "constructive use." The concept of constructive use is that a project that does not physically use land in a park, for example, may still, by means of noise, air pollution, water pollution, or other impacts, dissipate its aesthetic value, harm its wildlife, restrict its access, and take it in every practical sense. Constructive use occurs when the impacts of a project on a Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the Section 4(f) property that contribute to its significance or enjoyment are substantially diminished. This means that the value of the Section 4(f) property, in terms of its prior significance and enjoyment, is substantially reduced or lost. For example, noise would need to be at levels high enough to have negative consequences of a substantial nature that amount to a taking of a park or portion of a park for transportation purposes.

The responsible FAA official must consult all appropriate Federal, state, and local officials having jurisdiction over the affected Section 4(f) properties when determining whether project-related impacts would substantially impair the resources. Following consultation and assessment of potential impacts, the FAA is solely responsible for Section 4(f) applicability and determinations.

The land use compatibility guidelines in 14 CFR part 150 (the part 150 guidelines) may be relied upon by the FAA to determine whether there is a constructive use under Section 4(f) where the land uses specified in the part 150 guidelines are relevant to the value, significance, and enjoyment of the Section 4(f) lands in question. The FAA may rely on the part 150 guidelines in evaluating constructive use of lands devoted to traditional recreational activities. The FAA may primarily rely upon the DNL in part 150 rather than single event noise analysis because DNL: (1) is the best measure of significant impact on the quality of the human environment, (2) is the only noise metric with a substantial body of scientific data on the reaction of people to noise, and (3) has been systematically related to Federal compatible land use guidelines.

The FAA may also rely on the part 150 guidelines to evaluate impacts on historic properties that are in use as residences. The part 150 guidelines may be insufficient to determine the noise impact on historic properties where a quiet setting is a generally recognized purpose and attribute, such as a historic village preserved specifically to convey the atmosphere of rural life in an earlier era or a traditional cultural property. If architecture is the relevant characteristic of a historic neighborhood, then project-related noise would not substantially impair the characteristics that led to eligibility for or listing on the NRHP. As a result, noise would not constitute a constructive use, and Section 4(f) would not be triggered. A historic property would not be considered to be constructively used for Section 4(f) purposes when the FAA issues a finding of no historic properties affected or no adverse effect under Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108. Findings of adverse effects do not automatically trigger Section 4(f) unless the effects would substantially impair the affected resource's historical integrity. Although there may be some physical taking of land, Section 4(f) does not apply to NRHP-listed or eligible archeological properties where the responsible FAA official, after

consultation with the SHPO/THPO, determines that the archeological resource is important chiefly for data recovery and is not important for preservation in place.

When assessing use of Section 4(f) properties located in a quiet setting and where the setting is a generally recognized feature or attribute of the site's significance, the FAA carefully evaluates reliance on the part 150 guidelines. The FAA must weigh additional factors in determining whether to apply the thresholds listed in the part 150 guidelines to determine the significance of noise impacts on noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites including traditional cultural properties). The FAA may use the part 150 land use compatibility table as a guideline to determine the significance of noise impacts on Section 4(f) properties to the extent that the land uses specified bear relevance to the value, significance, and enjoyment of the lands in question. However, the part 150 guidelines may not be sufficient for all historic sites as described above, and the part 150 guidelines do not adequately address the impacts of noise on the expectations and purposes of people visiting areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute. When determining constructive use, noise resulting from the proposed project would need to be at levels high enough to have negative consequences of a substantial nature that amount to a taking of a park or portion of a park for transportation purposes.

B-2.2.3. *De Minimis* Impact Determination.

The FAA may make a *de minimis* impact determination with respect to a physical use of Section 4(f) property if, after taking into account any measures to minimize harm, the result is either:

- A determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or wildlife or waterfowl refuge for protection under Section 4(f); or
- A Section 106 finding of no adverse effect or no historic properties affected.

The FAA's NEPA document must include documentation sufficient to support the above results, including the measures to minimize harm that the FAA is relying on to make the *de minimis* impact determination. The FAA must ensure that mitigation measures are implemented. A *de minimis* impact determination is not a full and complete Section 4(f) evaluation. It does not require an analysis and finding that there are no feasible and prudent alternatives or a finding that all possible planning has been done to minimize harm.

A *de minimis* impact determination is not appropriate for constructive use of a Section 4(f) property because constructive use is defined as substantial impairment, and substantial impairment cannot be considered to be a *de minimis* impact.

A *de minimis* impact determination requires agency coordination and public involvement. For parks, recreation areas, and wildlife and waterfowl refuges, the officials with jurisdiction over the property must be informed of the FAA's intent to make a *de minimis* impact determination, after which the FAA must provide an opportunity for public review and comment. After considering any public comments and if the officials with jurisdiction concur in writing that the project would not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection, the FAA may finalize a *de minimis* impact determination. For historic sites, the FAA must consult the consulting parties identified in accordance with 36

CFR part 800, and inform the officials with jurisdiction of the intent to make a *de minimis* impact determination and must concur in a finding of no adverse effect or no historic properties affected. Compliance with 36 CFR part 800 satisfies the public involvement and agency coordination requirement for *de minimis* findings for historic sites.

B-2.3. Section 4(f) Evaluation.

When a project would involve the use of a Section 4(f) property and the FAA cannot make a *de minimis* impact determination, the FAA must prepare a Section 4(f) evaluation. The FAA should incorporate the evaluation into the FAA's NEPA review and process to the fullest extent possible, but may prepare a stand-alone Section 4(f) evaluation (referred to as a Section 4(f) statement).

The Section 4(f) evaluation must sufficiently explain the purpose and need for the project. The Section 4(f) evaluation must also include adequate discussion of alternatives to support an FAA determination regarding the availability of feasible and prudent alternatives to the use of the Section 4(f) property. The no action alternative is one avoidance alternative. An alternative that would involve any use of Section 4(f) property is not an avoidance alternative.

The evaluation must determine if there is a feasible and prudent alternative that would avoid the use of the Section 4(f) property. According to the FHWA/FTA regulation at 23 CFR § 774.17:

(1) *a feasible and prudent* alternative is one that avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property. In assessing the importance of protecting the Section 4(f) property, it is appropriate to consider the relative value of the property (i.e., some Section 4(f) properties are worthy of a greater degree of protection than others).

(2) an alternative is not feasible if it cannot be built as a matter of sound engineering judgment.

(3) an alternative is not prudent if it:

- Compromises the project to such a degree that it is unreasonable to proceed with the project in view of its stated purpose and need (i.e., the alternative does not address the purpose and need of the project);
- Results in unacceptable safety or operational problems;
- Causes, after reasonable mitigation:
  - Severe social, economic, or environmental impacts,
  - Severe disruption to established communities,
  - Severe or disproportionate impacts to minority or low-income populations, or
  - Severe impacts to environmental resources protected under other Federal statutes;
- Results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- Causes other unique problems or unusual factors; or
- Involves multiple factors above that, although individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

Supporting documentation is required in the Section 4(f) evaluation for findings of no feasible and prudent alternatives. If the Section 4(f) evaluation identifies a feasible and prudent alternative that avoids Section 4(f) properties, the FAA may not select an alternative that uses a Section 4(f) property. If there is no feasible and prudent alternative that avoids all Section 4(f) property, the FAA may approve only the alternative that meets the purpose and need and causes the least overall harm to Section 4(f) property. The FHWA/FTA regulation at 23 CFR § 774.3(c) identifies the following factors to be balanced in determining the alternative that causes the least overall harm:

- The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
- The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
- The relative significance of each Section 4(f) property;
- The views of the official(s) with jurisdiction over each Section 4(f) property;
- The degree to which each alternative meets the purpose and need for the project;
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
- Substantial differences in costs among the alternatives.

In evaluating the degree of harm to Section 4(f) properties, the FAA will consider the views of officials having jurisdiction over each Section 4(f) property. The Section 4(f) evaluation will describe how the FAA considered the seven factors to determine the least overall harm, including the extent to which each alternative meets the project purpose and need. The final Section 4(f) evaluation must document the analysis and identification of the alternative that has the least overall harm.

If the Section 4(f) evaluation concludes there are no feasible and prudent alternatives to the use of Section 4(f) property, it must also document that the project includes all possible planning to minimize harm to Section 4(f) property. As defined in 23 CFR § 774.17, *all possible planning* means that all reasonable measures to minimize harm or mitigate adverse impacts must be included in the project. Mitigation measures may include those described in Paragraph B-2.7 below. In evaluating the reasonableness of measures to minimize harm, the responsible FAA official will consider the preservation purpose of the statute, the views of officials having jurisdiction over the Section 4(f) property, whether the cost of measures is a reasonable public expenditure in view of the adverse impacts on the Section 4(f) property and the benefits of the measures to the property, and impacts or benefits of the measures to communities or environmental resources outside the Section 4(f) property.

B-2.4. Section 4(f) Finding.

In order for the FAA to approve an action that would use Section 4(f) property, the Section 4(f) evaluation must conclude with the required finding that there is no feasible and prudent alternative that would avoid the use of Section 4(f) property and that the project includes all possible planning to minimize harm resulting from the use. Where a Finding of No Significant Impact (FONSI) is prepared, this finding must be included in the FONSI, if not included in the

EA (see FAA Order 1050.1F, Paragraph 6-3.b(4)). Where an EIS is prepared, this finding must be included in the final EIS if possible, and in the Record of Decision (ROD) (see FAA Order 1050.1F, Paragraphs 7-1.2.g and 7-2.2.e). When a CATEX is used for an action (see FAA Order 1050.1F, Chapter 5), the Section 4(f) finding may either be included in documentation prepared to support the use of the CATEX (see FAA Order 1050.1F, Paragraph 5-3) or documented separately.

B-2.5. Requirements under Section 6(f) of the Land and Water Conservation Fund Act.

A project that would use Section 4(f) parks or recreation areas must also comply with Section 6(f) of the Land and Water Conservation Fund, 16 U.S.C. §§ 4601-8(f), if the property was acquired or developed with financial assistance under the Land and Water Conservation Fund State Assistance Program. Section 6(f), administered by the National Park Service (NPS), requires that areas funded through the program remain for public outdoor recreation use or be replaced by lands of equal value, location, and recreation usefulness.

A request to convert Land and Water Conservation Fund-assisted properties in whole or in part to uses other than public outdoor recreation must be submitted to the appropriate NPS Regional Director in writing. NPS approval is required to convert Section 6(f) lands. The NPS will consider conversion requests if the request complies with Section 4(f), information is provided that is needed to make findings required under Section 6(f), and coordination is carried out with the NPS and the state agency responsible for the Section 6(f) property. The Section 4(f) evaluation should also include evidence that applicable requirements of Section 6(f) have been met.

B-2.6. Section 4(f) Significance Determination.

Exhibit 4-1 of FAA Order 1050.1F provides the FAA's significance threshold for Section 4(f) properties. A significant impact would occur when: *The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource.*[21] A significant impact under NEPA would not occur if mitigation measures eliminate or reduce the impacts of the use below the threshold of significance. If a project would physically use Section 4(f) property, the FAA is responsible for complying with Section 4(f) even if the impacts are less than significant for NEPA purposes.

B-2.7. Section 4(f) Mitigation.

Section 4(f) use requires all possible planning to minimize harm. The NEPA document should provide detailed measures to minimize harm and include evidence of concurrence or efforts to obtain concurrence of appropriate officials having jurisdiction over the affected Section 4(f)

[21] A "minimal physical use" is part of the FAA's significance threshold that has been continued from FAA Order 1050.1E. It is not the same as a *de minimis* impact determination established in Section 6009 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETY-LU). A *de minimis* impact determination is described in Appendix B, B-2.2.3.

property regarding such measures. Some examples of potential measures to mitigate impacts to Section 4(f) properties include:

- Changing project design to lessen the impact on the Section 4(f) property;
- Replacement of land or facilities (e.g., replacement of a neighborhood park);
- Monetary compensation to enhance the remaining segments of the affected Section 4(f) property;
- Building noise walls or installing visual or vegetative buffers to lessen adverse impacts; or
- Enhancing project access the jurisdictional agency supports (i.e., disabled access ramps).

Mitigation of historic sites usually consists of measures necessary to preserve the historic integrity of the site and agreed to in accordance with 36 CFR part 800 by the FAA, the SHPO/THPO, and other consulting parties. Equal replacement of a Section 6(f) property that will be converted is required to satisfy Section 6(f) requirements. The replacement area must be at least equal to that of the converted property, including equal location and usefulness.

Appendix C. Federal Aviation Administration Guidance on Third Party Contracting for Environmental Impact Statement Preparation

1. Introduction.

a. Section 1506.5(c) of the Council on Environmental Quality's Regulations for Implementing the Provisions of the National Environmental Policy Act (CEQ Regulations) states that any environmental impact statement (EIS) prepared pursuant to the requirements of the National Environmental Policy Act (NEPA) shall be prepared directly by a lead agency; by a cooperating agency upon request of the lead agency; or by a contractor selected by the lead or a cooperating agency.

b. The intent of Section 1506.5(c) is to avoid conflicts of interest by those preparing EISs. Contractors must be able to sign a disclosure statement specifying that they have no financial or other interest in the outcome of the project.

c. The following guidance is provided to ensure the FAA's continued compliance with the CEQ Regulations and NEPA.

2. General Guidance.

a. The FAA must either prepare an EIS in-house (utilizing agency personnel and resources) or select a contractor to prepare the EIS. One method of selecting a contractor that may be used is known as "third party contracting."

b. "Third party contracting" refers to the preparation of an EIS by a contractor selected by the FAA and under contract to and paid by an applicant. Through the statement of work, the contractor is responsible for assisting the FAA in preparing an EIS that meets the requirements of the CEQ Regulations, the FAA's NEPA procedures, and all other appropriate Federal, state, and local laws. Since this process is purely voluntary, it is recommended that a Memorandum of Understanding (MOU) among the FAA, contractor, and the applicant be used to establish a scope of work, and delineate the FAA, contractor, and applicant responsibilities. In such situations, the FAA retains oversight of the EIS. CEQ recognizes the third party contracting arrangement as a legitimate method of EIS preparation in which the non-Federal applicant actually executes the contract and pays for the cost of preparing the EIS (see number 16 in CEQ's *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *Federal Register* 18026 (March 23, 1981) and CEQ Guidance Regarding NEPA Regulations, 48 *Federal Register* 34263 (July 28, 1983) available at http://energy.gov/nepa/downloads/guidance-regarding-nepa-regulations).

c. The FAA may select a contractor under this process by evaluating a pre-selection list ("short list") of contractors submitted to the FAA by an applicant based on the applicant's request for proposal (RFP) and evaluation. The applicant may submit the list of candidates to the FAA ranked according to the applicant's evaluation of the contractor's qualifications. The FAA, however, is under no obligation to make a selection based on this ranking. The applicant also may submit the list of candidates to the FAA in an unranked form. The FAA recommends the selection procedures summarized below:

(1) The FAA should provide the proposed scope of work.

(2) If the applicant prepares a short list of contractors, the FAA should concur with the evaluation criteria prepared by the applicant.

(3) Using the previously agreed upon evaluation criteria, the FAA should independently evaluate and rank the contractors on the short list in order of preference, based on qualifications.

(4) The FAA should advise the applicant and the contractor of the FAA's selection, and the applicant can then advise and initiate discussions with the selected contractor regarding project cost and scope.

(5) The FAA should prepare an internal selection report for the project administrative file, which should include the disclosure statement executed with the selected contractor.

d. The applicant pays the costs for preparing the EIS. For airport development projects and related activities, the EIS may be funded by either Airport Improvement Plan (AIP) funds or local funds including Passenger Facility Charge (PFC) revenues. While AIP funds may be used to pay for costs associated with EIS preparation by a contractor selected by the FAA, Federal procurement requirements do not apply. Federal agencies are permitted under 40 CFR part 18 to substitute their judgment for that of the grantee (i.e., airport) if the matter is primarily a "Federal concern" (i.e., consultant selection by the FAA to comply with the requirements of the CEQ Regulations 40 CFR § 1506.5(c) is a "Federal concern").

e. Guidance provided in the most current version of FAA Advisory Circular 150/5100-14, *Architectural, Engineering and Planning Consultant Services for Airport Grants Projects*, must be followed in selecting a contractor for EIS preparation.

f. When a contractor prepares an EIS, the FAA is still responsible for:

(1) Obtaining a "disclosure statement" from the contractor;

(2) Exercising oversight of the contractor to ensure that a conflict of interest does not exist;

(3) Taking the lead in the scoping process;

(4) Furnishing guidance and participating in the preparation of the EIS;

(5) Independently evaluating the EIS and verifying environmental information provided by the applicant, or others, adding its expertise through review and revision;

(6) Approving the EIS; and

(7) Taking responsibility for the scope and content of the EIS.

Appendix D. National Environmental Policy Act Process Flowcharts

Exhibit D-1. Typical Categorical Exclusion Process

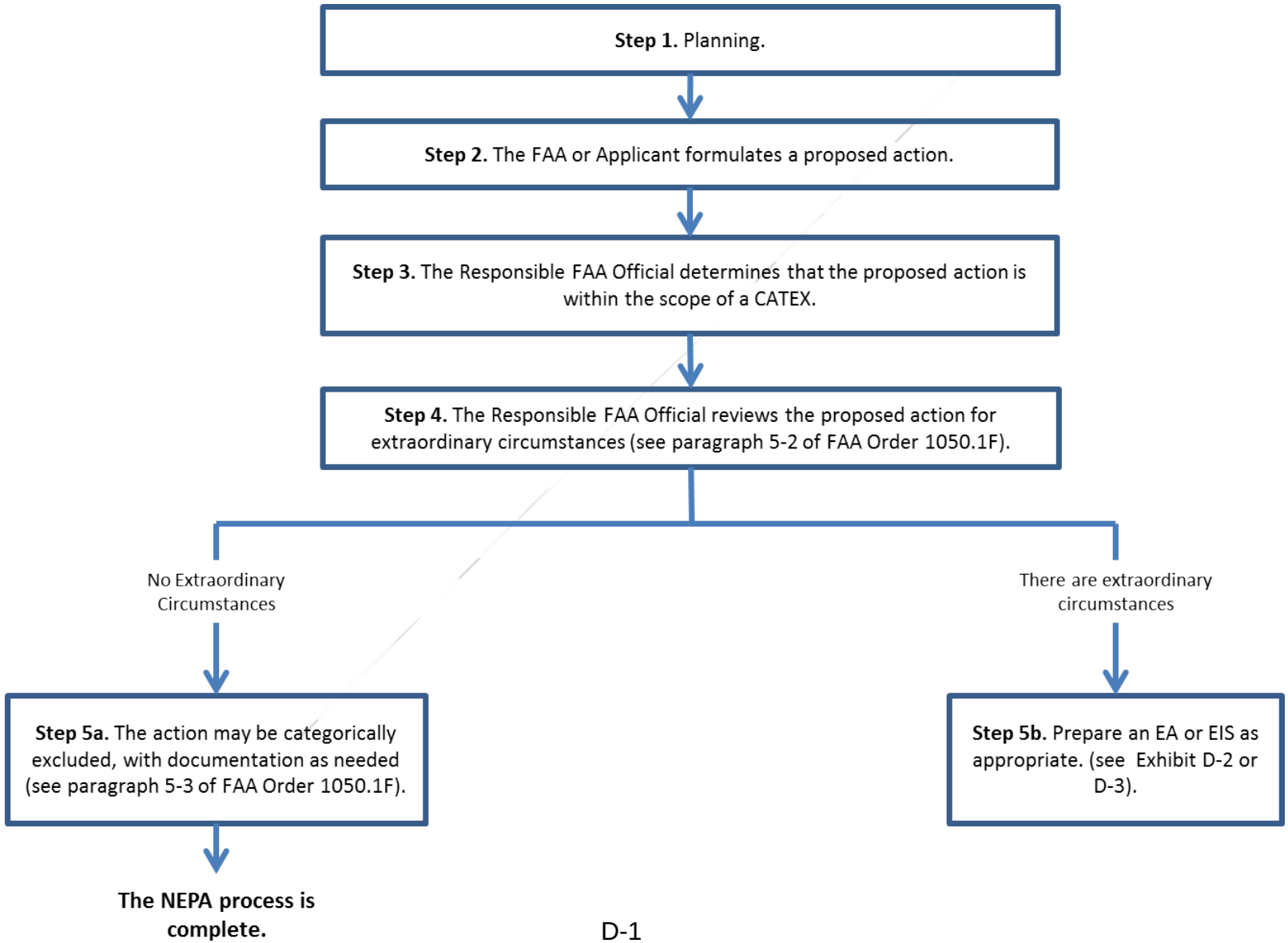
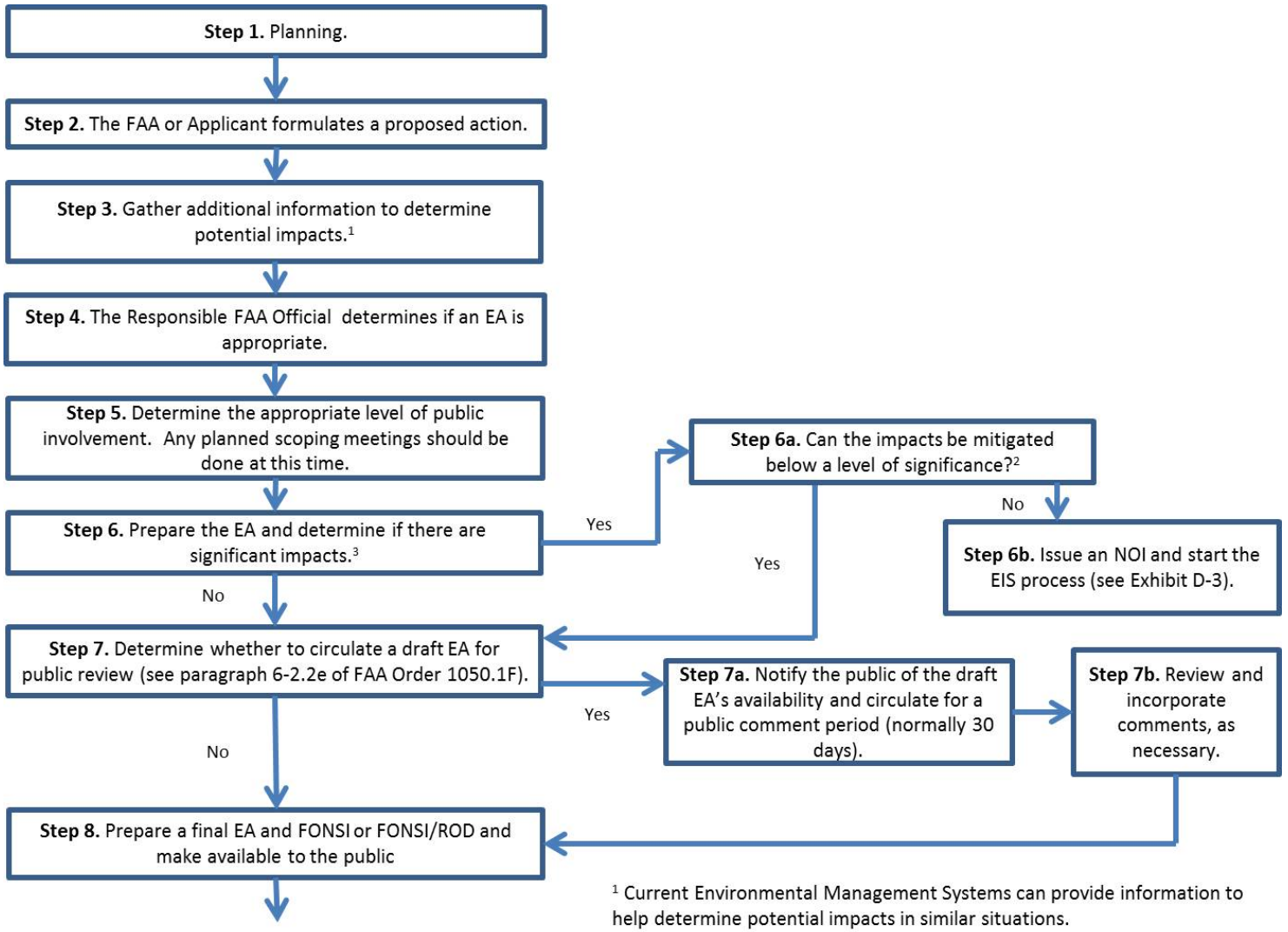
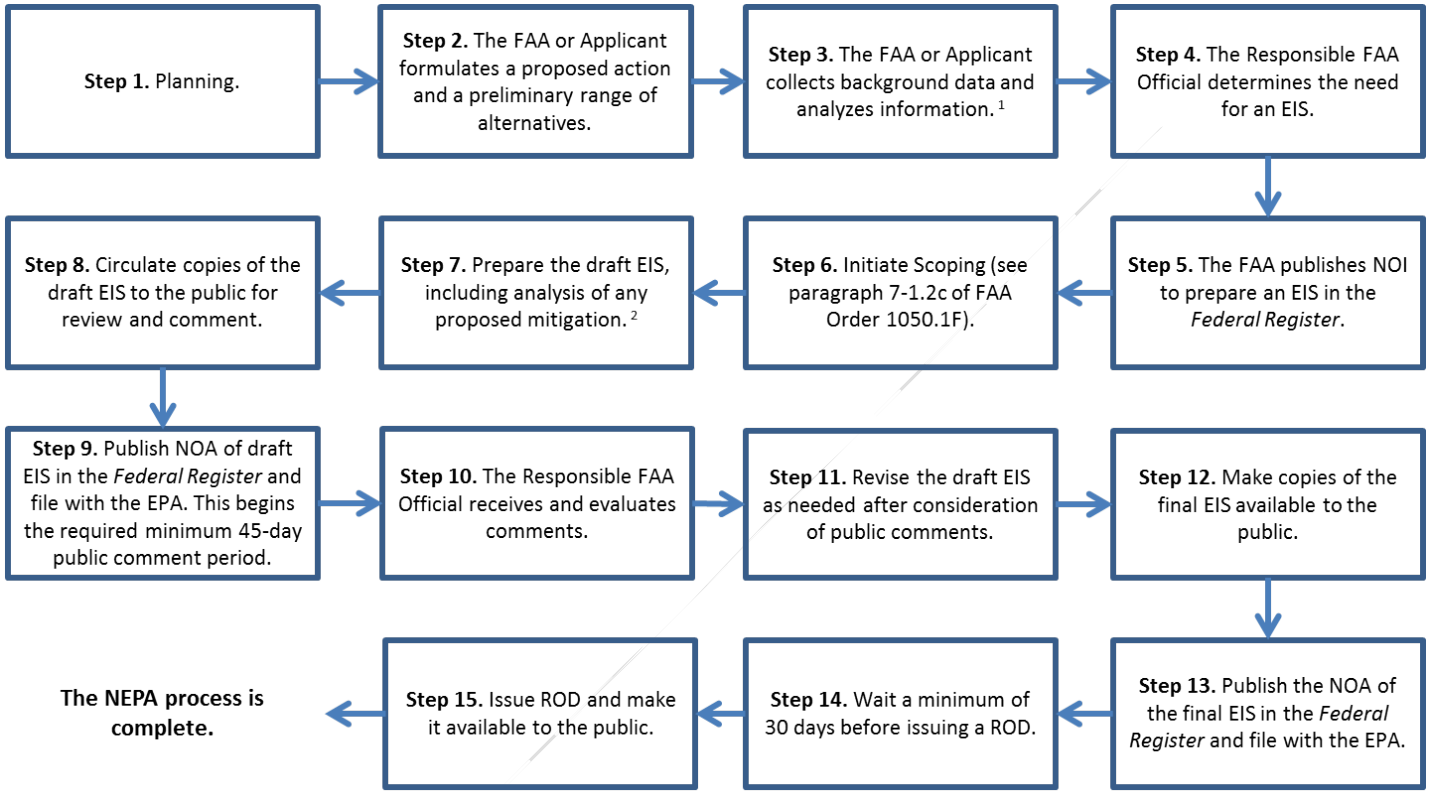


Exhibit D-2. Typical Environmental Assessment Process



[1] Current Environmental Management Systems can provide information to help determine potential impacts in similar situations.
[2] Environmental Management Systems can be used to monitor mitigation.
[3] This determination may be revisited after any public/agency review.

Exhibit D-3. Typical Environmental Impact Statement Process[22]



[1] Current Environmental Management Systems can provide information to help determine potential impacts in similar situations.
[2] Environmental Management Systems can be used to monitor mitigation.

[22] In November 2014, DOT released guidance on implementing Section 1319 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), 42 U.S.C. § 4332a, which alters the EIS process for DOT actions. Section 1319(a) relates to errata sheets and reflects the CEQ regulations (see 40 CFR § 1503.4(c) and Paragraph 7-1.2(f) of this Order). Section 1319(b) requires DOT, to the maximum extent practicable, to expeditiously develop a single document that consists of a final EIS and a ROD, unless certain conditions exist. The DOT guidance is available at http://www.dot.gov/sites/dot.gov/files/docs/MAP-21_1319_Final_Guidance.pdf. AEE is preparing additional, FAA-specific guidance on implementing-Section 1319 of MAP-21. LOBs/SOs are encouraged to work with AGC-600 and AEE-400 to ensure compliance with Section 1319(b).

ORDER
5050.4B

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) IMPLEMENTING INSTRUCTIONS FOR AIRPORT ACTIONS

Effective Date: April 28, 2006 **Initiated by: APP-1**

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
5050.4B

Effective Date:
April 28, 2006

SUBJ: National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.

The Federal Aviation Administration's Office of Airports (ARP) is responsible for identifying major Federal actions involving the Nation's public-use airports. After determining that an airport sponsor is proposing a major Federal action, ARP is responsible for analyzing the environmental effects of that action and its alternatives. ARP issues Order 5050.4B to provide instruction on evaluating those environmental effects.

Order 5050.4B supplements FAA Order 1050.1E, "Environmental Impacts: Policies and Procedures." That Order provides all FAA organizations with policies and procedures for complying with NEPA and the implementing regulations the Council on Environmental Quality has issued (40 CFR Parts 1500-1508).

Order 5050.4B substantially updates and revises Order 5050.4A, "Airports Environmental Handbook." ARP's issuance of Order 5050.4B cancels Order 5050.4A, which has served ARP well for over 20 years.

Dennis E. Roberts
Director of Airport Planning and Programming
Federal Aviation Administration

TABLE OF CONTENTS

INTRODUCTION

ARP's mission....1
Purpose of this Order. 1
Updating this Order....1
Updating the *Desk Reference*. 1
The need to consider an action's environmental impacts. 2
Considering environmental impacts is the agency's responsibility....2
The NEPA document. 2

CHAPTER 1. ORDER OBJECTIVES AND DEFINITIONS

1. THE NATIONAL ENVIRONMENTAL POLICY ACT. 1-1
2. NEPA'S OBJECTIVES. 1-1
3. COUNCIL ON ENVIRONMENTAL QUALITY REGULATIONS. 1-1
4. FAA'S ENVIRONMENTAL OBJECTIVES. 1-1
5. THE PURPOSE OF THIS ORDER. 1-1
a. Instructions to FAA personnel 1-2
b. Relationship of this Order to FAA Order 1050.1E. 1-2
6. OTHER ORDER USERS. 1-3
7. DISTRIBUTION. 1-3
a. Headquarters. 1-3
b. Regions. 1-3
c. Aeronautical Center, Airports, and Logistics Branch. 1-3
d. Other interested parties. 1-3
(1) Interested parties without internet access. 1-3
(2) Interested parties without computers. 1-4
8. CANCELLATION. 1-4
9. DEFINITIONS. 1-4
a. Advisory actions. 1-4
b. Airport Improvement Program. 1-4
c. Approving FAA official. 1-5
d. Cooperating agency. 1-5
e. Environmental Management System. 1-5
f. Expertise agency 1-5
g. Federal action. 1-5
h Federal environmental approval. 1-6
i. Highly controversial action. 1-6
j. Joint lead agency. 1-7
k. Lead agency 1-7
l. Major runway extension 1-7
m. "NEPA-like" State or agency. 1-7

n. Noise sensitive areas. 1-8
o. Passenger Facility Charge Program. 1-8
p. Project involving an airport location. 1-9
q. Reasonably foreseeable action. 1-9
r. Responsible FAA official. 1-9
s. Significant impact threshold. 1-10
t. Special purpose laws. 1-10
u. Sponsor. 1-11
v. Written re-evaluation. 1-11
10. – 199. RESERVED. 1-11

CHAPTER 2. SPECIAL NEPA REQUIREMENTS AND RESPONSIBILITIES FOR AIRPORT ACTIONS

200. GENERAL INFORMATION. 2-1
a. FAA implementation procedures for NEPA. 2-1
b. Levels of NEPA processing for Federal actions at airports. 2-1
201. AIRPORT SPONSOR RESPONSIBILITIES. 2-1
a. General. 2-1
b. Environmental responsibilities. 2-2
202. AIRPORT LAYOUT PLAN (ALP) 2-2
a. General. 2-2
b. NEPA compliance for ALP approvals. 2-2
c. FAA's ALP approval choices. 2-3
(1) Conditional ALP approval. 2-3
(2) Unconditional ALP approval. 2-3
(3) "Mixed" ALP approval. 2-3
(4) Limitations on ALP approvals. 2-4
d. FAA's ALP approval letters. 2-5
(1) A conditional ALP approval. 2-5
(2) An unconditional ALP approval. 2-5
(3) A "mixed" ALP approval. 2-6
203. AIRPORT LOCATION APPROVAL. 2-6
204. LAND ACQUISITION. 2-6
a. General. 2-6
b. FAA responsibilities. 2-6
c. Sponsor responsibilities. 2-7
205. JOINT-USE OR MILITARY CONVERSION PROGRAMS. 2-7
206. CONVEYANCE OF OTHER UNITED STATES GOVERNMENT LANDS. 2-7
a. FAA instructions on transferring Federally-owned lands. 2-8
b. Airport sponsor documentation. 2-8
c. FAA's role. 2-8
207. RELEASES OF AIRPORT LAND. 2-9

a. General. 2-9
b. Long-term leases. 2-9
c. ARP's approval. 2-9
(1) Land use restrictions and covenants. 2-9
(2) Enforcement. 2-9
(3) Title covenants. 2-10
(4) Potential uses of the land. 2-10
(5) Environmental analysis. 2-10
(a) Categorical exclusions. 2-10
(b) Contents of an EA or EIS. 2-10
208. AIRPORT ACTIONS SIGNIFICANTLY AFFECTING A FOREIGN COUNTRY. 2-11
a. General. 2-11
b. Responsible FAA official's duties. 2-11
c. Addressing substantial differences. 2-12
d. Actions not causing significant impacts. 2-12
209. NEPA REQUIREMENTS AND WILDLIFE HAZARD MANAGEMENT PLANS. 2-12
a. Wildlife Hazard Management Plans (WHMPs). 2-12
b. NEPA requirements. 2-12
210. THE STATE BLOCK GRANT PROGRAM. 2-12
a. General. 2-12
b. SBGP purpose. 2-13
c. SBGP selection criteria. 2-13
d. SBGP agency responsibilities. 2-13
e. SBGP participating states. 2-13
211. THE SBGP AND NEPA. 2-14
212. STATE BLOCK GRANT AGENCY ENVIRONMENTAL RESPONSIBILITIES. 2-14
a. Meet the requirements of this Order. 2-14
b. "NEPA-like" states or agencies participating in the SBGP. 2-14
c. "Non-NEPA-like" states or agencies participating in the SBGP. 2-14
d. Substitute text for SBGP actions. 2-15
e. Tribal consultation and SBGP actions. 2-15
f. SBGP actions involving Section 106 of the National Historic Preservation Act, Section 7 of the Endangered Species Act, and the Archeological and Historical Preservation Act of 1974. 2-15
213. FAA OVERVIEW OF THE SBGP AND ACTIONS CONNECTED TO SBGP ACTIONS. 2-15
214. ENVIRONMENTAL DOCUMENT PREPARATION FOR SBGP ACTIONS. 2-16
a. An EA addressing actions solely under SBGP agency purview. 2-16
b. An EA for actions involving an SBGP agency action andan FAA organization. 2-16

c. SBGP actions causing significant impacts. 2-17
215. – 299. RESERVED. 2-18

CHAPTER 3. AGENCY AND TRIBAL COORDINATION

300. IMPORTANCE OF COORDINATION. 3-1
301. EARLY COORDINATION IN THE ENVIRONMENTAL REVIEW PROCESS 3-1
302. STATE AND LOCAL REVIEW PROCESSES 3-1
a. Procedures for state and local reviews of airport actions. 3-2
b. Timing consultation. 3-2
(1) When requesting discretionary funding for an action that is normally a categorical exclusion. 3-2
(2) When requesting discretionary funding for an action normally requiring an EA 3-2
(3) When requesting approval of an ALP change but not discretionary or entitlement funding. 3-2
303. GOVERNMENT-TO-GOVERNMENT RELATIONS WITH NATIVE AMERICAN TRIBAL GOVERNMENTS. 3-3
a. Conducting these consultations. 3-3
b. Assistance. 3-3
304. USING INFORMATION FROM THE AGENCY AND TRIBAL REVIEW PROCESSES. 3-3
305. – 399. RESERVED. 3-4

CHAPTER 4. PUBLIC PARTICIPATION

400. PUBLIC PARTICIPATION. 4-1
401. FAA'S COMMUNITY INVOLVEMENT POLICY. 4-1
402. PUBLIC PARTICIPATION UNDER THE AIRPORT IMPROVEMENT PROGRAM (AIP) 4-1
403. PUBLIC PARTICIPATION REQUIRMENTS UNDER NEPA AND SPECIAL PURPOSE LAWS. 4-2
a. Factors to consider when deciding if a public hearing is warranted for NEPA purposes. 4-2
b. Public participation and hearings for special purpose laws. 4-2
404. NOTICE OF OPPORTUNITY FOR A PUBLIC HEARING. 4-2
a. Publish notice. 4-2
b. Hearing opportunity to meet NEPA or special purpose law public involvement requirements. 4-3
405. WHEN THERE IS NO REQUEST FOR A HEARING. 4-3
a. When the airport sponsor offers the hearing to comply with 49 USC 47106(c)(1)(A)(i). 4-3

b. When FAA or the airport sponsor offered the opportunity for a hearing to meet NEPA or special purpose law requirements. 4-3
406. RESPONSIBILITIES WHEN A PUBLIC HEARING WILL OCCUR..... 4-4
a. Benefits of public hearings. 4-4
b. Notice of Public Hearing. 4-4
c. Hearing transcripts and comments. 4-4
d. Summarize issues. 4-4
407. – 499. RESERVED. 4-4

CHAPTER 5. AIRPORT PLANNING AND NEPA

500. AIRPORT ACTIONS SUBJECT TO NEPA. 5-1
a. General. 5-1
b. NEPA document choices. 5-1
501. PROJECT PLANNING AND NEPA. 5-1
a. Environmental factors and planning. 5-1
b. Early FAA contact is critical. 5-1
c. Interdisciplinary approach. 5-2
502. WHY PLANNING INFORMATION IS IMPORTANT IN THE NEPA PROCESS. 5-2
503. AIRPORT PLANNING INFORMATION CRITICAL TO THE NEPA PROCESS. 5-3
a. Important airport planning data. 5-3
b. The need for current, technical information. 5-3
c. Noise. 5-4
d. Evaluate and adjust planning as needed. 5-4
504. KEY MASTER PLAN STEPS THAT AID THE NEPA PROCESS. 5-4
a. Meet with ARP regional or district office personnel. 5-4
b. Develop good aviation forecasts. 5-5
c. Conduct a facility inventory. 5-5
d. Develop alternatives. 5-5
(1) During the airport master planning process. 5-5
(2) During the NEPA process. 5-5
e. Identify a proposed action. 5-6
505. ARP RESPONSIBILITIES. 5-6
506. FAA'S ENVIRONMENTAL REVIEW PROCESS. 5-6
a. Categorical exclusion. 5-6
b. Environmental assessment (EA). 5-6
c. Environmental impact statement (EIS). 5-7
507. – 599. RESERVED. 5-7

CHAPTER 6. CATEGORICAL EXCLUSIONS

600. CATEGORICAL EXCLUSIONS. 6-1

601. CATEGORICAL EXCLUSIONS FOR AIRPORT ACTIONS. 6-1
a. Similar actions. 6-1
b. Tables 6-1 and 6-2. 6-1
c. Categorical exclusions satisfy NEPA. 6-1
602. TYPES OF CATEGORICAL EXCLUSIONS. 6-1
a. Actions unlikely to involve extraordinary circumstances. 6-1
b. Actions that may involve extraordinary circumstances. 6-2
c. Categorical exclusion citation. 6-2
603. SPONSOR-PROVIDED INFORMATION TO SUPPORT A CATEGORICAL EXCLUSION. 6-2
a. Plan accordingly. 6-2
b. Information the sponsor should provide to FAA. 6-2
c. Airport actions in Table 6-1. 6-3
d. Airport actions in Table 6-2. 6-3
604. CATEGORICAL EXCLUSIONS UNLIKELY TO INVOLVE EXTRAORDINARY CIRCUMSTANCES. 6-3
605. CATEGORICAL EXCLUSIONS THAT MAY INVOLVE EXTRAORDINARY CIRCUMSTANCES. 6-3
a. An action not involving an extraordinary circumstance. 6-3
b. An action involving an extraordinary circumstance 6-3
606. EXTRAORDINARY CIRCUMSTANCES. 6-4
a. Extraordinary circumstances. 6-4
b. Special purpose laws. 6-4
(1) Compliance requirements. 6-4
(2) Resource agency input. 6-5
(3) Mitigation. 6-5
(4) When a resource agency does not respond. 6-5
(5) Required good faith efforts. 6-6
607. FAA DOCUMENTATION. 6-6
a. CEQ regulations. 6-6
b. Required information to streamline the review of categorical exclusions involving special purpose laws. 6-6
c. Optional documentation. 6-6
608. NOTIFYING THE AIRPORT SPONSOR ABOUT A CATEGORICAL EXCLUSION. 6-7
609. – 699. RESERVED. 6-7

CHAPTER 7. THE ENVIRONMENTAL ASSESSMENT

700. THE ENVIRONMENTAL ASSESSMENT 7-1
701. PURPOSE OF THE EA. 7-1
702. AIRPORT ACTIONS NORMALLY REQUIRING AN EA. 7-1
a. A normally categorically excluded action involving extraordinary circumstances. 7-1

b. Helicopter facilities or operations..... 7-2
c. Land acquisition..... 7-2
d. New airport serving general aviation..... 7-2
e. New airport location..... 7-2
f. New runway..... 7-2
g. Major runway strengthening or a major runway extension..... 7-2
h. Prime and unique farmland..... 7-3
i. Waters or wetlands..... 7-3
j. Other circumstances..... 7-3
703. EA PREPARATION..... 7-3
704. EA PREPARATION COORDINATION..... 7-4
a. Public input..... 7-4
b. Adopting another Federal agency's EA..... 7-4
705. SCOPING ENVIRONMENTAL ASSESSMENTS..... 7-4
a. Conducting EA scoping..... 7-4
b. EA scoping package..... 7-5
706. EA FORMAT AND CONTENT..... 7-5
a. The EA cover sheet..... 7-5
b. The Purpose and Need..... 7-5
c. The Proposed Action..... 7-6
d. Alternatives..... 7-6
e. Affected Environment..... 7-8
f. Environmental Consequences..... 7-9
(1) Impact descriptions..... 7-9
(2) Special purpose laws..... 7-9
(3) Determining environmental consequences..... 7-10
g. Mitigation..... 7-10
(1) EA format..... 7-10
(2) Proof of consultation..... 7-10
(3) Incorporating Part 150 noise mitigation in a proposed action..... 7-10
(4) Using an Environmental Management System (EMS)..... 7-11
h. Cumulative impact analysis and agencies and people consulted..... 7-11
707. FAA'S ROLE WHEN A SPONSOR OR ITS CONSULTANT PREPARES AN EA..... 7-11
a. Aid the airport sponsor or its consultant..... 7-11
b. Review the EA..... 7-12
c. Request correction of deficiencies..... 7-12
d. Resolving outstanding issues..... 7-12
e. Regional Counsel reviews of EAs..... 7-13
(1) Required review..... 7-13
(2) Optional review..... 7-13
f. Required EA adequacy statement..... 7-13
g. Recommend a finding..... 7-14
708. DISTRIBUTING DRAFT EAs..... 7-14

a. When a public hearing will occur under 49 USC 47106(c)(A)(i). 7-14
b. NEPA and special purpose laws. 7-14
c. Distributing the draft EA. 7-14
709. FILING THE FINAL EA WITH FAA. 7-14
710. PROCESSING THE FINAL EA. 7-15
a. The responsible FAA official. 7-15
b. The approving FAA official. 7-15
711. PUBLIC DISTRIBUTION OF A FINAL EA. 7-15
712. EA TIME LIMITS AND THE NEED TO RE-EVALUATE OR SUPPLEMENT AN EA 7-15
713. RE-EVALUATING OR SUPPLEMENTING AN EA. 7-16
714. – 799. RESERVED. 7-16

CHAPTER 8. FINDING OF NO SIGNIFICANT IMPACT (FONSI)

800. FAA'S ENVIRONMENTAL FINIDING. 8-1
a. Impact factors. 8-1
b. Reconsidering impact significance. 8-1
c. Completing the analysis of impact significance. 8-1
801. IF FAA'S PREFERRED ALTERNATIVE DIFFERS FROM THE SPONSOR'S PROPOSED ACTION. 8-2
a. General. 8-2
b. Notify the airport sponsor. 8-2
c. Further environmental processing. 8-2
802. FONSI CONTENT. 8-2
a. General. 8-2
b. Heading. 8-3
c. Identify the airport. 8-3
d. The Proposed Action and its reasonable alternatives. 8-3
e. Assessment. 8-3
f. Mitigation measures. 8-3
g. The approving FAA official's statement of environmental finding. 8-4
803. COORDINATING A PROPOSED FONSI WITHIN FAA. 8-4
a. Regional legal sufficiency review. 8-4
(1) Required review. 8-4
(2) Optional review. 8-4
b. Approving FAA official's approval. 8-5
c. Regional Administrator's approval. 8-5
(1) The responsible FAA official's duty. 8-5
(2) The approving FAA official's duty. 8-5
d. APP-400 review. 8-5
804. EXTERNAL REVIEW OF A PROPOSED FONSI. 8-5
a. Required Federal agency review. 8-6
b. Required public review. 8-6

c. Optional public review. 8-7
d. Notifying the public about the availability of a proposed FONSI. 8-7
805. THE APPROVED FONSI AND THE NEED FOR A RECORD OF DECISION. 8-7
a. When to prepare a FONSI/ROD. 8-7
b. FONSI/ROD contents. 8-7
c. FONSI/ROD availability. 8-8
806. DISTRIBUTING AN APPROVED FONSI. 8-8
807. NOTIFYING THE PUBLIC OF AN APPROVED FONSI'S AVAILABILITY. 8-8
a. Announcement content. 8-8
b. Announcement methods. 8-8
808. COMMITTING AN AIRPORT SPONSOR TO MITIGATION IN A FONSI. 8-9
a. Environmental Management System. 8-9
b. Sponsor failure to carry out mitigation. 8-9
809. CHANGING A FONSI. 8-9
a. EA adequacy. 8-9
b. Contacting headquarters. 8-9
c. When EA changes are needed. 8-9
810. – 899. RESERVED. 8-9

CHAPTER 9. THE ENVIRONMENTAL IMPACT STATEMENT (EIS), SCOPING, AND COOPERATING AGENCIES

900. EIS PURPOSE. 9-1
901. EIS CONTENT. 9-1
902. FAA'S LEAD AGENCY RESPONSIBILITIES. 9-1
a. EIS content. 9-1
b. EIS schedule. 9-1
903. AIRPORT ACTIONS NORMALLY REQUIRING AN EIS. 9-2
a. An environmental assessment signaling a significant impact. 9-2
b. EISs without EAs. 9-2
(1) A new commercial service airport in a Metropolitan Statistical Area (MSA). 9-2
(2) A new runway in an MSA 9-2
c. Exceptions to paragraph 903.b. 9-2
904. STARTING THE EIS. 9-2
a. Early application of NEPA. 9-2
b. EIS timing. 9-3
c. EIS topics. 9-3
d. EIS schedule. 9-3
905. SCOPING. 9-3
906. WAYS TO ENHANCE SUCCESSFUL SCOPING. 9-4
a. Scoping goals. 9-5
(1) Clarify legal responsibilities. 9-5

(2) Clarify areas of special expertise. 9-5
(3) Invite other agencies with jurisdiction by law or having special expertise to participate in scoping and the EIS process as cooperating agencies. 9-5
(4) Provide FAA's proposed procedures for overseeing EIS progress. .. 9-5
(5) Give cooperating agencies opportunities to review their roles. 9-5
(6) Give the public opportunities to provide input and concerns. 9-6
b. Scoping techniques. 9-6
c. Preparing for scoping. 9-6
d. Using an existing EA for information. 9-6
e. When no EA is available 9-7
907. SCOPING AND THE TIMING OF THE NOTICE OF INTENT NOI) TO PREPARE AN EIS. 9-7
a. NOI timing. 9-7
b. Scoping's timing 9-7
908. THE NOTICE OF INTENT (NOI) 9-8
a. NOI contents. 9-8
b. Publishing the NOI. 9-8
909. WITHDRAWING AN NOI. 9-8
a. Publish notice in the *Federal Register*. 9-8
b. Start an EA. 9-8
910. RESPONSIBLE FAA OFFICIAL SCOPING DUTIES. 9-9
a. Determine interested parties. 9-9
b. Identify other requirements. 9-9
c. Identify cooperating agencies 9-9
d. Focus EIS content. 9-10
e. Identify impacts that are not significant. 9-10
f. Explain the timing of FAA's Record of Decision. 9-10
g. Determine other scoping needs. 9-10
h. How FAA will address comments an agency fails or refuses to provide during scoping. 9-11
911. THE AIRPORT SPONSOR'S ROLE DURING SCOPING. 9-11
a. Review effects of various proposals on airport operations. 9-11
b. Act as liaison. 9-11
(1) Inform the public. 9-11
(2) Exchange information. 9-11
912. FAA'S ROLES AS A COOPERATING AGENCY 9-12
913. - 999. RESERVED. 9-12

CHAPTER 10. THE ENVIRONMENTAL IMPACT STATEMENT

1000. GENERAL. 10-1
1001. EIS PURPOSE. 10-1
1002. WHEN TO PREPARE AN EIS. 10-1

1003. EIS PREPARATION. 10-1
a. Contractor selection and oversight. 10-2
b. "NEPA-like" state or agency. 10-2
c. Memorandum of Understanding. 10-2
d. Disclosure statement. 10-3
e. Payment for consultant work. 10-3
1004. LIMITATIONS ON ACTIONS DURING THE NEPA PROCESS. 10-3
a. Actions having adverse effects or that limit alternatives. 10-3
b. ALP approvals and land purchases. 10-3
c. Plans and designs for NEPA purposes. 10-3
d. Plans and designs needed for permits or assistance beyond NEPA. 10-4
1005. ADOPTING ANOTHER FEDERAL AGENCY'S EIS. 10-4
a. Ensure the EIS meets FAA needs. 10-4
b. Notify EPA. 10-5
c. Re-circulating an adopted EIS. 10-5
(1) When FAA is a cooperating agency. 10-5
(2) When FAA adopts an EIS, but FAA is not a cooperating agency. 10-5
d. When to file an adopted EIS with EPA. 10-6
1006. EIS CONTENT. 10-6
1007. EIS FORMAT. 10-6
a. Cover sheet. 10-6
b. Summary. 10-7
c. Table of Contents. 10-8
d. Purpose and Need. 10-8
(1) The purpose and need for streamlined airport actions under 49 U.S.C. Subpart III, section 47171(j). 10-8
(2) Sponsor prepared EAs. 10-9
e. Alternatives, including the No Action alternative. 10-9
(1) Alternatives for streamlined airport projects under 49 U.S.C. Subpart III, section 47171(k). 10-9
(2) Alternatives for airport projects not subject to streamlining under 49 U.S.C. Subpart III, section 47171(k). 10-9
(3) If an EA precedes an EIS. 10-9
(4) Actions involving new airports, new runways, or major runway extensions. 10-9
(5) Airport actions resulting in use of section 4(f)-protected resources. 10-10
(6) Airport actions involving floodplains, wetlands, or conflicts with other laws. 10-11
(7) FAA's preferred alternative. 10-11
f. Affected Environment. 10-11
g. Environmental Consequences. 10-12
h. Mitigation. 10-13
i. Cumulative impact. 10-14

j. List of preparers. 10-15
k. List of EIS recipients. 10-15
l. Index. 10-16
m. Comments. 10-16
n. Appendices incorporated by reference in an EIS. 10-16
o. Incomplete on unavailable information. 10-16
1008. – 1099. RESERVED. 10-16

CHAPTER 11. PROCESSING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

1100. INTERNAL AGENCY REVIEW OF A PRELIMINARY DRAFT EIS. 11-1
a. PDEISs for streamlined airport projects. 11-1
b. PDEISs for airport projects that are not streamlined. 11-1
1101. DISTRIBUTING THE DEIS FOR AGENCY AND PUBLIC REVIEW. 11-1
a. When to seek comments on a DEIS. 11-1
b. Where to coordinate and deliver a DEIS. 11-2
(1) Availability to agencies. 11-2
(a) The Department of Commerce (DOC). 11-2
(b) The Department of Energy (DOE). 11-2
(c) The Department of the Interior (DOI). 11-3
(d) The Environmental Protection Agency. 11-3
(1) Regional office(s). 11-3
(2) Headquarters office(s). 11-3
(2) Public availability. 11-4
(3) Notice of Public Availability (NOA). 11-4
(4) DEIS distribution for FAA review. 11-4
1102. TIME LIMITS FOR REVIEWING THE DEIS. 11-5
a. Resource agency and public review. 11-5
b. Altering the DEIS review period. 11-5
(1) Extending the DEIS review period. 11-5
(2) Reducing the DEIS review period. 11-5
c. Washington headquarters review. 11-5
1103. DEIS COMMENTS. 11-6
a. Comments received from agencies. 11-6
b. Comments received from EPA. 11-6
1104. RE-CIRCULATING THE DEIS. 11-6
1105. – 1199. RESERVED. 11-6

CHAPTER 12. PROCESSING THE FINAL ENVIRONMENTALIMPACT STATEMENT (FEIS)

1200. THE FEIS AND COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS). 12-1
1201. COMMENT RESPONSE OPTIONS. 12-1
1202. FAA'S PREFERRED ALTERNATIVE. 12-2
1203. FEISs PREPARED FOR AIP-ELIGIBLE AIRPORT DEVELOPMENT PROJECTS. 12-2
a. Airport development projects. 12-2
b. Airport development involving a new airport, a new runway, or a major runway extension. 12-2
1204. ACTIONS INVOLVING THE USE OF RESOURCES PROTECTED UNDER SECTION 4(f). 12-3
1205. ACTIONS DISPLACING PEOPLE AND BUSINESSES REQUIRING THEIR RELOCATIONS. 12-4
1206. ACTIONS INVOLVING CONSTRUCTION DIRECTLY IN OR INDIRECTLY AFFECTING WETLANDS. 12-4
1207. ACTIONS SIGNIFICANTLY ENCROACHING ON A FLOODPLAIN. 12-4
1208. ACTIONS IN OR AFFECTING COASTAL ZONE AREAS. 12-4
a. FAA approvals for sponsor-proposed airport actions. 12-5
b. FAA actions. 12-5
1209. ACTIONS INVOLVING DISPROPORTIONATELLY HIGH AND ADVERSE IMPACT TO MINORITY OR LOW INCOME POPULATIONS. 12-6
1210. APPROVING THE FEIS. 12-6
a. Airports Program approval authority. 12-6
b. Approval declaration. 12-7
c. Signature block. 12-7
1211. ANNOUNCING AND DISTRIBUTING APPROVED FEISs. 12-7
a. FEIS distribution. 12-7
b. Comments on an FEIS. 12-7
c. Extending the 30-day "wait period" between FEIS release and the agency's decision. 12-7
d. Distribution to commenting parties 12-8
e. Distribution to regional EPA offices. 12-8
f. Distribution to EPA headquarters. 12-8
g. Distribution to the DOI. 12-8
h. Distribution to FAA headquarters. 12-8
i. Public notice and availability. 12-8
1212. FEIS REFERRALS TO CEQ. 12-9

a. General. 12-9
(1) Who may refer? 12-9
(2) Time limits for filing referrals. 12-9
(3) Notifying the lead agency about the referral. 12-9
b. Addressing a referral notice. 12-9
c. Resolving referrals. 12-9
1213. – 1299. RESERVED. 12-9

CHAPTER 13. THE RECORD OF DECISION

1300. DECISION ON THE FEDERAL ACTION. 13-1
1301. ROD CONTENT. 13-1
a. A brief description of the airport sponsor's proposed action. 13-1
b. A summary of the necessary Federal actions. 13-1
c. A summary of the reasonable alternatives considered. 13-1
(1) The environmentally preferred alternative. 13-1
(2) Proposed action. 13-2
(3) The preferred alternative. 13-2
d. A summary of information needed to address resources protected under special purpose laws or airport legislation. 13-3
e. A summary of mitigation measures in the approved FEIS. 13-3
f. Changes to mitigation in the approved FEIS. 13-3
g. Completing required mitigation. 13-3
h. Other information. 13-4
1302. ROD SIGNATORY. 13-4
a. General. 13-4
b. Regional Airports Division Manager duties. 13-4
1303. ISSUING THE ROD. 13-5
a. Reducing the 30-day "wait period." 13-5
b. Extending the 30-day "wait period." 13-5
1304. ROD PUBLIC AVAILABILITY. 13-5
1305. – 1399. RESERVED. 13-5

CHAPTER 14. SPECIAL INSTRUCTIONS ON RE-EVALUATING, SUPPLEMENTING, AND TIERING NEPA DOCUMENTS AND ADDRESSING EMERGENCIES

1400. GENERAL. 14-1
1401. TIME LIMITATIONS FOR EAs AND EISs AND THE NEED FOR WRITTEN RE-EVALUATIONS. 14-1
a. General. 14-1
b. Draft EAs and draft EISs. 14-1
c. Final EAs or final EISs. 14-2

(1) Major steps toward implementation of the proposed action. 14-2
(2) Substantial changes in the proposed action. 14-2
(3) Staged projects or projects requiring successive Federal approvals..... 14-2
d. Format and circulation..... 14-3
1402. SUPPLEMENTING A NEPA DOCUMENT. 14-3
a. General..... 14-3
b. Circumstances requiring a supplement. 14-3
c. Content of a supplement..... 14-3
d. Preparing a supplement. 14-3
1403. TIERING. 14-4
a. General..... 14-4
b. An example of tiering..... 14-4
1404. ADDRESSING EMERGENCY SITUATIONS. 14-4
a. Alternative arrangements. 14-5
b. Developing alternative arrangements. 14-5
c. CEQ notice..... 14-5
1405. – 1499. RESERVED..... 14-5

CHAPTER 15. ENVIRONMENTAL STEWARDSHIP AND STREAMLINING FOR AIRPORT DEVELOPMENT PROJECTS.

1500. GENERAL.
a. Vision 100..... 15-1
b. Streamlining. 15-1
c. Directions to the Secretary of Transportation. 15-1
1501. STREAMLINING POLICY. 15-1
1502. RELATIONSHIP OF THIS ORDER TO OTHER REQUIREMENTS..... 15-2
1503. PROJECTS SUBJECT TO STREAMLINING IN VISION 100. 15-2
a. Airport capacity project at a congested airport. 15-2
b. Aviation safety project. 15-2
c. Aviation security project. 15-2
1504. PROJECT DESIGNATION. 15-2
a. An airport capacity project at a congested airport..... 15-2
(1) Runway construction or expansion projects..... 15-3
(2) Other projects. 15-3
b. Aviation safety or security project. 15-3
c. ARP and AEE responsibilities for safety and security projects..... 15-3
1505. THE COORDINATED AND EXPEDITED ENVIRONMENTAL REVIEW PROCESS. 15-4
a. Identify Federal and State jurisdictional agencies..... 15-4

b. Federal and State agency participation. 15-4
c. Coordinated and expedited review process. 15-4
d. High priority for environmental reviews. 15-5
e. Memorandum of Understanding. 15-5
f. Streamlining Agreement. 15-5
g. Interagency EIS teams. 15-6
h. Lead agency responsibilities. 15-6
i. Purpose and Need. 15-7
j. Alternatives. 15-7
k. Reporting and correcting a failure to meet a project milestone. 15-7
1506. OTHER VISION 100 PROVISIONS. 15-8
a. Airport funding for FAA staff and consultants. 15-8
b. Air traffic procedures for airport capacity projects at congested airports. 15-8
c. Flexible noise mitigation funding for airport capacity projects or other airport development projects. 15-8
d. Voluntary air quality initiatives. 15-9
1507. – 1599. RESERVED. 15-9

APPENDIX 1. FLOW CHARTS DEPICTING STEPS FOR COMPLETING:
CATEGORICAL EXCLUSIONS.
ENVIRONMENTAL ASSESSMENTS.
FINDINGS OF NO SIGNIFICANT IMPACT.
ENVIRONMENTAL IMPACT STATEMENTS.
RECORDS OF DECISION.

TABLES

Table 1-1. A list of statutes, regulations, and executive orders included in defining the term, "special purpose laws" 1-12

Table 6-1. Airport-specific Categorical Exclusions Unlikely to Involve Extraordinary Circumstances. 6-8

Table 6-2. Airport-specific Categorically Excluded Actions that May Involve Extraordinary Circumstances. 6-10

Table 6-3. An Annotated Summary of Extraordinary Circumstances 6-15

Table 7-1. Significant Impact Thresholds..... 7-17

INTRODUCTION

FAA is the Federal agency responsible for providing the nation with a safe, efficient, civil aviation system. FAA's Office of Airports (ARP) is the FAA organization responsible for FAA decisions on major Federal actions at public-use airports.

ARP's mission. The mission of FAA's Airports organization is to provide leadership in planning and developing a safe, efficient national airport system to satisfy the needs of the aviation interests of the United States. In carrying out this mission, ARP will consider economics, environmental compatibility, and local proprietary rights, and safeguard the public investment.[1]

Purpose of this Order. This Order provides information to ARP personnel and others interested in fulfilling National Environmental Policy Act (NEPA) requirements for airport actions under FAA's authority. This Order is part of FAA's effort to ensure its personnel have clear instructions to address potential environmental effects resulting from major airport actions. In preparing Order 5050.4B, ARP has made it consistent with Order 1050.1E.[2]

Information on Federal environmental laws other than NEPA appears in an another document entitled, *An Environmental Desk Reference for Airport Actions.* ARP will publish notices in the *Federal Register* announcing the *Desk Reference's* availability.

Updating this Order. As needed, ARP will publish in the *Federal Register* a notice of proposed changes to this Order for public review and comment. ARP will do so after coordinating those changes with the Office of the Secretary of Transportation, FAA's Office of the Chief Counsel, and FAA's Office of Environment and Energy to ensure Departmental and agency concurrence.

The proposed changes will appear on the ARP web page. The *Federal Register* notice mentioned previously will provide the internet address where interested parties may find those changes. Interested parties without internet access may request a free CD-ROM version or a paper copy of the proposed text. ARP will issue updates to the *Desk Reference* mentioned above on a special ARP web page.

Updating the *Desk Reference*. ARP will also issue notices when it updates the *Desk Reference* to reflect changes in environmental laws, regulations, or executive orders other

---

[1] http://www.faa.gov/about/office_org/headquarters_offices/arp/.

[2] *Environmental Policies and Procedures* at www.faa.gov/regulations_policies/orders_notices/media/ALL1050-1E.pdf.

than NEPA. ARP will also notify airport associations of updates and request their cooperation in distributing new information.

The need to consider an action's environmental impacts. In passing NEPA, Congress recognized the importance of restoring and preserving environmental quality and declared:

> "the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, is to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." (42 U.S.C. Section 4331).

Through NEPA, Congress requires Federal agencies to consider the environmental effects of proposed actions and their reasonable alternatives.

Considering environmental impacts is the agency's responsibility. FAA begins its consideration of environmental issues early in its decision making process. Eventually, when selecting a preferred alternative, the approving FAA official often finds that FAA's mission has unavoidable environmental impacts.

The NEPA document. To select a preferred alternative under NEPA, the approving FAA official considers the environmental effects a proposed action and its reasonable alternatives would cause in meeting a defined purpose and need. During that process, the official also considers the safety, economic, technical, and engineering factors of those alternatives.

To consider the environmental effects of the no action alternative, the proposed action and its reasonable alternatives, ARP prepares or reviews environmental documents describing environmental effects proposed airport actions would cause. The Environmental Assessments (EA) ARP personnel review or the Environmental Impact Statements (EIS) they prepare provide interdisciplinary analyses showing that FAA officials have taken " a hard look" at the environmental impacts a proposed action and its reasonable alternatives would cause.

The documents also allow FAA to provide interested agencies and the public the opportunity to review the scientific and technical information ARP personnel consider. This information focuses on environmental impacts and the conceptual measures that would mitigate those effects. Finally, EAs and EISs provide agencies and the public with information so they can comment on those impacts and FAA's analyses of them.

When an EA is prepared, FAA may issue a Finding of No Significant Impact to present its determination that an action would not significantly affect environmental resources. Conversely, its review of an EA may show that an EIS is needed because the actions

would significantly affect those resources. After completing an EIS, FAA prepares a Record of Decision to explain the decisionmaker's rationale for selecting FAA's preferred alternative. Regardless of the document prepared, the NEPA process leads to a final FAA decision to approve or not approve a proposed airport action.

CHAPTER 1. ORDER OBJECTIVES AND DEFINITIONS

1. THE NATIONAL ENVIRONMENTAL POLICY ACT. The National Environmental Policy Act of 1969 (NEPA) is one of the Federal laws passed to protect the nation's environment. As 40 CFR 1500.1(a) notes:

> "The National Environmental Policy Act (NEPA) is our basic national charter for protecting the environment. It establishes policy, sets goals (section 101), and provides means (section 102) for carrying out the policy. Section 102(2) contains 'action-forcing' provisions to make sure that federal agencies act according to the letter and spirit of the Act."

2. NEPA'S OBJECTIVES. NEPA requires each Federal agency to disclose to the interested public a clear, accurate description of potential environmental impacts that proposed Federal actions and reasonable alternatives to those actions would cause. Through NEPA, Congress directed Federal agencies to integrate environmental factors in their planning and decision making processes. This provides the public with a fair, open opportunity to review and comment on those alternatives and impacts and other important environmental matters related to a proposed Federal action. In approving the Federal actions necessary to support an airport development proposal, the approving FAA official must consider environmental effects as fully and as fairly as it does technical, economic, and other non-environmental considerations.

3. COUNCIL ON ENVIRONMENTAL QUALITY REGULATIONS. NEPA created the President's Council on Environmental Quality (CEQ). CEQ's responsibilities include developing national policies to foster and promote improving environmental quality and oversight of the Federal government's NEPA activities. CEQ has issued regulations at 40 CFR, Part 1500 *et. seq.* providing directions on how to comply with NEPA. This Order uses CEQ terms in 1500 *et. seq.* when possible and cites the applicable CEQ regulation as, "40 CFR 1508," "40 CFR 1508.9," etc.

4. FAA's ENVIRONMENTAL OBJECTIVES. Provisions in 49 USC section 40101 describe FAA's multiple missions. In proposing actions to carry out its mission to maintain safety and efficiency in air commerce and to consider the requirements of national defense and commercial and general aviation, FAA must comply with NEPA. To do this, FAA must consider ways to enhance environmental quality and avoid or minimize adverse environmental impacts resulting from proposed FAA actions and their reasonable alternatives.

5. THE PURPOSE OF THIS ORDER. FAA's Office of Airports (ARP) has prepared this Order to ensure ARP personnel and others interested or involved in ARP actions are able to prepare accurate, timely, and high quality environmental documents that comply with NEPA.

a. Instructions to FAA personnel. This Order directs ARP personnel to carefully consider and weigh the environmental impacts of Federal actions and their reasonable alternatives. The evaluation used to do so must employ an interdisciplinary approach and occur in a timely, efficient, and comprehensive manner. This Order directs FAA personnel to involve other Federal agencies, State and local agencies, agencies and officials having expertise on environmental resources and the affected or interested public in this process. When appropriate, FAA should also involve Tribal officials having jurisdiction by law.

b. Relationship of this Order to FAA Order 1050.1E. Users of this Order must interpret it in a manner that is consistent with FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*. Order 1050.1E describes FAA's agency-wide environmental policy and how FAA will comply with NEPA. Order 5050.4B supplements FAA Order 1050.1E by providing NEPA instructions prepared especially for proposed Federal actions to support airport development projects. Therefore, Order 5050.4B:

(1) Cross-references the paragraphs in Order 1050.1E identifying actions associated with airport projects that normally qualify for categorical exclusions and provides a table listing those actions for convenience.

(2) Incorporates the extraordinary circumstances described in Order 1050.1E that ARP must consider when determining if proposed FAA actions qualify as categorical exclusions.

(3) Applies the impact thresholds in Order 1050.1E, Appendix A, to determine if a proposed FAA action and its reasonable alternatives would cause significant environmental impacts. This Order also provides factors specific to resources to help the responsible FAA official determine impact significance.

(4) Defines the term, "special purpose laws" and provides information about their relation to the NEPA process.

(5) Explains how to include resource agencies and the public in the environmental process for major Federal actions involving airport projects.

(6) Provides information to ARP personnel and other interested parties about airport-related:

(a) Categorical exclusions.

(b) Environmental assessments (EAs) and Findings of No Significant Impact (FONSIs) and Records of Decision for FONSIs.

(c) Environmental impact statements (EISs) and EIS Records of Decision (RODs).

6. OTHER ORDER USERS. Airport sponsors, their environmental consultants, and other interested parties should use this Order for airport actions under FAA's purview and those under the purviews of state aviation agencies participating in FAA's State Block Grant Program. Instructions in this Order should help those parties complete the environmental review process efficiently and facilitate FAA decisions on proposed airport actions. The Order provides information:

(a) To airport sponsors on proposed projects that may be categorically excluded.

(b) To airport sponsors, their environmental consultants, and other interested parties about preparing EAs for proposed airport projects and how FAA will determine if the EAs are acceptable and if FONSIs are appropriate for those projects.

(c) About the process ARP must complete for airport projects having impacts that require FAA (ARP) to prepare EISs and issue Records of Decision.

7. DISTRIBUTION. ARP provides this Order to personnel in these locations:

a. Headquarters. Division and Branch levels in the Offices of Airport Planning and Programming; Airport Standards; the Chief Counsel; and Environment and Energy:

b. Regions.

(1) Airports Division offices and their associated levels.

(2) Airports District Offices (ADO) and Airports field offices.

(3) Regional Counsels.

c. Aeronautical Center, Airports and Logistics Branch.

d. Other interested parties. Other interested parties may get a copy of this from ARP's internet site (http://www.faa.gov/airports_airtraffic/airports/).

(1) Interested parties without internet access. Interested parties may request a computer disk containing this Order by writing to:

Federal Aviation Administration
Office of Airport Planning and Programming
Airport Planning and Environment Division (APP-400)

800 Independence Avenue, S.W.
Washington, D.C. 20591

(2) Interested parties without computers. Interested parties may obtain a photocopy of the Order, for a fee, by contacting FAA Rules Docket at:

Federal Aviation Administration
Office of the Chief Counsel
ATTN: Rules Docket (AGC-200)
Docket No. FAA/2004/19058
800 Independence Avenue, S.W.
Washington, D.C. 20591

8. CANCELLATION. This Order cancels FAA Order 5050.4A, *Airport Environmental Handbook* dated October 8, 1985.

9. DEFINITIONS: To address terms specific to the airport program, this Order supplements some of the definitions in FAA Order 1050.1E as noted here.

a. Advisory actions. Some Federal actions are advisory and are not considered Federal actions under NEPA. Categorical exclusions, environmental assessments, or environmental impact statements are not required for these actions. If ARP personnel know or anticipate that an advisory action includes a subsequent Federal action, they must note that Federal action in the advisory action. Examples of airport-related advisory actions include:

(1) Determinations under 14 CFR, Part 77, *Objects Affecting Navigable Airspace*.

(2) Determinations under 14 CFR, Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports, and Marking and Lighting Recommendations*.

b. Airport Improvement Program. Chapter 471 of Title 49 USC establishes the general requirements and conditions for federally financing the Airport Improvement Program (AIP) that ARP administers on FAA's behalf. AIP funding is used to develop a nationwide public-use airport system to meet the country's current and projected civil aviation needs. The airports comprising that system make up the National Plan of Integrated Airport Systems (NPIAS). The AIP also provides funding for noise compatibility programs (NCPs) and implementing FAA-reviewed and approved recommendations comprising an NCP. FAA Order 5100.38, *Airport Improvement Program Handbook*, provides details on administering the AIP.

c. Approving FAA official. For purposes of this Order, this is the FAA official having the authority to decide on one or more of the actions listed in paragraph 9.g or other activities connected to those actions. FAA Order 1100.154A, *Delegation of Authority*, provides more information on this official's duties.

d. Cooperating agency. This is a Federal agency or Tribe having special expertise regarding environmental resources or having jurisdiction by law over a resource or activity associated with a Federal action. At a lead agency's request, a cooperating agency helps the lead agency prepare an environmental document. Occasionally, FAA may act as a cooperating agency. In those cases, FAA reviewers should focus on the technical and aeronautical issues associated with civil aviation and the environmental impacts resulting from aviation-related actions under FAA's jurisdiction.[1] The following web address provides CEQ information on Tribes and their cooperating agency activities.

http://ceq.eh.doe.gov/nepa/tribes.htm

e. Environmental Management System (EMS). This is a set of processes and practices designed to provide an organization with information about environmental impacts of its operations. An EMS monitors and reports on an organization's environmental practices and tracks measures used to mitigate environmental impacts due to organizational actions. For example, an EMS may provide valuable information about airport facility designs and mitigation measures that have helped prevent or minimize significant environmental impacts. An EMS may be used to track the status of environmental activities and to highlight those activities that may require change.

f. Expertise agency. A Federal, State, local, or Tribal government agency with specialized skill or technical knowledge on a particular environmental resource. Examples include, but are not limited to, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, a State Department of Environmental Quality, a Tribal Historic Preservation Officer, or a similar entity. Many times, expertise agencies serve as cooperating agencies during the NEPA process.

g. Federal action. For ARP, a Federal action may include one or more of the following:

(1) Conditional, unconditional, or mixed approval[2] of Federal funding for airport planning and development projects, including separate funding of plans and specifications for those projects.

---

[1] CEQ Memorandum entitled *Designating Non-Federal Agencies to be Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act* (July 28, 1999) and the CEQ Memorandum for heads of Federal Agencies entitled, *Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act* (January 30, 2002) are useful references.

[2] See paragraph 202.c of this Order for information on these approvals.

(2) Conditional, unconditional, or mixed approval a location for a new, public use airport.

(3) Conditional, unconditional, or mixed approval of a first-time or changed airport layout plan (ALP).

(4) Authorizing an airport sponsor to impose and use Passenger Facility Charges (PFC).

(5) Conditional, unconditional, or mixed approval of an airport sponsor's request under 49 USC, section 47125, to use or transfer Federally-owned land to carry out an action under 49 USC Chapter 471, Subchapter I, at a public-use airport or to support the airport's operations.

(6) Conditional, unconditional, or mixed approval an airport sponsor's request to release airport land from a Federally-obligated, public-use airport when the land would be used for non-aeronautical purposes.

(7) Conditional, unconditional, or mixed approval of the use of a facility as public-use airport when the facility becomes available under the Surplus Property Act.

(8) Approving noise compatibility programs under 14 CFR, Part 150.

(9) Approving an airport sponsor to restrict the use of Stage 3 aircraft at public-use airports under 14 CFR Part 161.

(10) Issuing a Part 139 certification. and

(11) Conditional, unconditional, or mixed approval of funding for measures in an FAA-approved Wildlife Hazard Management Plan or approving ALP changes to accommodate those measures.

h. Federal environmental approval. This is the approving FAA official's determination that FAA's Finding of No Significant Impact (FONSI) or final EIS (FEIS) satisfies the applicable environmental statutes and regulations. Note that these environmental approvals do not constitute FAA decisions or approvals of Federal actions. For projects addressed in EISs, the FAA approving official will not issue a decision concerning the proposed Federal actions (Record of Decision) until 30 days have passed from the date EPA announces the availability of the FEIS in the *Federal Register*.

i. Highly controversial action. This is when the effects of a proposed Federal action on the quality of the human environment are likely to be highly controversial on environmental grounds. The term "controversial" means that a substantial dispute exists

concerning the size, nature, or effect of a proposed Federal action. Effects are considered highly controversial when reasonable disagreement exists over a project's risks of causing environmental harm. Opposition on environmental grounds by a Federal, State, or local government agency or by a Tribe or by a substantial number of people the action would affect should be considered in determining whether reasonable disagreement regarding a proposed action's environmental effects exists. If in doubt about a proposed action's controversy, consult ARP's Airports Planning and Environmental Division (APP-400), Regional Counsel, or Office of the Chief Counsel (AGC-600) for assistance.

j. Joint lead agency. This is a Federal, State, local, or Tribal governmental agency that may work with at least one Federal agency to prepare an EIS. To reduce duplicating NEPA, State, or local requirements, 40 CFR 1506.2 promotes joint lead agency arrangements when possible, unless an agency is prohibited from doing so. Joint lead agency planning, environmental research, public hearings, and environmental analyses should occur with the intent of preparing one environmental document that will satisfy the NEPA requirements for each Federal agency involved in a proposed action.

k. Lead agency. See FAA Order 1050.1E, paragraph 207. For most airport actions, FAA will be the lead agency.

l. Major runway extension. A major runway extension involves at least one of the conditions mentioned in paragraphs 9.l(1) or (2) of this Order. ARP notes that removing a displaced threshold is not a runway extension.

(1) The action causes a significant adverse environmental impact to any affected environmental resource (e.g., wetland, floodplain, historic property, etc.). This, includes but is not limited to causing noise sensitive areas in the DNL 65 dB contour to experience at least a DNL 1.5 dB noise increase when compared to the no action alternative for the same time frame.[3] Note that this threshold includes exposing noise sensitive land uses in the DNL 63.5 dB to DNL 65 dB noise levels or greater.

(2) Removing a relocated threshold, if an ALP indicates the removal results in a permanent, new threshold.

m. " NEPA-like" State or agency. According to 40 CFR, Part 1506.2(c), this is a State or agency that is subject to state or local requirements comparable to NEPA

[3] Under 49 U.S.C, section 47501 – 47510 (formerly, the Aviation Safety and Noise Abatement Act of 1979), FAA must use one system for measuring aircraft noise. FAA (and other Federal agencies) chose DNL due to its reliable relationship between projected noise exposures and how surveyed communities and people react to noise. In 1992, the Federal Interagency Committee on Noise (FICON) evaluated and re-affirmed the DNL metric as the principal means for describing long-term noise exposures for civilian and military aircraft operations. FICON noted that DNL is the government's primary cumulative noise exposure descriptor because it accounts for all noise events (including aircraft noise) over a period of time. FICON noted that DNL also provides information on intensity and duration of that noise.

requirements for environmental impact statements. These entities, unless specifically barred by other law, shall, to the fullest extent possible, jointly prepare EISs and are considered joint lead agencies with FAA. As joint leads, these states or agencies may share the responsibilities with FAA for scoping or preparing EISs, and selecting contractors to prepare EISs or perform studies. In all cases, FAA remains responsible for taking the lead in scoping, providing guidance in preparing an EIS, participating in EIS preparation, independently evaluating EISs, and approving them. Information on "NEPA-like" states is available at:

http://ceq/eh.doe.gov/nepa/states.html

n. Noise sensitive area. This is an area where noise interferes with the area's typical activities or its uses. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas (including areas having wilderness characteristics), wildlife refuges, and cultural and historical sites. For example, in the context of noise from airplanes and helicopters, noise sensitive areas include such areas within the Day Night Level (DNL) 65 noise contour (in California, use the Community Noise Equivalent Level (CNEL) instead of the DNL metric). Individual, isolated, residential structures may be considered compatible within the 65 DNL noise contour where the primary use of land is agricultural and adequate noise attenuation is provided. Also, transient residential use such as motels should be considered compatible within the 65 DNL noise contour where adequate noise attenuation is provided. A site that is unacceptable for outside use may be compatible for use inside of a structure, provided adequate noise attenuation features are built into that structure. (See table 1 on land use in FAA Order 1050.1E, Appendix A, section 4; Order 1050.1E, Appendix A, section 14, Noise; and 14 CFR Part 150, Airport Noise Planning, Land Use Compatibility). FAA recognizes that there are settings where the 65 DNL standard may not apply. In these areas, the responsible FAA official will determine the appropriate noise assessment criteria based on specific uses in that area. (See also Order 1050.1E, Appendix A, section 6.2i for further guidance.) In the context of facilities and equipment, such as emergency generators but not including aircraft, noise sensitive areas may include such sites in the immediate vicinity of operations, pursuant to the Noise Control Act of 1972, (See State and local ordinances, which may be used as guidelines for evaluating noise impacts from operation of such facilities and equipment).

o. Passenger Facility Charge Program. Congress established the Passenger Facility Charge Program (PFC) in the 1990 Aviation Safety and Capacity Expansion Act (49 USC 40117). FAA manages the PFC under authority delegated to it by the Secretary of Transportation. The Program authorizes a public agency to impose a passenger facility charge on each enplaned passenger at a commercial service airport that public agency controls. PFC proceeds are used to finance eligible, FAA approved airport-related projects. PFC proceeds may be used for actions that:

(1) Preserve or enhance safety, security, or capacity of the national airport system.

(2) Reduce noise from an airport that is part of that system. or

(3) Provide opportunities for increased competition between or among air carriers.

p. Project involving an airport location. This is an action involving an airport sponsor's proposal to build a new public-use airport, to buy land, or enter into a long-term lease (e.g., at least 20 years) for that purpose. This does not include changing the ownership of an existing airport.

q. Reasonably foreseeable action. An action on or off-airport that a proponent would likely complete and that has been developed with enough specificity to provide meaningful information to a decisionmaker and the interested public. Use the following table to help determine if an action is reasonably foreseeable.[4]

Off-airport action.	**On-airport action.**
The proponent has committed to completing the proposed action. As a result, the action is or will be the subject of a NEPA document, or a Federal, State, local, or Tribal government permit application or approval and would occur within the same time frames as those evaluated for the proposed airport action.	The action is included on an unconditionally approved ALP and the proponent has: 1) committed to complete the proposed action depicted on the unconditionally approved ALP; and/or 2) developed preliminary design plans for an action in an Airport Capital Improvement Plan and those plans are available for review by interested parties.
Would affect all, some, or one of the environmental resources that the proposed action would affect.	Would affect all, some, or one of the environmental resources that the proposed action would affect.
Would occur within the same time frames as the time frames analyzed for the proposed airport action.	Would occur within the same time frames as the time frames analyzed for the proposed airport action.

r. Responsible FAA official. This is the FAA employee responsible for the activities described in 9.g. (1) - (11). In doing so, the employee:

(1) Advises an airport sponsor on how to integrate environmental considerations into the airport planning process early in the planning stage.

(2) Reviews proposed airport actions to determine if a categorical exclusion applies or an EA or an EIS is needed.

[4] Paragraph 905.c(1) and (2) provide definitions of "connected actions" and "similar actions," respectively.

(3) Provides guidance to an airport sponsor during EA preparation and independently evaluates and takes responsibility for the scope and content of the sponsor's EA.

(4) Analyzing expected environmental impacts and determining if they meet or exceed applicable significant adverse impact thresholds used to determine impact intensity.

(5) Recommends issuance of a FONSI to approving FAA officials and prepares FONSIs when the approving FAA official concurs with that recommendation.

(6) Evaluates contractors and selects the contractor who will help FAA prepare an EIS. The official also obtains a disclosure statement from the contractor who will assist FAA prepare the EIS.

(7) Conducts scoping activities for FAA EISs.

(8) Provides guidance to the EIS contractor and participates in EIS preparation.

(9) Assures proper coordination and consultation occurs with Federal, State, Tribal, and local agencies and the public.

(10) Evaluates EISs and takes responsibility for their scopes and contents.

(11) Prepares Records of Decision (RODs).

s. Significant impact threshold. The impact level or "threshold" that the responsible FAA official uses to determine if the environmental effects of a proposed action or its reasonable alternatives would cause significant environmental effects. If FAA has established a threshold for a resource, the responsible FAA must use that threshold to determine impact severity and context.

Note: For convenience, Table 7-1 of Chapter 7 of this Order provides the verbatim text of significant impacts in FAA Order 1050.1E, Appendix A, for many environmental resources. The Table also presents information about those thresholds to help analyze airport-related environmental impacts.

t. Special purpose laws. These are Federal laws, regulations, executive orders, or departmental orders that are outside NEPA. FAA must often address special purpose law requirements in completing its environmental analyses of major Federal actions involving airports. For example, before deciding if an action qualifies as a categorical exclusion, the responsible FAA official must examine extraordinary circumstances, which are often based on these laws, regulations, or orders. FAA Order 1050.1E,

Appendix A, provides more information on these items and how to address their requirements for all FAA organizations. *An Environmental Desk Reference for Airport Actions* provides similar information, but focuses on how to analyze that information for major Federal actions involving airports. Table 1-1 lists the laws, regulations, and orders comprising the term, "special purpose laws" used in this Order.

u. Sponsor. 49 USC 47102 (19) notes this is:

(1) A public agency that submits an application to the Secretary of Transportation for financial assistance under 49 USC Subpart B, Chapter 471, Subchapter I, Airport Development. or

(2) A private owner of a public-use airport who submits an application for financial aid for the airport to the Secretary of Transportation under 49 USC Subpart B, Chapter 471, Subchapter I.

v. Written re-evaluation. FAA Order 1050.1E, paragraph 515, defines this term. In summary, this is a document the responsible FAA official prepares to document the validity of a previously prepared EA or EIS. Conversely, the re-evaluation may conclude that substantial changes to the project or new information pertaining to affected environmental resources require preparation of a new EA or EIS or that a supplement to an earlier-prepared EA or EIS is needed. In preparing this re-evaluation, the responsible FAA official will determine that:

(1) There are no significant new circumstances or information relevant to environmental concerns that have a bearing on the proposed action or its impacts.

(2) The EA or EIS continues to accurately describe the proposed action and that there are no substantial changes in the proposed action that have relevant environmental concerns.

(3) The EA or EIS contains data and analyses that remain substantially valid.

(4) The EA or EIS continues to support a conclusion that the current action will meet or has met the relevant conditions and requirements of FAA's approval.

10. - 199. RESERVED.

Table 1-1. A list of statutes, regulations, and executive orders included in defining the term, "special purpose laws."

Statute or Executive Order	Implementing Regulation or Guidance	Notes
Statutes		
49 USC. Subchapter I, section 303.c.		Formerly, Section 4(f) of the Dept. of Transportation Act.
49 USC Subpart B, Chapter 471, section 47106.(c).		Environmental Requirements for new airports, new runways, or major runway extensions.
American Indian Religious Freedom Act	43 CFR, Parts 7.32, 7.7	
Anadromous Fish Conservation Act	50 CFR, Part 401	
Archeological and Historic Preservation Act	36 CFR, Part 68	
Archeological Resources Protection Act	25 CFR, Part 262 36 CFR, Part 79 43 CFR, Parts 3, 7	
Clean Air Act	40 CFR, Part 93	See Subpart B
Coastal Barrier Resources Act		
Coastal Zone Management Act	15 CFR, Part 930	See Subparts C and D
Comprehensive Environmental Response, Conservation, and Liability Act	40 CFR, Part 307	See Subpart J for more information on various topics addressed for this law.
Endangered Species Act, Section 7	50 CFR, Parts 17, 402	Part 17 lists species.
Farmland Protection Policy Act	7 CFR, Part 657, 658	
Land and Water Conservation Act, section 6(f)	36 CFR, Part 59	
Magnuson-Stevens Act	50 CFR, Part 600	See Subpart J for Essential Fish Habitats and Subpart K for Coordination and Consultation.
Marine Mammal Protection Act	50 CFR, Part 18, 216	
Migratory Bird Treaty Act	50 CFR, Part 21	
National Historic Preservation Act	36 CFR, Parts 800 *et. seq.*	
National American Graves Repatriation Act	43 CFR, Part 10 25 CFR, Part 262.8	When airports occur on Indian reservation land or Federal lands.
Resource Conservation and Recovery Act	40 CFR, Part 256	See Subpart E.
Safe Drinking Water Act	40 CFR, Part 141	
Uniform Relocation and Real Property Acquisition Policy Act	49 CFR, Part 49 FAA Order 5100.38B	
Wild and Scenic Rivers Act	36 CFR, Part 297	

Executive Orders	Implementing Regulation or Guidance	Notes
11593, *Protection and Enhancement of the Cultural Environment*		
11593, *Protection and Enhancement of the Cultural Environment*		
11990, *Protection of Wetlands*	DOT Order, 5660.1A	
11998, *Floodplain Management*	DOT Order 5650.2	
12372, *Intergovernmental Review of Federal Programs*		
12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	DOT Order 5610.2	
13007, *Indian Sacred Sites*		
13045, *Protection of Children from Environmental Health Risks and Safety Risks*		
13089, *Coral Reef Protection*		
13112, *Invasive Species*		
13158, *Marine Protection Areas*		Includes Great Lakes
13175, *Consultation and Coordination With Indian Tribal Governments*	FAA Order 1210.20	
13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*		
13274, *Environmental Stewardship and Transportation Infrastructure Projects*		

CHAPTER 2. SPECIAL NEPA REQUIREMENTS AND RESPONSIBILITIES FOR AIRPORT ACTIONS

200. GENERAL INFORMATION.

a. FAA implementing procedures for NEPA. NEPA places responsibilities on each Federal agency to comply with specific requirements as the agency carries out its mission. While CEQ has oversight responsibility for overall Federal NEPA compliance, FAA is responsible for applying NEPA to its particular programs and actions.

(1) FAA's decision making process for airport projects must consider the environmental, social, economic, and technical factors of a proposed action and those reasonable alternatives that meet the purpose and need. To do this, CEQ regulations allow FAA to adopt its own implementing procedures to supplement the regulations at 40 CFR, Part 1500 *et. seq*. FAA has done this in Order 1050.1E.

(2) Order 5050.4B supplements FAA Order 1050.1E. It provides detailed guidance on how FAA integrates NEPA into the planning and decision making processes for major Federal actions related to airports (see paragraph 9.g(1) – (11) of this Order). Order 5050.4B presents this information to ensure Office of Airports (ARP) personnel carefully consider and weigh environmental values and resources and other factors in a timely manner when evaluating proposed Federal actions at airports. These procedures are intended to guide ARP and other involved FAA organizations prepare and review environmental documents for airport actions. This ensures that FAA decisionmakers base their decisions on accurate and timely environmental information.

b. Levels of NEPA processing for Federal actions at airports. The Office of Airports (ARP) analyzes Federal airport actions that could potentially cause environmental impacts. To fulfill the terms of CEQ's NEPA regulations, ARP may: categorically exclude the action; require the airport sponsor to prepare an environmental assessment (EA) under FAA oversight; or prepare an environmental impact statement (EIS). Chapters 6, 7, and 9, respectively, of this Order discuss these NEPA reviews in detail.

201. AIRPORT SPONSOR RESPONSIBILITIES.

a. General. Airport sponsors, not FAA, own and operate public-use airports in the United States and its territories. As a result, airport sponsors are responsible for deciding when and where airport development is needed and for building and operating airport facilities. Airport sponsors may seek FAA approvals for changes to their Airport Layout Plans (ALP) or for Federal funds under the Airport Improvement Program (AIP) to build airport facilities. Sponsors may also seek approvals of ALP changes to accommodate airport projects funded by Passenger Facility Charges or other local funds.

b. Environmental responsibilities. Airport sponsors may request ARP ALP approval for the actions noted in paragraph 9.g. However, before ARP decides whether

to approve these actions, it must comply with NEPA and other applicable special purpose laws. As an applicant for Federal approval, an airport sponsor should take on some or all the following responsibilities.

(1) In consultation with ARP planners and environmental specialists, consider known environmental factors in early master planning efforts for proposed airport development projects (paragraph 504 of this Order). Doing so would help the sponsor:

(a) Identify obvious, specially-protected environmental resources such as Federally-listed endangered species, historic properties, wetlands, and parkland during the development's conceptual phase when the greatest range of alternatives exists.

(b) Consider practicable, possible, or prudent alternatives to avoid specially-protected resources. or

(c) Consider conceptual mitigation in project design to reduce unavoidable environmental effects if no practicable, possible, or prudent alternative exists.

(2) Provide environmental information to its consultant or to ARP.

(3) Prepare EAs or hire qualified environmental contractors to prepare those documents.

(4) Provide opportunities for public participation, and a public hearing, if one is appropriate.

(5) Consult with ARP personnel, and as needed, coordinate with Federal, State, and local agencies, Federally-recognized Tribes, and the affected community as described in this Order.

(6) Join ARP in a Memorandum of Understanding to pay the contractor ARP selects to help it prepare the EIS for a proposed action.

202. AIRPORT LAYOUT PLAN (ALP).

a. General. An ALP identifies all existing and future runways, runway extensions, terminal buildings and other airfield facilities, and the descriptions of the development needed to support them. The ALP is for planning purposes only. It does not commit the airport sponsor to building any depicted airport facilities. Also, ARP's approval of an ALP does not commit ARP to contribute Federal financial support to the facilities the ALP depicts.

b. NEPA compliance for ALP approvals. As paragraph 9.g.(3) notes, FAA's conditional, unconditional, or mixed approval of an ALP is a Federal action subject to NEPA and other environmental laws.

c. FAA's ALP approval choices. The approving FAA official may issue a "conditionally" or "unconditionally" approve an ALP as discussed below. Also, that official may environmentally and unconditionally approve more immediate range development shown on an ALP, while deferring environmental action on later stages of proposed development depicted on the same ALP but not yet ripe for decision. This situation leads to the official a "mixed" ALP approval as discussed in paragraph 202.c(3).

(1) Conditional ALP approval. This approval signals that:

(a) The proposed ALP depicts features that are safe and efficient for airport operations and airport use.

(b) ARP has not yet completed its review of the environmental impacts the features depicted on the ALP would cause. ARP has not done so because the features are not yet needed and are not ripe for decision (see "tiering" paragraph 1403 of this Order for more information). or

(c) The approving FAA official has *not* authorized the airport sponsor or project proponent to begin building the facilities shown on the conditionally approved ALP. The sponsor or proponent may start building those facilities *only after* the ARP completes its environmental analysis of those facilities and the approving FAA official issues an unconditional approval of the ALP depicting those facilities.

Note: A conditional ALP approval normally qualifies as a categorical exclusion under the Administrative/General exclusions, FAA Order 1050.1E, paragraph 307.p. (also see Chapter 6, Table 6-1, of this Order). Because there is no reasonable expectation that the approval would cause environmental effects, it rarely involves extraordinary circumstances (FAA Order 1050.1E, paragraph 303d**).**

(2) Unconditional ALP approval. This approval signals that:

(a) The proposed ALP depicts features that are safe and efficient for airport operations and airport use and that the features are ripe for Federal decision.

(b) ARP has completed the environmental review process this Order requires for the near-term and immediate-term development that is ripe for decision. and

(c) The approving FAA official *has* authorized the airport sponsor or project proponent to begin building the facilities or equipment depicted on the unconditionally approved ALP.

(3) "Mixed" ALP approval. ARP would issue this approval when it unconditionally and conditionally approves the same ALP. ARP would likely issue this approval for ALPs resulting from master plans showing various airport development over a long period of time. In these cases, ARP would environmentally analyze and unconditionally approve the near-term and immediate-term development shown on an ALP that is ripe for decision. However, ARP would defer its environmental review of

the long-term development that is not yet ripe for decision. When issuing a "mixed ALP approval:"

(a) The approving FAA official would unconditionally approve that portion of an ALP depicting the proposed near-term and immediate-term development the sponsor proposes. But to do so, ARP must have completed its environmental review and make applicable assurances (e.g., those addressing Section 4(f), relocation, wetlands, floodplains, and coastal zone management programs) for those actions ripe for decision. If ARP has evaluated the environmental effects for all of the development on the ALP, the official would unconditionally approve the entire ALP. ARP urges sponsors or proponents to begin all of the unconditionally approved development within 3 years of the date ARP completes its environmental review for that development. If they do not, ARP would need to complete a written re-evaluation of or a supplement to the NEPA document ARP completed earlier when it unconditionally approved the ALP. (See paragraphs 1401 and 1402 of this Order for more information).

(b) The approving FAA official would conditionally approve that portion of the ALP depicting the long-term development that is not yet ripe for decision. Later, when the airport sponsor or proponent chooses to build this development, it must ***first*** obtain the official's unconditional ALP approval for that development. To do so, ARP would have to complete the proper NEPA document, issue the proper assurances, and the official would have to unconditionally approve the ALP segments depicting the development that is now ripe for decision.

(4) Limitations on ALP approvals. The approving FAA official may not conditionally approve an ALP depicting a new airport, a new runway, or a major runway extension if any of those projects and their associated actions are the subjects of an EA or EIS that is being prepared. In these instances, the approving FAA official may unconditionally approve an ALP depicting those facilities and their connected actions, but only if FAA has issued a FONSI or ROD that is based on an EA or EIS that addresses those airport actions.[1] These limitation do not preclude ARP from taking any of the following actions:

(a) Approving ALPs depicting and approving Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) funding for projects having independent utility from those the ongoing NEPA document is addressing. For purposes of this Order, a project has independent utility when the project has logical starting and end points and would have a useful purpose without relying on other transportation improvements.

(b) Issuing airspace determinations that focus on the effect of proposed major airport development projects on the safe, efficient use of the airport's navigable airspace. or

[1] Memo from Manager, Community and Environmental Needs Division, dated November 17, 2003, addressing Airport Layout Plan Approvals.

(c) Issuing written findings that ALPs depict features that are safe and efficient for airport operations and airport use.

d. FAA's ALP approval letters. These letters reflect FAA's decision on the proposed project's effect on airport utility as well as safe and efficient use of the airport and navigable airspace. They also reflect the status of FAA environmental reviews for facilities the ALP depicts.

(1) A conditional ALP approval. When the approving FAA official conditionally approves an ALP, the approval letter must specifically identify those items on the associated ALP that FAA has *not* environmentally analyzed. In addition, the ALP should be dated. Either the dated plans or an approval letter accompanying it should clearly indicate that the approving FAA official has *conditionally* approved the ALP and that the ALP is *still* subject to environmental review. The approval letter should include text similar to this:

> "My signature on the enclosed ALP does not necessarily reflect the FAA's official views or policy, authorize construction of the development, nor constitute FAA's commitment to take part in the recommended development.
>
> The actions listed below are subject to Federal environmental laws, statutes, and regulations. FAA first must make an environmental finding on these actions *before* the airport sponsor may begin them. To satisfy these responsibilities, FAA must complete the environmental process described in the most current version of FAA Order 5050.4.

(ARP suggests listing here those actions requiring FAA's written environmental approval).

> "This approval does not cancel notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(2) An unconditional ALP approval. When the approving FAA official unconditionally approves an ALP, the letter must specifically state that fact. ARP suggests listing the facilities the official is unconditionally approving. A way to do so is to stamp the words, "UNCONDITIONALLY APPROVED" on the ALP and enter the date of that approval. Suggested language for the unconditional approval letter is:

> "The Federal Aviation Administration (FAA) has completed its environmental review of the enclosed Airport Layout Plan (ALP) and has unconditionally approved the facilities listed below. Note the approval does not necessarily reflect FAA's official views or policy. Also note my signature does not constitute the FAA's commitment to take part in the recommended development.
>
> This approval does not cancel notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(ARP suggests listing here those projects FAA is unconditionally approving).

(3) A "mixed" ALP approval. When the approving FAA official issues a "mixed" ALP approval, the letter must specify those projects that the decisionmaker has unconditionally and conditionally approved. Suggested language for a "mixed" ALP approval is:

> "Due to the various timing of projects depicted on this ALP, I am issuing unconditional and conditional ALP approvals as described below. FAA has completed its environmental reviews of those projects that I have unconditionally approved. For FAA purposes, the sponsor may undertake only those projects that have received that approval. All other projects depicted on the ALP have not yet been environmentally reviewed. Therefore, I have conditionally approved them. For FAA purposes, the sponsor is not authorized to construct those projects until FAA unconditionally approves them.
>
> Neither approval cancels notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(ARP suggests listing here those actions for which FAA has completed its environmental review (unconditionally approved) and those for which it has not (conditionally approved)).

203. AIRPORT LOCATION APPROVAL. An approving FAA official may approve an airport sponsor's request for first-time Federal aid for a public use airport listed in the NPIAS (see paragraph 9.b of this Order) at a location where no airport exists. However, the approving FAA official cannot do so until the responsible FAA official completes the proper environmental review. If an airport sponsor selects an airport location during the early stage of a master plan study, the environmental document prepared for the request for Federal aid must have the information necessary for FAA to analyze the proposed action and its reasonable alternatives. This information enables the approving FAA official to make an informed decision about funding for the site, the action's expected environmental impacts, and any required mitigation.

204. LAND ACQUISITION.

a. General. Airport sponsors may have the authority to buy or condemn land bordering their existing airports or to build a new airport at a new location without prior FAA approval. Title 40 CFR 1506.1(a) and (b) note that, until a Federal agency issues its Record of Decision, neither the agency or the applicant, respectively, may take action concerning any proposal that would have adverse environmental impact or limit the choice of reasonable alternatives.

b. FAA responsibilities. When ARP is notified or becomes aware of the possibility that an airport sponsor is about to buy land before ARP completes its NEPA process, the approving FAA official must advise the sponsor that:

(1) Actions that are inconsistent with the environmental policies of this Order could prejudice or preclude a favorable ARP decision on proposed changes in airport

layout or development that would use the land the sponsor bought or condemned or on sponsor requests for reimbursement for the property. and

(2) ARP will take appropriate action to insure that it achieves the objectives and meets the procedures of NEPA and applicable federal laws by:

(a) Carefully considering if the land acquisition would have adverse environmental impacts or limit the choice of reasonable alternatives, based on the manner in which the sponsor obtained the property before ARP makes any decision approving future FAA actions involving the property.

(b) Paying special attention to ARP responsibilities under Section 4(f) of the Department of Transportation Act to insure that a special effort is made to preserve the natural beauty of the countryside, public parks and recreation areas, wildlife and waterfowl refuges, and historic sites. and

(c) Paying special attention to sponsor actions involving wetlands, floodplains, coastal zones, endangered species, properties eligible for inclusion on the National Register of Historic Places, the provisions of Title VI of the Civil Rights Act of 1964, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Areas*, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended.

c. Sponsor responsibilities. ARP will require a sponsor who has acquired or condemned land without prior FAA approval to demonstrate to the approving FAA official's satisfaction that the purchase was consistent with the environmental policies in this Order. The sponsor must also demonstrate that the purchase has not prejudiced the ARP's full and objective consideration of alternatives or limited possible implementation of a preferred alternative.

205. JOINT-USE OR MILITARY CONVERSION PROGRAMS. Public agencies may receive surplus, Federally-owned property for use as a public-use airport. The most current version of FAA Order 5150.2A, *Federal Surplus Property for Public Airport Purposes*, describes FAA's role in this process. Normally, the military service operating the base would be the lead agency for NEPA purposes. FAA would assume a cooperating agency role because of its expertise in determining the requirements for a publicly-owned, public use airport and the acreage needed for that development. In doing so, ARP must work closely with the lead agency and other agencies to fulfill its cooperating agency role.

206. CONVEYANCE OF OTHER UNITED STATES GOVERNMENT LANDS. Under 49 USC 47125(b), FAA may request another Federal agency to convey federally-owned land or airspace to an airport sponsor. FAA makes this request when it is necessary to carry out an airport development project at a public-use airport, to operate a public-use airport, or to develop an airport under the NPIAS. The Federal agency controlling the land will decide if the requested conveyance is consistent with its needs

and will notify FAA of its decision within four months after receiving FAA's request. FAA may not make conveyance requests for lands within national parks, national wildlife refuges, or other areas. FAA will not do so because these conveyances do not apply to land (or airspace) the Federal Government controls in a national park, national monument, national recreation area or similar area under the jurisdiction of the National Park Service. In addition, the conveyances do not apply to refuges under the jurisdiction of the U.S. Fish and Wildlife Service or a national forest or Indian reservation (see 49 USC 47125 (b)(1) – (3)).

a. FAA instructions on transferring Federally-owned lands. FAA Order 5170.1, *Transfer of Federal Lands, Section 23, of the Airport and Airway Development Act of 1970* (or later revisions), presents FAA's procedures for these land transfers. The Order states:

> "Where there is other Government land adjoining the land being requested for an airport, an easement interest should be requested as necessary to protect the airport. This involves enough control to clear and protect the aerial approaches to the airport, to maintain freedom from electronic interference, or smoke-producing activities, and the right to overfly any land or any interest therein necessary to insure that such land is used only for purposes which are compatible with the noise levels of the operation of a public airport."

b. Airport sponsor documentation. The airport sponsor's conveyance request to FAA must include an EA, unless the proposed use of the conveyed land is either unchanged or the use is a categorical exclusion (see FAA Order 1050.1E, paragraph 307.c or Chapter 6, Tables 6-1 and 6-2 of this Order).

c. FAA's role. The responsible FAA official must consult with the Federal agency controlling the land. This assures that the environmental documentation for the proposed airport's use of the conveyed land meets the controlling agency's needs as well as FAA's. When the actions of the FAA and the agency controlling the land are connected, both agencies should cooperate to prepare a single NEPA document. If an EA or an EIS is needed, FAA may either act as joint lead agency with the controlling agency or as a cooperating agency with jurisdiction by law. FAA may request more information from the airport sponsor to complete its environmental impact analysis.

(1) The approving FAA official may include environmental mitigation measures as covenants in the deed or patent transferring the land. The AIP Grant Agreement for a proposed action may also include those covenants.

(2) To address the requirements of FAA Order 5170.1, *Transfer of Federal Lands*, the responsible FAA official must evaluate the need to buy more tracts necessary to ensure adjoining areas have airport compatible land uses.

207. RELEASES OF AIRPORT LAND.

a. General. An airport sponsor incurs specific obligations to use land for airport purposes when it accepts:

(1) AIP financing to buy land for airport development.

(2) AIP financing for any AIP-eligible airport development. or

(3) A conveyance of Federal surplus property.

If an airport sponsor no longer needs airport land for aeronautical purposes, the sponsor may request that FAA release the land for sale or long-term lease for non-aeronautical uses.

b. Long-term leases. For purposes of this Order, airport land includes long-term leases for airport properties. In addition, FAA Order 5100-38C[2], paragraph 711.c.(2) defines title to airport land to include a long-term lease provided, among other things, the lease has a minimum duration of 20 years from the date of the AIP grant. Therefore, before an airport sponsor may convert land dedicated to airport use (i.e. aeronautical activities and airline services) to non-aeronautical, revenue producing use (e.g., concessions, providing public shelter, ground transportation, food, or personal service businesses) under a long-term lease, the sponsor must obtain ARP approval. ARP must also release the sponsor from its federal grant assurance obligations addressing the uses of the land.

c. ARP's approval. When an airport sponsor seeks ARP approval to sell, lease or release airport land, the approving FAA official must decide if ARP will approve the airport sponsor's request and if ARP will release the airport sponsor from AIP grant obligations pertaining to the uses of that land. As part of this decision, the responsible FAA official must complete the following steps.

(1) Land use restrictions and covenants. The responsible FAA official must concur that the airport has kept adequate restrictions and covenants necessary for safe, efficient airport operations and noise compatibility purposes. The conveyance agreement and documents must contain adequate terms stating the purchaser/lessee (grantee) will adhere to all applicable laws for the use or development of the released land (e.g., environmental requirements, obtaining all necessary permits, etc.).

(2) Enforcement. The responsible FAA official must consider the extent of the Federal government's ability to enforce required restrictions and covenants after the airport land is released.

[2] *Airport Improvement Program Handbook*, June 28, 2005.

(3) Title covenants. The responsible FAA official must review title covenants currently protecting aviation and determine ARP's ability to enforce these covenants after it allows the airport sponsor to release the land.

(4) Potential uses of the land. The responsible FAA official must analyze the environmental effects of the proposed release. To do so, the official evaluates the intended, reasonably foreseeable uses of the land. Therefore, the airport sponsor must advise the responsible FAA official of and provide information on the known plans for use of that land when the sponsor submits its request to FAA for release of the airport land. If none exists, the sponsor should provide zoning information for the land to show potential uses of the released land. This helps the official determine the likely, reasonably foreseeable land uses and make reasonable assumptions about the land uses local authorities would allow on the released land. This zoning information provides the best available information for FAA's evaluation of potential environmental impacts that would occur if FAA approves the land release.

(5) Environmental analysis. The responsible FAA official should review the submitted information and any necessary supplemental information needed to properly evaluate environmental effects of the subsequent use of the land the sponsor wishes to release. The official should then determine the proper NEPA process for the release.

(a) Categorical exclusion. Normally, FAA would categorically exclude land release requests (FAA Order 1050.1E, paragraph 307.b. and Chapter 6, Tables 6-1 or 6-2 of this Order). However, after reviewing the reasonably foreseeable uses of the property and extraordinary circumstance (see Chapter 6 and Table 6-3) on a case-by-case basis, the responsible FAA official may decide that an EA, at a minimum, is needed. For example, a proposed release of airport land for use as an industrial complex or a shopping mall may require air quality data and analyses associated with those land uses.

(b) Contents of an EA or EIS. In preparing EAs or EISs for these actions, the airport sponsor or the responsible FAA official, as appropriate, must coordinate with the Federal, state, and local agencies or Tribes having jurisdiction or special expertise regarding the environmental resources the release would affect.

1. The EA or EIS must show the airport sponsor or FAA has coordinated with the proper resource agency(ies) or tribes. Proof may be copies of agency and tribal comments and the airport sponsor's replies to those comments.

2. The EA and FONSI or EIS and ROD may include necessary mitigation measures. If the intended purpose of the released land meets needed mitigation measures, and an earlier approved environmental document addressed the measures, the responsible FAA official may use information from that document. The responsible FAA official may also use written re-evaluations of the document if appropriate (see Chapter 14 of this Order). Beyond environmental conditions, ARP should also include measures to protect the right of flight over the released land, if the approving FAA official decides these measures are needed. Such measures may include

the right to cause aircraft noise over the released land. They may also ban actions or erecting obstacles on the released land that could interfere with safe, efficient aircraft movement.

3. When FAA is not the lead agency for the release of airport land, it must be a cooperating agency or a joint-lead agency. When FAA is a cooperating agency, the approving FAA official may adopt the lead agency's environmental document, under 40 CFR 1506.3. To adopt the document, the responsible FAA official must independently review the document and determine its adequacy for FAA's purposes.

208. AIRPORT ACTIONS SIGNIFICANTLY AFFECTING A FOREIGN COUNTRY. When a proposed action is under the jurisdiction of the United States, NEPA requires analysis and disclosure of transboundary impacts.[3] FAA must comply with Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*, dated January 4, 1979, when a major Federal action may cause significant environmental effects on a foreign country.

a. General. The Executive Order requires each Federal agency to set up internal procedures to address major Federal actions significantly affecting the environment outside the geographical borders of the United States, its territories, and possessions. The Executive Order applies when the affected nation does not join in or have any involvement in the action. The Executive Order:

(1) Heightens the approving FAA official's awareness of and interest in a foreign country's environmental concerns.

(2) Ensures the approving FAA official considers a proposed action's significant environmental effects on a foreign country during FAA's decision making process. and

(3) Promotes environmental cooperation between the United States and the affected country.

b. Responsible FAA official duties. The Executive Order and FAA Order 1050.1E, paragraph 521, provide more information on this issue. Paragraph 16 of the Executive Order requires the responsible FAA official to coordinate initial correspondence addressing environmental studies or documentation with the Department of State (DOS). For airport actions, ARP's Airports Planning and Environmental Division (APP-400) will conduct the coordination with the U.S. Department of Transportation's Office of Transportation Policy and Development (P-100), per Order 1050.1E, paragraph 521f. After DOS makes initial contact with the affected country, the responsible FAA official may directly forward to the affected country's civil aviation authority all requests for more information needed to prepare the EIS. As a courtesy,

[3] *Council on Environmental Quality Guidance on NEPA Analyses for Transboundary Impacts*, July 1, 1997, memo.

APP-400 will provide copies of public hearing notices (if one is held) and copies of a draft and final EIS to that authority and the affected country's embassy in Washington, D.C.

c. Addressing substantial differences. The responsible FAA official should refer any substantial differences between the foreign country and FAA on the proposed action's significant environmental impacts to APP-400. In resolving these differences, APP-400 will consult the FAA Assistant Administrator for International Aviation (API) and, if necessary, the U.S. Department of Transportation.

d. Actions not causing a significant impacts. When the responsible FAA official determines the proposed airport development action or other airport action would not cause significant impacts abroad, the official must prepare a memorandum to API. The document must provide the underlying reasons for that determination. The responsible FAA should send the memorandum to APP-400, which will ensure API receives it.

209. NEPA REQUIREMENTS AND WILDLIFE HAZARD MANAGEMENT PLANS. Title 49 USC 44706 discusses FAA issuance of airport operating certificates to ensure safety in air transportation.

a. Wildlife hazard management plans (WHMPs). To implement section 44706, 14 CFR Part 139 prescribes rules governing the certification and operation of airports. Section 139.337 discusses the need to manage wildlife hazards on or near airports when aircraft collide with wildlife or birds or the size of wildlife or bird populations could cause collisions. When the FAA Administrator determines that an airport sponsor operating a certificated airport must prepare a WHMP to address these wildlife hazards, the sponsor must submit the WHMP to the Administrator for approval prior to implementation.

b. NEPA requirements. A grant to fund the preparation of a WHMP or the approval of that plan normally qualifies for categorical exclusion under Order 1050.1E paragraph 308e. However, airport layout plan approvals and/or approvals of grants for Federal funding to carry out measures in an FAA approved WHMPs include items that may be:

(1) Categorically excluded. or

(2) Require preparation of an environmental assessment or an environmental impact statement.

210. THE STATE BLOCK GRANT PROGRAM.

a. General. In its May 1992 Report to Congress on the State Block Grant Program (SBGP), FAA noted the AIP process was considerably more complex than it was in prior years. The Report noted the complexity was due to ARP's increasing

environmental and sponsor compliance requirements, which had substantially increased AIP-related workload. The Report noted, "…[t] he greater state role [under the SBGP] supplements limited FAA resources available to manage these expanding responsibilities."[4] The enabling statute limits the SBGP to non-primary airports. These are commercial service airports where less than 10,000 people board a commercial aircraft each year (49 USC 47102 (11)).

b. SBGP purpose. Title 49 USC 47128, authorizes FAA's current SBGP. FAA regulations at 14 CFR Part 156 discuss how ARP carries out the SBGP. Since the SBGP is now a permanent part of the AIP, paragraphs 1090–1099 of FAA Order 5100.38C, *Airport Improvement Program Handbook*, provide guidance for administering a block grant made under 49 USC 47128(b)(1).

c. SBGP selection criteria. Before selecting a state for participation in the program, 49 USC 47128(b)(4), requires the Secretary of Transportation to find, "…that the State has agreed to comply with United States Government standards for administering the block grant." The Secretary must also find, "…the State has an organization capable of effectively administering a block grant made under this section" (49 USC. 47128(b)(1)). To ensure SBGP participants meet contractually required Federal safety and other requirements, FAA (ARP) oversees each State's implementation of the SBGP.

d. SBGP agency responsibilities. Airport actions under the AIP that would normally be under ARP's scope (see paragraphs 210.d.(1) – (6)) become State actions under the SBGP. Therefore, states participating in the SBGP are responsible for the following airport actions at their non-primary airports:

(1) Determining the eligibility and timing of airport actions.

(2) Approving SBGP funds to finance airport actions.

(3) Approving ALPs and changes to them.

(4) Approving real property maps attached to ALPs.

(5) Reviewing safety or phasing plans. and

(6) Inspecting the airports for compliance with SBGP grant assurance obligations.

e. SBGP participating states. The SBGP initially included Illinois, Missouri, and North Carolina. Later, Congress authorized FAA to increase the number of participating states to 10 by 2001 and made the SBGP a permanent program (49 USC 47128). By 2001, Michigan, New Jersey, Pennsylvania, Tennessee, Texas, and

[4] *Report to Congress: State Block Grant Program*. FAA. May 1992, p. 43.

Wisconsin had become SBGP participants. Since then, New Jersey has withdrawn from the SBGP.

211. THE SBGP AND NEPA. FAA's approval of block grants to participating states normally qualifies as a categorical exclusion (FAA Order 1050.1E, paragraph 307.o; Chapter 6, Table 6-1 of this Order). After distributing the SBGP grants, ARP has no control, responsibility, or discretion for the use of SBGP funds for airport specific projects under the SBGP. In fact, those airport-specific responsibilities ARP would normally fulfill under the AIP become State responsibilities under the SBGP. Therefore, NEPA and other environmental statutes applicable to "Federal actions" do not apply to airport actions under the SBGP, since there is not major Federal action.

212. STATE BLOCK GRANT AGENCY ENVIRONMENTAL RESPONSIBILITIES. Because FAA does not retain funding for or approval of SBGP actions, actions under the SBGP technically do not qualify as "Federal actions." Nevertheless, FAA, in consultation with CEQ, determined it to be good environmental policy and stewardship to require SBGP states that are not subject to state laws comparable to NEPA to consider the environmental consequences that SBGP actions would cause. As a result, each SBGP has contractually committed to consider the environmental effects of their actions as noted below.

a. Meet the requirements of this Order. This Order describes the duties ARP personnel must fulfill to comply with NEPA. It also mentions special purpose laws outside NEPA that protect specific environmental resources. Therefore, this Order provides SBGP personnel with information they must use to evaluate the environmental effects of SBGP actions in a comprehensive, interdisciplinary manner.

b. "NEPA-like" states or agencies participating in the SBGP. States or agencies having environmental laws similar to NEPA, within the meaning of CEQ 1506.2(c) ("NEPA like" states)[5] have contractually agreed to follow their NEPA-like state laws. The contracts also require these States to meet the requirements of special purpose laws outside NEPA because those special purpose laws would have applied to these airport actions had FAA remained responsible for them. Paragraph 9.t and Table 1-1 of this Order and Order 1050.1E, Appendix A provide information on the special purpose laws.

c. "Non-NEPA-like" states or agencies participating in the SBGP. States or agencies not having environmental laws similar to NEPA ("non-NEPA-like") have contractually agreed to meet the requirements of NEPA in this Order. They must also meet the requirements of special purpose laws outside NEPA that would have applied to the actions, had FAA been responsible for those actions. Paragraph 9.t and Table 1-1 of this Order and Order 1050.1E, Appendix A provide information on the special purpose laws.

[5] North Carolina and Wisconsin are NEPA-like states. See http://ceq.eh.doe.gov/nepa/states.html for more information on NEPA-like states.

d. Substitute text for SBGP actions. When reading the instructions in this Order, SBGP personnel should substitute the words, "SBGP agency personnel" for the words, "responsible FAA official" or "approving FAA official" as needed. In addition, SBGP agency personnel should modify standard text that refers to FAA, FAA personnel, or Federal requirements (e.g., paragraphs 707.f, Figures 7-1 and 8-1, 802.g, 1007.a(1), 1007.a(4)) by substituting appropriate wording. The wording should clearly inform the reader that the State, not FAA, is taking an action or making a finding or decision regarding a particular airport action under the SBGP.

e. Tribal consultation and SBGP actions. When SBGP airport actions have connected actions that remain under FAA's scope (paragraph 213), regional or district Airports office personnel will assist the FAA organization responsible for conducting the government-to-government consultation paragraph 303 of this Order discusses. This will ensure efficient consultation among the SBGP agency, the responsible FAA organization, and the Tribe. For airport projects having no FAA involvement, the SBGP agency is responsible for consulting with the Federally-recognized Tribe; however, regional or district Airports office personnel are available to support the SBGP agency , if needed. Although the Executive Order and the FAA order cited in paragraph 303 apply solely to Federal agencies, the information in paragraph 303 is useful for SBGP purposes. When consulting with Tribes for any reason, ARP recommends that SBGP agencies follow the instructions in paragraph 303 to ensure Tribal consultation occurs in a respectful manner.

f. SBGP actions involving Section 106 of the National Historic Preservation Act, Section 7 of the Endangered Species Act, and Archeological and Historic Preservation Act of 1974 and SBGP actions. When SBGP airport actions have connected actions that remain under FAA's scope (paragraph 213), the FAA organization is responsible for the connected action is responsible for conducting any necessary consultation and fulfilling requirements under these laws. Regional or district Airports office personnel are available to assist the responsible FAA organization as needed. For airport projects having no FAA involvement, the SBGP agency is responsible for complying with these laws as part of meeting their SBGP contractual commitments.

213. FAA OVERSIGHT OF THE SBGP AND ACTIONS CONNECTED TO SBGP ACTIONS. Although Congress authorized FAA to enter into contracts with states to administer the SBGP for certain non-primary airports, FAA remains responsible for the activities listed below and for overseeing the portion of the SBGP for which the participating state is responsible. This oversight is needed to ensure the participant is honoring its commitment to the contractual agreements it made when it became a SBGP participant (see paragraph 212). In addition, various FAA organizations retain oversight and NEPA responsibilities for the actions listed below because the actions are not authorized under the SBGP and are outside its scope.

a. SBGP airport actions for which the SBGP agency requests AIP discretionary funds to supplement SBGP funding for a specific airport project at a specific location and ARP provides those funds.

b. Airport noise compatibility planning, including approval of airport noise compatibility programs under 14 CFR Part 150. (See FAA Order 5100.38C, paragraph 1096.c.).

c. Airport land releases, including approval of such releases.

d. Issuing Part 139 certifications.

e. Installing or moving FAA-owned navigational equipment.

f. Establishing or revising air traffic and flight procedures. and

g. Completing airspace reviews for ALP approval under 14 CFR Part 157 and FAA Order 7400.2E, *Procedures for Handling Airspace Matters*.

Note: The regional or district Airports office overseeing the geographic area where the airport is located is responsible for the connected actions in paragraphs 213. a - d. The regional Air Traffic Organization office is responsible for the connected actions in paragraphs 213.e – g.

214. ENVIRONMENTAL DOCUMENT PREPARATION FOR SBGP ACTIONS. Paragraph 213 lists those actions that may be connected to airport actions that are funded under the SBGP. Because those connected actions are outside the SBGP they remain under the purview of an FAA organization. Consequently, the SBGP agency should work cooperatively with the responsible FAA organization when preparing the necessary environmental document.

a. An EA addressing actions solely under SBGP agency purview. The SBGP agency is solely responsible for preparing the EA. The agency should follow the instructions in paragraph 212 as appropriate.

b. An EA for actions involving an SBGP agency and an FAA organization. Non-ARP organizations remain responsible for actions listed in paragraphs 213.d - f that are connected to an SBGP project. When actions outside the SBGP are connected to an SBGP action, the SBGP agency (or its consultant) will prepare the EA. The responsible FAA organization must independently review and take responsibility for the portions of the EA addressing the connected actions under that organization's authority. The responsible FAA organization will advise the EA preparers of revisions needed to ensure the EA addresses the organization's concerns and environmental needs.

(1) The SBGP agency would prepare the portions of the EA that address the airport actions listed in paragraph 210.d(1) – (6).

(2) Regional or district Airports officer personnel are responsible for the document or portions of it addressing impacts of actions listed in paragraph 213.a – d that are connected to the SBGP action.

(3) Non-ARP organizations are responsible for the document or portions of it addressing impacts of actions listed in paragraphs 213.e– g that are connected to the SBGP.

(4) If a Finding of No Significant Impact (FONSI) is appropriate, the SBGP agency prepares the portion of the FONSI addressing the airport actions specifically under the SBGP. Conversely, the responsible FAA organization prepares the portion of the FONSI for the non-SBGP actions. Then, the SBGP agency and FAA co-approve the FONSI. Here, the FAA organization retains responsibilities and approvals only for the portions of the proposed action not under the SBGP.

c. SBGP actions causing significant impacts. An SBGP action causing significant effects requires an EIS-like document or an EIS.

(1) If an EIS-like document is required because there is no connected Federal action, the SBGP agency should complete the following steps:

(a) If the action would occur in a "NEPA-like state," the SBGP agency follows instructions in paragraph 212.b.

(b) If the action would occur in a state not having "NEPA-like laws," the SBGP agency follows the instructions in paragraph 212.c.

(c) As needed, the SBGP may request help from the appropriate regional or district Airports office. Although those offices are not responsible for preparing the document, they have experience that may aid the SBGP agency in preparing the document. Airports office involvement may also help ensure efficient information exchanges and proper consultation among the SBGP, agencies, and interested parties occurs.

(2) If an EIS is required because there is a connected Federal action that remains under an FAA organization's purview, the SBGP agency follows the instructions in paragraphs 214.c (1) (a) or (b), as appropriate. In addition:

(a) The FAA organization responsible for the connected action will be a joint-lead agency with the SBGP agency to ensure the document also meets the requirements of Order 1050.1E or Order 5050.4B, as appropriate.

(b) If no regional or district Airports office is involved in the SBGP action, the SBGP and/or the FAA organization should note that these Airports offices are available to assist in the NEPA process. Although they are not responsible for preparing the document, these offices have substantial experience in preparing EISs for airport actions. Their experience may also help ensure efficient information exchanges and proper consultation among the SBGP, the FAA organization, agencies, and interested parties occurs.

215. - 299. RESERVED.

CHAPTER 3. AGENCY AND TRIBAL COORDINATION

300. IMPORTANCE OF COORDINATION. Coordination with resource agencies and, as appropriate, Tribal representatives is not only necessary, but is essential in completing the NEPA process in a timely and effective manner. This coordination facilitates FAA's evaluation of action-related environmental impacts by:

a. Providing important information to an airport sponsor and FAA about site-specific concerns and issues.

b. Identifying potential adverse impacts to environmentally sensitive resources, alternatives to avoid or reduce impact severity, and measures to conceptually mitigate those impacts.

c. Helping to lessen the likelihood of delays due to agency or Tribal opposition to the proposed Federal action.

d. Avoiding delays by resolving conflicts between FAA and agencies or Tribes concerning alternative uses of available resources.

e. Reducing duplicate efforts.

f. Reducing the need to extensively revise an EA or EIS to address their concerns. and

g. Improving the likelihood that a single environmental document would adequately meet lead and cooperating agency requirements.

301. EARLY COORDINATION IN THE ENVIRONMENTAL REVIEW PROCESS. Under 40 CFR 1501.4, Federal agencies must:

> "…involve environmental agencies, applicants, and the public, to the extent practicable, in preparing [environmental] assessments."

Therefore, when conducting the NEPA process, FAA and the airport sponsor, as appropriate, should begin early coordination with the proper Federal, State, Tribal, and local agencies, including surrounding municipalities, to determine each agency's environmental concerns. This effort helps to eliminate duplication and helps to ensure NEPA documents address major issues concerning those interested parties.

302. STATE AND LOCAL REVIEW PROCESSES. Including State and local resource agencies and municipalities in the environmental process is critical to successfully meeting NEPA's public involvement requirements and making the NEPA process more efficient. This effort helps address issues conflicting with local planning processes (40 CFR 1506.2). In addition, these agencies are often valuable sources of information about environmental resources and concerns in the project area.

a. Procedures for State and local reviews of airport actions. Airport sponsors should note that each state might have specific processes for reviewing Federal actions.

(1) Airport sponsors and the responsible FAA official should use the review process established in the state where the project would occur. State and local agencies, municipalities, and zoning authorities have knowledge about statewide and area-wide comprehensive plans. Airport sponsors, and ARP planners and environmental specialists should consider these plans when designing proposed, Federally funded airport projects. This helps ensure the proposed actions will meet the goals of those plans, since compatibility with local plans is a crucial factor in ARP's decision process.

(2) As encouraged by the Office of Management and Budget, some states have established a "single point of contact" to coordinate State or local reviews. Where this "contact" exists, sponsors should ask the contact to notify agencies having responsibilities for or expertise on potentially affected resources. If the sponsor or regional or district office ARP staffs know certain agencies or members of the public are interested in the action, they should provide this information to the contact to hasten information distribution.

b. Timing consultation. When an airport project is being proposed, the responsible FAA official and the airport sponsor, as appropriate, should begin consultation as soon as possible. Normally, this would be when the sponsor's early planning information is sufficient to describe the proposed action and a preliminary scope of the action's expected environmental impacts. When a schedule for the NEPA process has been established at the airport sponsor's request, ARP recommends the approaches noted below to help the responsible FAA official complete the NEPA process according to the schedule. At a minimum, a sponsor seeking AIP financing or ALP approval for a proposed airport action should begin consulting with FAA, the agencies, or the single point of contact. If consultation with a Federally-recognized Tribe is needed, the responsible FAA official must conduct that consultation as described in paragraph 303.

(1) When requesting discretionary funding for an action that is normally a categorical exclusion. Sponsors should provide the responsible FAA with information about a proposed action and its associated impacts (extraordinary circumstances by April 30th of the fiscal year (FY) *preceding* the FY in which the sponsor is requesting discretionary funding. This should provide the official with enough time to determine if a proposed airport action maybe categorically excluded.

(2) When requesting discretionary funding for an action normally requiring an EA. Sponsors develop a schedule that provides them enough time to submit a final, FAA-accepted EA by April 30th of the FY *preceding* the FY in which the sponsor is requesting discretionary AIP funding.

(3) When requesting approval of an ALP change but not discretionary or entitlement funding. Sponsors should consult with the responsible FAA official to determine the time needed for the official to complete the appropriate NEPA process, while trying to accommodate the sponsor's schedule.

303. GOVERNMENT-TO-GOVERNMENT RELATIONS WITH NATIVE AMERICAN TRIBAL GOVERNMENTS. Executive Order 13175, *Consultation and Coordination With Indian Tribal Governments*, dated November 6, 2000, provides instructions to *Federal* agencies about relations with Federally-recognized Native Americans (i.e., Alaska Natives and American Indians). The Executive Order requires FAA, to the extent practicable and allowable by law, to consult Tribal governments before taking actions that could significantly or uniquely affect them. In addition, FAA must assure FAA policies, programs, and activities properly address a Tribe's concerns regarding its rights or potential impacts on tribal trust resources.

a. Conducting these consultations. The responsible FAA official must conduct open and candid consultation in a manner respecting Tribal sovereignty. FAA Order 1210.20, *American Indian and Alaska Native Tribal Consultation Policy and Procedures*, dated January 28, 2004, provides specific guidance for FAA personnel on how to conduct those government-to-government consultations for FAA activities.

(1) The responsible FAA official should begin the consultation as soon as FAA knows enough about the proposed action to present a list of potential environmental issues to the Federally-recognized Tribe. This ensures FAA knows of Tribal concerns early in project development when the greatest range of alternatives exists. It also allows the Tribe to present its concerns and information in a timely manner to ensure FAA fully considers issues of tribal importance.

(2) When FAA engages in consultations, the responsible FAA official must provide a current record of this and all other consultation conducted with Federally-recognized Tribes to comply with FAA Order 1210.20, section 8b. The responsible FAA official should provide the record to Regional Tribal Consultation Official for the region where the action would occur. The Tribal Consultation Official will include that information in FAA's Tribal Consultation Reporting database.

b. Assistance. The following sources provide more information on conducting required consultation.

(1) Department of Transportation's Office of the Assistant Secretary for Aviation and Intergovernmental Affairs (X-1).

(2) Environmental Protection Agency's Office of Environmental Justice, American Indian Environmental Office.

(3) FAA's Federal Historic Preservation Officer or Regional Tribal Consultation Officials.

304. USING INFORMATION FROM THE AGENCY AND TRIBAL REVIEW PROCESSES. The airport sponsor or FAA, as appropriate, should consider comments and recommendations they receive through the State, local, and Tribal review processes. Final copies of EAs or EISs must contain those comments or recommendations and the sponsor's or

FAA's responses to them. Paragraph 707.d of this Order discusses how to resolve issues an EA addresses. Paragraph 1201 addresses how to respond to comments on DEISs. That information is also useful for EAs.

305. – 399. RESERVED.

CHAPTER 4. PUBLIC PARTICIPATION

400. PUBLIC PARTICIPATION. Like many infrastructure projects, most airport development triggers public interest, especially in those areas that would sustain development-related environmental impacts. It is through this public participation that Federal agencies disclose information about the proposed action, reasonable alternatives, and expected environmental effects. This participation also provides the Federal decision maker with information about issues most important to the public that the proposed action and its reasonable alternative(s) would affect.

401. FAA'S COMMUNITY INVOLVEMENT POLICY. FAA has a community involvement policy (FAA-EE-90-03, August 1990). That policy recognizes community involvement as an essential part of FAA programs and decisions. ARP, like each FAA office, must incorporate open, effective community involvement to achieve the following goals and tasks.

a. Provide active, early, and continuous public involvement and reasonable public access to information that accurately describes a proposed project and its environmental effects.

b. Ask for and consider public input on plans, proposals, alternatives, impacts, and mitigation.

c. Use public involvement techniques designed to meet the needs of different interest groups and individuals.

d. Promote an active public role to lessen potentially adverse community reaction to agency actions needed for safe, efficient aviation.

402. PUBLIC PARTICIPATION UNDER THE AIRPORT IMPROVEMENT PROGRAM (AIP). An airport sponsor submitting an application for AIP funding to build one of the airport projects listed in paragraphs 402.a – c must afford the public with an opportunity for a hearing under 49 USC 47106(c)(1)(A)(i). The sponsor must certify to the Secretary of Transportation that it has provided the public an opportunity for a public hearing to consider the economic, social and environmental effects of its actions (see paragraph 404.b). The responsible FAA official should ensure an environmental document prepared for the actions listed below discusses the airport sponsor's steps to comply with section 47106(c)(1)(A)(i).

a. A new airport.

b. A new runway. or

c. A major runway extension.

To streamline the public involvement activities, ARP uses its NEPA public involvement process as "framework" to comply with this requirement.

403. PUBLIC PARTICIPATION REQUIREMENTS UNDER NEPA AND SPECIAL PURPOSE LAWS. CEQ gives Federal agencies instructions on NEPA's public involvement process at 40 CFR 1506.6. In addition, many special purpose laws applicable to airport projects (see paragraph 9.t of this Order) require notice and opportunity for public involvement. One way to effectively meet public participation requirements is to conduct a public hearing (see paragraph 404).

a. Factors to consider when deciding if a public hearing is warranted for NEPA purposes. A public hearing is a gathering under the direction of a designated hearing officer for the purpose of allowing interested parties to speak and hear about issues of concern to interested parties. Title 40 CFR 1506.6(c), states that public hearings should be held whenever appropriate or to meet statutory requirements applicable to an agency. To determine if a public hearing is warranted under NEPA, the responsible FAA official or airport sponsor should consider these following factors:

(1) Is their substantial environmental controversy concerning the proposed action or is there substantial interest in holding the hearing (CEQ 1506.6(c)(1))?

(2) Has another agency with jurisdiction over the action requested a public hearing, and has that agency supported its request with reasons a hearing would be helpful (CEQ 1506.6(c)(2))?

b. Public participation and hearings for special purpose laws. In addition to NEPA, airport projects may trigger other public participation requirements of various special purpose laws. For example, Executive Orders on Floodplains and Wetlands, 11988 and 11990, respectively, and regulations addressing National Register-listed or eligible historic properties at 36 CFR Part 800 require an opportunity for public review of actions that could affect those resources. Often, ARP uses its NEPA public involvement process as the "framework" to coordinate the various public involvement requirements of these special purpose laws. In addition, the sponsor or responsible FAA official may conduct a hearing during State, local, or Tribal review processes that paragraphs 302 and 303 discuss. If those processes occur before the hearing occurs, the airport sponsor or the responsible FAA official should make the comments they received from State or local agencies, or Tribes available at the hearing.

404. NOTICE OF OPPORTUNITY FOR A PUBLIC HEARING. When a sponsor provides an opportunity for a public hearing to comply with 49 USC 47106(c)(1)(A)(i) the following must occur:

a. Publish notice. The airport sponsor must publish a "Notice of Opportunity for a Public Hearing." The notice must appear in an area-wide or local newspaper having general circulation. The notice should contain the following information:

(1) A statement of the sponsor's intent to undertake the proposed action.

(2) A concise description of the proposed action.

(3) A concise statement that the hearing's purpose is to address the proposed actions, potential economic, social, and environmental and the project's consistency with the goals and objectives of each affected area's land use or planning strategy.

(4) The locations and times where the draft environmental assessment (EA) or draft environmental impact statement (DEIS) will be available for public review to allow the public to prepare for the public hearing. The draft documents must be available for review at least 30 days before the hearing occurs.

(a) Environmental assessment (EA). When an airport sponsor is preparing an (EA), the sponsor should file a draft EA with FAA for review before a public hearing occurs. After changing the EA to reflect FAA's concerns, the sponsor must make the draft available for public review before the public hearing occurs. This ensures that the EA the public will review accurately reflects FAA policy and concerns.

(b) Environmental impact statement. The responsible FAA official should ensure the DEIS FAA prepares for an action meets the requirements of this order and other applicable Federal environmental requirements. This ensures the EIS accurately reflects FAA policy and concerns. and

(5) A statement that anyone interested in the project has up to 15 days from the date the Notice of Opportunity for a Public Hearing is issued to request a hearing.

b. Hearing opportunity to meet NEPA or special purpose law public involvement requirements. The responsible FAA official or airport sponsor should follow the procedures in paragraph 404.a if a public hearing or meeting will be held to meet public involvement requirements. If the sponsor or the responsible FAA official provides an offer for public hearing for an action but no one requests a hearing the sponsor or FAA official should follow the instructions in paragraph 405.

405. WHEN THERE IS NO REQUEST FOR A HEARING. Sometimes, the airport sponsor or the responsible FAA official provides an opportunity for public hearing, but no one requests a hearing.

a. When the sponsor offers the meeting to comply with 49 USC 47106(c)(1)(A)(i). The sponsor must certify to the responsible FAA official in its grant application that it published a "Notice of Opportunity for a Public Hearing." The responsible FAA official should place the certification in the project's Administrative Record.

b. When the FAA or airport sponsor offered the opportunity for a public hearing to meet NEPA or special purpose law requirement. The responsible FAA

official should include in the Administrative Record a copy of the hearing notice and the reasons the hearing was not held.

406. RESPONSIBILITIES WHEN A PUBLIC HEARING WILL OCCUR.

a. Benefits of public hearings. During a public hearing or meeting, agencies, the public, or Tribes having an interest in a proposed Federal action gather information about a proposed action and other issues related to the action. For example, a hearing or meeting provides those parties with a forum to discuss preliminary information concerning an action's potential economic, social, and environmental effects. Hearings or meetings also provide occasions to consult with a Metropolitan Planning Organization and discuss an action's reasonable consistency with the affected community's completed or proposed planning objectives.

b. Notice of Public Hearing. When, a public hearing is deemed appropriate, the deciding party should publish a "Notice of Public Hearing." This notice informs the public that a hearing will occur. This notice must appear in the same newspaper(s) that published the "Notice of Opportunity for a Public Hearing" and must appear at least 30 days before the date the hearing will occur. The "Notice of Public Hearing" must include all of the following:

(1) The information discussed in paragraphs 404.a(1) – (4).

(2) The hearing's date, time, and location. If, for some reason, the Notice of Public Hearing does not contain this information, the sponsor or FAA must publish this scheduling information at least 15 days before the date the hearing will occur.

(3) Based on information in the draft EA or EIS available for public review (see paragraph 404.a(4), a list of potentially affected environmental resources.

(4) A statement that interested parties should send written comments to the sponsor or FAA within the 10-day period following the date the hearing occurs or by the end of the NEPA document comment period, whichever is later.

c. Hearing transcripts and comments. Decision makers need accurate information about major public concerns made during public hearings. Public hearing transcripts are ways to provide that information. Therefore, the airport sponsor must place a copy of the hearing transcript in the project record. The airport sponsor must provide FAA a copy of the transcript when asked to do so. If FAA conducts a public hearing, FAA will provide the sponsor a copy of the meeting transcript. The responsible FAA official should file the transcript in the project's Administrative Record.

d. Summarize issues. An appendix accompanying the final version of an EA or EIS should include a detailed summary of issues raised during the public hearing and responses to those issues. Neither document needs to contain a hearing transcript.

407. - 499. RESERVED.

CHAPTER 5. AIRPORT PLANNING AND NEPA

500. AIRPORT ACTIONS SUBJECT TO NEPA.

a. General. Paragraphs 9.g(1) – (11) of this Order lists those airport activities that are Federal actions. Before making a decision on these actions, the Office of Airports (ARP) must complete the NEPA process. This process is an independent, Federal decision making process requiring public disclosure of critical planning and environmental information regarding the proposed action and its reasonable alternatives. The approving FAA official uses this information and considers public concerns when making decisions about a proposed airport action.

b. NEPA document choices. The responsible FAA official must clearly identify potential environmental impacts the proposed action and its alternatives may cause. Based on the proposed airport project and its environmental effects, the responsible FAA official decides if the Federal action qualifies as a categorical exclusion or if an environmental assessment (EA) or an environmental impact statement (EIS) is required. [1]

501. PROJECT PLANNING AND NEPA. To achieve NEPA's intent, 40 CFR 1501.2 states:

> "Agencies shall integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head-off potential conflicts."

a. Environmental factors and planning. Conflicts noted in the regulation could range from community concerns about aircraft noise to an action that poses a legal barrier to ARP approval, such as a Jeopardy Opinion for a Federally-listed endangered species. Since airport planners are responsible for planning projects at their airports, it is critical that they note the requirements of 40 CFR 1501.2. Doing so promotes intensive, scrutiny of reasonable alternatives meeting airport needs while avoiding or reducing potential environmental impacts and conflicts those alternatives could cause (see paragraph 504.d).

b. Early FAA contact is critical. ARP experience shows that delays in the NEPA process may occur when airport planning is not properly conducted. Therefore, during early project planning, it is critical that the airport sponsor critically analyze a project's goal, the data supporting that goal, reasonable ways to achieve the goal, and the environmental issues surrounding the alternatives considered to achieve that goal.

(1) Chapter 5 (Environmental Considerations) of FAA's Advisory Circular (AC) 150/5070-6, *Airport Master Plans*, urges sponsors to work with FAA airport planners and environmental specialists early in project planning. Environmental specialists have knowledge

[1] Chapters 6, 7, and 9 of this Order, respectively, discuss these NEPA documents in detail.

about environmental impacts associated with airport projects and the environmental concerns resource agencies, Tribes, and the public normally present about those projects.

(2) This early contact is intended to identify potential major environmental impacts and concerns early in planning, especially when an airport sponsor proposes a complex or controversial airport action. This step often reduces the probability that airport planning efforts or the subsequent environmental analyses and NEPA document will require time-consuming changes to address planning or environmental issues or concerns not clearly identified early in airport planning.

c. Interdisciplinary approach. To complete this interdisciplinary effort, planners, engineers, and environmental specialists should review maps, aerial photographs, existing permit application records, or other environmental documents containing information on the airport's locale. ARP's Best Practices website[2] and the AC provide more details on coordinating early airport planning and the environmental process. This early, interdisciplinary approach discussed above should make airport planning and NEPA processes more efficient because it:

(1) Promotes the coordinated consideration of reasonable alternatives under FAA's or the sponsor's authority when the widest range of alternatives exists.

(2) Promotes awareness of environmentally sensitive resources and the special analyses or coordination needed to resolve adverse effects on those resources.

(3) Provides planners and designers with opportunities to change facility plans or develop alternatives that reduce the need for later costly, complex, or delay-inducing changes in project design necessary to protect environmentally sensitive resources. and

(4) Helps ARP and the airport sponsor identify planning and financial issues.

Note: Although this chapter discusses the critical relationship of a master plan and the NEPA process, it is not a substitute for FAA AC, 150/5070-6. The AC provides greater detail on airport planning principles.

502. WHY PLANNING INFORMATION IS IMPORTANT TO THE NEPA PROCESS. Airport planning information is the backbone of a proposed airport action. As noted earlier, it is critical to complete the NEPA process efficiently and effectively. ARP airport planners are responsible for reviewing the sponsor's proposed actions and alternatives for consistency with FAA's airport planning and design standards. Those planners approve only projects meeting those standards, unless they determine the projects warrant modifications to those standards. The Purpose and Need is developed during the NEPA process after considering FAA's statutory mission and the sponsor's goals and objectives. Among other uses, planning information helps the sponsor or ARP during the NEPA process to:

[2]http://www.faa.gov/airports_airtraffic/airports/environmental/eis_best_practices/

a. Define the airport sponsor's proposed project.

b. Describe the purpose and need and identify reasonable alternatives to address the purpose and need.

c. Provide analyses of potential environmental impacts the proposed project and its reasonable alternatives could cause. and

d. Develop the full scope of reasonably foreseeable airport development that is critical to the Federal action's cumulative impact analysis.

503. AIRPORT PLANNING INFORMATION CRITICAL TO THE NEPA PROCESS.

a. Important airport planning data. Because they influence impact analyses, some of the most important planning data for NEPA purposes include:

(1) An inventory of existing conditions and facilities.

(2) An airport layout plan (ALP) showing proposed development.

(3) Planned project linkages versus independent utility.

(4) Aircraft operation and enplanement (boarding passengers) forecasts.[3]

(5) The design aircraft and fleet mix to accommodate those forecasts.

(6) The airport's existing capacity to accommodate those forecasts.

(7) Facility requirements needed to accommodate those forecasts.

(8) Timing and phasing of the projected necessary airport development.

(9) Runway utilization and flight tracks. and

(10) An airspace analysis.

b. The need for current, technical information. Current, technically acceptable planning information is critical to airport planning and accurate, efficient environmental analyses and document preparation. Failure to provide this information causes the problems listed in paragraph 503.(b)(1) – (3). Airport sponsors, ARP, and consultants must ensure that planning information is technically valid, based on accepted assumptions and methods, and current

[3] Refer to paragraph 504.b for acceptable deviation limits between a sponsor's forecasts and FAA's Terminal Area Forecasts.

operational and/or passenger forecasts. This helps the sponsor and ARP determine that proposed facilities, their costs, and their potential environmental effects are warranted, and that they are based on accurate airport operation or enplanement forecasts. Paragraph 504.b discusses this further.

(1) If data are not current or technically acceptable, the proposed project and reasonable alternatives or the analyses related to them will need to be modified.

(2) Updating these data so they accurately reflect an airport's needs often requires repeating earlier, costly environmental analyses that were based on outdated or technically insufficient information.

(3) This duplication and the lost time it requires delay FAA's decision making process, the airport sponsor's schedule, and the airport's ability to efficiently meet air projected transportation needs.

c. Noise. Noise from airport projects is often the public's primary concern. Therefore, a master plan addressing proposed airport development should consider whether the proposed project would increase noise impacts over noise sensitive land uses around the airport (see paragraph 9.n of this Order). If so, then the master plan should highlight these potential impacts.[4] (See paragraph 706.g(3) for information about incorporating Part 150 noise mitigation in a proposed action).

d. Evaluate and adjust planning as needed. Proposed Federal actions should be evaluated and adjusted continually as planners and environmental specialists collect more information during the planning process. This will promote the accuracy, efficiency, and effectiveness of the subsequent NEPA process.

504. KEY MASTER PLAN STEPS THAT AID THE NEPA PROCESS. An airport sponsor developing a master plan that accurately reflects needed airport improvements should focus on the following steps.

a. Meet with ARP regional or district office personnel. Early in a project's planning phase, the airport sponsor and its planners should meet with the appropriate ARP regional or district office's planners and environmental specialists. As noted in paragraph 501, this early coordination allows ARP staff to view the initial, conceptual plan and highlight potential environmental issues airport planners need to consider. Information exchanged among the sponsor, planning consultants, and environmental specialists fosters effective, efficient airport planning. It also promotes completing the subsequent NEPA process in a timely, efficient manner.

[4] Noise exposure maps and noise compatibility plans prepared under 14 CFR Part 150 provide valuable information about an airport's present and future noise levels and land uses exposed to those levels in the airport vicinity.

b. Develop good aviation forecasts. The sponsor's airport planners should establish valid aviation forecasts and the forecasts' resulting airfield demands to aid in efficient environmental analyses. As noted in paragraph 503, accurate, current aviation forecasts are the "backbones" to efficient, accurate environmental analyses. Forecasts that are too high or too low will jeopardize the NEPA and decision making processes by affecting environmental and funding decisions. Planners should prepare aviation forecasts that use FAA-accepted methods supported by available data, and that are consistent with FAA's Terminal Area Forecast (TAF). Forecasts should be within 10 percent of the TAF for the 5-year analytical period and within 15 percent for the 10-year analytical period.[5] Forecasts not meeting these criteria require consultation with planners at regional or district Airports offices and perhaps, forecast specialists at FAA headquarters. This consultation is necessary to determine if another forecast is needed for airport planning and NEPA purposes.

c. Conduct a facility inventory. Planners should conduct a facility inventory and determine if existing facilities can meet forecast airside and/or landside demands. If they cannot, the airport sponsor may need to enhance or expand present facilities or build new ones. Reviewing ALPs and forecast activity data is an efficient way to complete this inventory.

d. Develop alternatives. Reasonable alternatives are feasible ways to achieve a project's purpose (FAA Order 1050.1E, paragraph 506e). As noted below, the range of reasonable alternatives during an airport sponsor's master planning process is different than the range of alternatives needed for the NEPA process.

(1) During the airport master planning process. Airport sponsors and their planners consider various ways of solving an airport's problems before FAA begins its formal NEPA process. According to Chapter 5 of AC 150/5070-6B, the sponsor, its planners, and FAA airport planners, during project master planning, should consider safe, efficient alternatives within the airport sponsor's or FAA's jurisdiction. When developing these alternatives, FAA environmental specialists should advise the sponsor and the planners about obvious, sensitive environmental resources in the airport vicinity. This step highlights the need for the sponsor and planners to consider alternative project layouts or designs that could eliminate or reduce environmental impacts when the widest range of layout or design options exists.

(2) During the NEPA purposes. When developing reasonable alternatives for NEPA purposes, the scope of alternatives must include the alternatives noted above and those reasonable alternatives *outside* the airport sponsor's and FAA's jurisdiction (40 CFR 1502.14(c). Consequently, these alternatives, "…include those [alternatives] that are practical or feasible ways from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."[6]

---

[5]December 23, 2004, memorandum from the Director, Airport Planning and Programming, entitled *Revision to Guidance on Review and Approval of Aviation Forecasts.*

[6]CEQ's *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, Question 2a.

e. Identity a proposed action. Sometimes a sponsor selects a reasonable alternative as the "proposed action" early in project planning. Early identification of the proposed action depends on the problem the sponsor is trying to solve and the problem's complexity. If the airport has inadequate apron space or an emergency vehicle building is needed, the sponsor may have little difficulty identifying the proposed action. Conversely, if the airport lacks sufficient runway capacity or a new airport is necessary, the range of reasonable alternatives may be varied and complex. Here, the sponsor may not be able to identify a proposed action during the planning process.

505. ARP RESPONSIBILITES. Close coordination among the airport sponsor, its planning consultant, and FAA encourages thoughtful, responsible airport planning. ARP airport planners, engineers, and environmental specialists should work closely with the sponsor's airport planners early in project planning. This effort will help planners prepare well-developed airport projects that consider environmental factors in project planning. Such projects enhance ARP's ability to later meet substantive Federal environmental requirements applicable to a proposed action and its reasonable alternatives.

506. FAA'S ENVIRONMENTAL REVIEW PROCESS. The responsible FAA official should determine the environmental review the proposed action requires. The official should do so after working with the airport sponsor's planners to use the interdisciplinary approach discussed in this chapter.

a. Categorical exclusion. The responsible FAA official may categorically exclude an airport action when the official finds:

(1) The proposed action is listed in FAA Order 1050.1E, paragraphs 307 through 312 (or Chapter 6, Tables 6-1 and 6-2 of this Order)**.** and

(2) Extraordinary circumstances in paragraph 304 of that order (or Chapter 6, Table 6-3 of this Order) do not require an EA or EIS.

b. Environmental assessment (EA). The responsible FAA official should inform the airport sponsor to prepare an EA when:

(1) The official determines that extraordinary circumstances applicable to a normally categorically excluded action suggest an EA is needed. or

(2) The action is not listed in Chapter 6, Tables 6-1 or 6-2 and, therefore, normally requires an EA at a minimum.

c. Environmental impact statement (EIS). The responsible FAA official should begin preparing an EIS when:

(1) The proposed action normally requires an EIS (see paragraph 903).

(2) An EA indicates that the approving FAA official cannot issue a Finding of No Significant Impact (FONSI) because the proposed action is likely to cause significant environmental effects that cannot be mitigated below significance thresholds. or

(3) ARP experience shows an action addressed in an EA would cause significant environmental impacts.

507. – 599. RESERVED.

CHAPTER 6. CATEGORICAL EXCLUSIONS

600. CATEGORICAL EXCLUSIONS. To reduce unnecessary paperwork, Council on Environmental Quality regulations at 40 CFR 1500.4(p) allow for the exemption of certain categories of actions from NEPA's EIS requirements. Specifically, 40 CFR 1508.4 defines categorical exclusions as:

> "…categories of actions that normally do not individually or cumulatively have significant adverse effects on the human environment and which have been found [by the federal agency] to have no such effect."

In developing categorically excluded actions, each Federal agency must consider:

> "… extraordinary circumstances in which a normally categorically excluded action may have a significant environmental effect." (See paragraph 606 of this chapter)

601. CATEGORICAL EXCLUSIONS FOR AIRPORT ACTIONS. Under FAA Order 1050.1E, paragraph 303c, the Office of Airports (ARP), like other FAA organizations, may categorically exclude actions listed in paragraphs 307 through 312 of that Order.

a. Similar actions. Some of these categorical exclusions are limited to specific actions, while others are defined to include not only specific, but also, similar actions. Examples of the latter exclusions include essentially similar facilities and equipment (see Order 1050.1E, paragraphs 309a, 309c, 309d, and 310g); essentially similar development (see Order 1050.1E, paragraph 310f); and similar systems (see Order 1050.1E, paragraph 310v). Here, the responsible FAA official should place in the project file a brief explanation of why the proposed action is similar to the specific action listed.

b. Tables 6-1 and 6-2. For convenience**,** Tables 6-1 and 6-2 at the end of this chapter provide alphabetical, annotated listings of the airport-specific portions of the categorically excluded actions in Order 1050.1E paragraphs 307 through 312.

c. Categorical exclusions satisfy NEPA. In categorically excluding an action, ARP meets its NEPA responsibilities. This allows the appropriate FAA official to determine if FAA should approve or fund that action without requiring an EA or preparing an EIS.

602. TYPES OF CATEGORICAL EXCLUSIONS. FAA has categorically excluded two types of actions.

a. Actions unlikely to involve extraordinary circumstances. Order 1050.1E, paragraph 303d, notes that certain categorically excluded actions are not reasonably expected to change land use or cause environmental impacts. These actions normally involve administrative and planning-related actions. This chapter lists airport actions in this grouping (see paragraph 604 and Table 6-1 of this Order).

b. Actions that may involve extraordinary circumstances. In contrast, actions discussed in paragraph 605 and listed in Table 6-2 of this chapter are categorical exclusions for actions that may cause environmental impacts involving extraordinary circumstances. Paragraph 304 of Order 1050.1E notes that an action involving one or more circumstance listed in Order 1050.1E, (Table 6-3 of this Order) does not necessarily require an EA or EIS. However, one may be needed as the responsible FAA official examines extraordinary circumstances associated with the proposed action. See paragraphs 606.a and b of this Order for more information.

c. Categorical exclusion citation. The correct citations for the categorically excluded, airport-related actions in Tables 6.1 and 6.2 are the paragraphs from FAA Order 1050.1E noted in the rightmost columns of those Tables. Do not cite Order 5050.4B as the authorization. For example, the reference for categorically excluding the issuance of an airport planning grant is Order 1050.1E, paragraph 307o. The reference is not Order 5050.4B, Table 6-1.

603. SPONSOR-PROVIDED INFORMATION TO SUPPORT A CATEGORICAL EXCLUSION. Sponsor-provided information greatly enhances the responsible FAA official's review of a proposed action.

a. Plan accordingly. Normally, airport sponsors know well in advance when they must take an action to meet an airport need. Therefore, as soon as the airport sponsor has defined its proposed action, ARP encourages airport sponsors to begin collecting information and completing the consultation (if the applicable special purpose law allows) or analysis that a categorical exclusion may need. ARP makes this recommendation to ensure the airport sponsor allocates enough time in the project's schedule to allow ARP to meet its responsibilities under NEPA and any applicable special purpose law(s).

b. Information the sponsor should provide to FAA. ARP urges airport sponsors (or its consultant) to review Table 6-3. This helps the sponsor determine if there is environmental information it can provide the responsible FAA official to facilitate the official's timely review of a proposed categorically exclusion involving an extraordinary circumstance. A sponsor not providing the needed information could delay the responsible FAA official's review of the action. That delay may occur because the responsible FAA official will have to collect and analyze the information the sponsor would have otherwise provided.

(1) An airport sponsor (or its consultant) should review the requirements of any special purpose law(s) that applies to a proposed action that may be categorically excluded. This review helps the sponsor determine if it or FAA must consult with a resource agency to meet special purpose law requirements and the extent of public involvement.

(2) That review also helps the airport sponsor determine the analyses and documentation needed for a proposed action or if FAA has a role in meeting those special

purpose law requirements. For example, eligibility determinations and effects determinations are solely FAA's responsibilities under Section 106 of the National Historic Preservation Act. Therefore, a sponsor's early notification to FAA that the agency must fulfill a special purpose law enhances the responsible FAA official's ability to comply with the law in a timely manner and meet the sponsor's schedule.

c. Airport actions in Table 6-1. The sponsor should briefly describe its proposed action. Cite the paragraph in the right-hand column of Table 6-1 listing the action as an FAA categorical exclusion. This helps the sponsor verify it is proposing an action FAA normally categorically excludes.

d. Airport actions in Table 6-2. Actions listed in Table 6-2 require the airport sponsor to review information on extraordinary circumstances (see paragraph 606 of this Order). If an extraordinary circumstance applies, ARP urges the airport sponsor or consultant to contact FAA to discuss the applicable extraordinary circumstance(s) and the information the responsible FAA official may need to address the circumstance(s).

604. CATEGORICAL EXCLUSIONS UNLIKELY TO INVOLVE EXTRAORDINARY CIRCUMSTANCES. After determining that an action may qualify for a categorical exclusion, the next step for the responsible FAA official is to determine whether the categorical exclusion is likely to involve extraordinary circumstances, using Table 6-1 and 6-2. Table 6.1 lists categorical exclusions for actions that FAA's experience shows are unlikely to involve extraordinary circumstances. If the action is in Table 6.1, normally no further environmental review is required and the official will categorically exclude the action.

605. CATEGORICAL EXCLUSIONS THAT MAY INVOLVE EXTRAORDINARY CIRCUMSTANCES. The responsible FAA official must determine if a normally categorically excluded action listed in Table 6-2 involves an extraordinary circumstance.

a. An action not involving an extraordinary circumstance. When the responsible FAA official determines an action listed in Table 6-2 does not involve any extraordinary circumstance, the official may categorically exclude the action.

b. An action involving an extraordinary circumstance. When the responsible FAA official determines an extraordinary circumstance possibly exists, the official must:

(1) Comply with any applicable special purpose laws and determine if the impacts associated with the possible extraordinary circumstance warrant a categorical exclusion. or

(2) Decide if an EA or EIS is needed to determine if the action involving an extraordinary circumstance that would cause a significant adverse environmental impact.

606. EXTRAORDINARY CIRCUMSTANCES. Extraordinary circumstances are those situations where an action that is normally categorically excluded may cause significant adverse environmental impacts. The process discussed below integrates into the NEPA process ARP's consideration of applicable special purpose law requirements or other environmental factors. This integration should provide the responsible FAA official with information needed to determine if ARP may categorically exclude a proposed action involving extraordinary circumstances. ARP believes the steps discussed below provide the flexibility necessary to act timely and responsibly on categorically excluded actions.

a. Extraordinary circumstances. *Before* categorically excluding actions listed in Tables 6-1 or 6-2, the responsible FAA official must review Table 6-3. Table 6-3 presents an alphabetized, annotated list of the circumstances described in FAA Order 1050.1E, paragraph 304. The asterisk in the Table means the circumstance is based on a special purpose law (paragraph 9.t of this Order). If a circumstance involves a special purpose law, the airport sponsor or responsible FAA official, as appropriate, should follow the process discussed below and in paragraph 606.b.

(1) The responsible FAA official should independently review the information the airport sponsor provides to determine if the information is sufficient to analyze the categorical exclusion and any applicable extraordinary circumstance(s). Lacking that information, the official should request that the sponsor provide the information needed to verify the action may be categorically excluded. If the sponsor does not do so, the official must collect that information.

(2) When the responsible FAA official has information sufficient to evaluate the extraordinary circumstance(s) related to the proposed action, the official may:

(a) Categorically exclude the action.

(b) Request that the sponsor prepare an EA. or

(c) Recommend that FAA begin preparing an EIS.

b. Special purpose laws. To streamline FAA's NEPA review and compliance with special purpose laws, the responsible FAA official (the airport sponsor or its consultant, if appropriate), should follow the instructions in paragraphs 606.b.(1) – (4) of this Order. FAA may categorically exclude an action for NEPA purposes, but *only* if it meets all requirements in paragraphs 606.b.(1) - (4) and the responsible FAA official determines the severity of environmental impacts does not warrant an EA or EIS.

(1) Compliance requirements. Except when the responsible FAA official determines that an EA or EIS is needed to properly analyze extraordinary circumstances under a special purpose law, the applicable special purpose law, not NEPA, determines the type of analysis, the extent of resource agency consultation, public involvement, and documentation needed to support a categorical exclusion.

(2) Resource agency input. FAA (or the sponsor, if determined appropriate under the applicable special purpose law) should obtain input from the resource agency as the special purpose law requires and place that information in the project file. A fax, e-mail, memorandum, letter, or other proof of communication providing a record of the consulted agency's input or opinion is sufficient. The responsible FAA official or the sponsor (or its consultant), if appropriate, must allow the resource agency the time specified in the applicable special purpose law to provide agency input. Therefore, the sponsor should include the required time in its project schedule.

(3) Mitigation. As appropriate or needed, the responsible FAA official or the sponsor and resource agency should discuss mitigation. These parties should ensure the mitigation is related to the proposed airport action, that it is reasonable, and that it complies with FAA's mission. The responsible FAA official must ensure the measures required to mitigate impacts are enforced under the:

(a) Applicable special purpose law or its implementing regulations.

(b) FAA's unconditional ALP approval letter. or

(c) Special assurances in FAA's grant for the action, if applicable.

(4) When a resource agency does not respond. Special purpose laws applicable to proposed actions may require input from or require that comment opportunities be afforded to resource agencies or agencies with special expertise. When that input is needed or the applicable law provides an opportunity for those agencies to review a proposed action, the responsible FAA official is encouraged to proactively seek that input. Doing so should lessen the possibility of delaying an action because an agency fails to act in a timely manner. If a resource agency does not respond or provide information within the time the applicable special purpose law specifies, the responsible FAA official may complete the environmental review of the proposed action. However, the official should consider contacting the expertise agency. Also, if the airports sponsor sought, but did not receive agency input, the sponsor should immediately alert the responsible FAA official. Those steps help FAA determine why the resource agency did not respond within the special purpose law's designated time. Those steps also provide opportunities to receive resource agency input and complete the project review, even though the designated time for that input has expired. The responsible FAA official should place a record of this effort in the project file.

(a) If the responsible FAA official's effort does not provide resource agency input, the responsible FAA official should immediately elevate the action to the approving FAA official for a decision. The responsible FAA official should provide the approving FAA official with documentation to show that FAA and/or the airport sponsor has complied with the applicable law.

(b) Based on the documentation, the approving FAA official has the discretion to:

1. Further seek agency input.

2. Categorically exclude the action. or

3. Require an EA or EIS.

(5) Required good faith efforts. In completing paragraphs 606b.(1) – (4), FAA (or the airport sponsor, as appropriate) must verify it has made a good faith effort to comply with NEPA and the applicable special purpose law(s).

607. FAA DOCUMENTATION.

a. CEQ regulations. CEQ's NEPA implementing regulations do not require documentation for categorically excluded actions. FAA Order 1050.1E, paragraph 305, reflects this, but it also notes that unique situations may occur, prompting the responsible FAA official to document a categorical exclusion.

b. Required information to streamline the review of categorical exclusions involving special purpose laws. To streamline the NEPA process while complying with special purpose laws, ARP requires the responsible FAA official to provide some documentation in a project file for a categorical exclusion involving special purpose laws.

(1) There is no prescribed format or amount of documentation to support the categorical exclusion, if the applicable special purpose law does not specify it. An airport sponsor (or consultant) should ask the responsible FAA official about how the official wishes to receive information involving those laws.

(2) If the applicable special purpose law requires certain documentation, the project file must include it. For example, the project file for a categorical exclusion that involves National Register-listed or eligible historic properties, must include information 36 CFR Part 800 requires for the type of effects that may occur. In other cases, the documentation may range from a specific analysis to a telephone memo, letter, a memorandum, or other personal communication. In all cases, the documentation must prove that FAA or the sponsor, as appropriate, has met the applicable special purpose law's requirements.

c. Optional documentation. ARP recognizes that the categorical exclusions in Table 6-1 rarely involve extraordinary circumstances, while those in Table 6-2 may do so. Even if the categorical exclusion does not require documentation to address any special purpose laws, the responsible FAA official may choose to include information in the project file for reference or legal challenges that may occur.

Note: ARP leaves the decision to include contractual requirements for SBGP participants to use forms to document categorical exclusions to the discretion of the Airports Division managers in the respective regions having SBGP participants.

608. NOTIFYING THE AIRPORT SPONSOR ABOUT A CATEGORICAL EXCLUSION. Via a dated e-mail or letter, the responsible FAA official must notify the airport sponsor that FAA has or has not categorically excluded a proposed action. This ensures the airport sponsor knows that FAA has met the requirements of NEPA and that FAA has addressed all associated extraordinary circumstances applicable to a proposed action. The responsible FAA official must place proof of this notice in the project file. If FAA cannot categorically exclude an action, the responsible FAA official should explain why. This information may help the sponsor design future actions that FAA may categorically exclude.

609. - 699. RESERVED.

Table 6-1. Airport-specific Categorical Exclusions Unlikely to Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION "Approving AIP funding for or a request to …"	CITE FROM FAA ORDER 1050.1E
Grants for airport planning or State Block Grants.	issue a planning grant that does not commit FAA to a project. Issuing grants to a state block grant program is included here.	307o.
Bond retirement for terminal development.	retire an airport sponsor's principal bond for terminal development.	307t.
Conditional Airport Layout Plan (ALP) approval.	conditionally approve an ALP.	307p.
Grants to prepare environmental documents.	issue a grant to prepare an EA or EIS.	307o.
Grants to prepare Noise exposure maps (NEMs) and noise compatibility programs (NCPs).	issue a grant to prepare NEMs or NCPs.	307n.
Approval of Passenger Facility Charge (PFC).	allow an airport sponsor to solely impose or to impose and use a PFC for planning studies. Note: FAA Order 5500.1, *Passenger Facility Charge* provides more information.	307h.

Table 6-1 (continued). Airport-specific Categorical Exclusions Unlikely to Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to …"	CITE FROM FAA ORDER 1050.1E
Issuing policy and planning documents.	issue these documents. Examples include the NPIAS, advisory information on the AIP.	307g.
Preliminary AIP eligibility actions.	tentatively or conditional actions taken to establish sponsor AIP eligibility.	307i.
Safety equipment for airport certification.	authorize the purchase of safety equipment such as snow removal equipment or other equipment necessary for airport certification.	309h.
Security equipment purchase.	buy equipment for airport security purposes, per 14 CFR Part 107. Note: This does not include fence installation because that action involves land disturbance that may involve an extraordinary circumstance. See Table 6-22, Security.	309h.

Table 6-2. Airport-specific Categorically Excluded Actions that may Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to approve or change an ALP to…"	CITE FROM FAA ORDER 1050.1E
Airfield barriers.	build or extend aircraft operating area fencing, or jet blast facilities.	310e
Airfield improvements, aircraft parking areas.	build, repair, or extend an existing airport's aprons, loading ramps, taxiway, or taxi lane provided they have only on-airport impacts.	310e.
Airfield improvements, roads.	build, maintain, move, or repair roads, if the action does not permanently reduce the Level of Service to unacceptable levels.[1]	310a.
Airfield improvements, runways.	extend, fillet, groove, mark, rebuild, resurface, or strengthen existing runways or runway surface areas.[2]	310e.
Airfield improvements, storage areas.	build or expand airport fire and rescue buildings, equipment storage buildings or T-hangars.	310f.
Airfield lighting.	install or upgrade airfield lighting (e.g., beacons, runway indicator lights, runway end identification lights, visual approach aids, etc.).	309b.

[1] Contact the local transportation agency for help in determining unacceptable Levels of Service.

[2] Substantial expansion: To screen noise for possible significant impacts, use the Area Equivalent Method (AEM). If this noise-screening tool indicates the proposed action's DNL or CNEL 65 dB contour is at least 17% greater in area when compared to the area of the future no action DNL or CNEL 65 dB contour, or if the AEM cannot be used, an EA may be necessary. To screen for air quality effects, use information in section 2, p. AD-6 of the September 2004 addendum to FAA's *Air Quality Procedures for Civilian Airports and Air Force Bases* handbook. Results may indicate an EA is needed.

Table 6-2 (continued). Airport-specific Categorically Excluded Actions That May Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to approve or change an ALP to…	CITE FROM FAA ORDER 1050.1E
Cargo building.	construct or expand a cargo building at an existing commercial service airport that does not substantially expand the building.[2]	310h.
Conveying Federally-owned airport land.	approve conveyance of Federal-owned land, including surplus property, provided intended use is categorically excluded.	307c.
Deicing/anti-icing facility.	build or operate this facility, provided it meets all water quality permit requirements and does not attract wildlife hazardous to aviation. Note: See FAA AC 150/5200-33A, *Hazardous Wildlife on or Near Airports*.	310d.
Fill activity.	fill deposits into previously excavated non-aquatic areas. Note: Fill cannot be contaminated, must be compatible with surrounding substrate, and must be contoured to match natural features.	310k.
General landscaping.	conduct landscape maintenance and vegetative and erosion control measures. Note: Actions cannot spread invasive species or attract wildlife hazardous to aviation.	310p.
Heliport at an existing airport.	a heliport that would not significantly increase noise over noise sensitive areas.	310t.
Low emission technology equipment, including the Voluntary Airport Low Emission Program	to buy this equipment and operate it within airport boundaries. This includes building, upgrading, refueling or recharging stations for low emission vehicles.	309g, 310f, 310n, 310u.
Miscellaneous items.	install or upgrade on-airport measuring devices, segmented circles, and landing aids.	309e.
Non-radar facilities.	install or upgrade non-radar equipment.	309c.
Noise barriers.	install vegetation, berms, or sound walls to reduce noise, provided they do not attract wildlife hazardous to aviation.	310q.

Table 6-2 (continued). Airport-specific Categorically Excluded Actions That May Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to approve or change an ALP to…"	CITE FROM FAA ORDER 1050.1E
Noise compatibility programs.	carry out FAA-approved noise compatibility programs or to amend airport layout plans depicting measures to be implemented.	307d.
Non-U.S. waters, including wetlands in which categorically excluded actions are proposed.	take an action that is normally categorically excluded and that unavoidably affects these aquatic resources, provided the project design would have met standards defined in a Corps of Engineers General Permit[3] that would have applied if the project involved jurisdictional waters. Often, poor or neglect of maintenance of airport drainage ditches results in conveyances that have hydrologic regimes and soil characteristics supporting wetland vegetation. Note: The instructions here do not pertain to those ditches having the following characteristics: - ditch must not drain a jurisdictional wetland; - the spoil from the ditch cannot contain toxic pollutants; and - the discharge of the spoil removed from the ditch cannot visibility alter the circulation or flow in waters of the U.S (see 33 CFR Part 328 for more detail on these waters).	310k.
On-airport obstruction treatment.	grade land or remove obstructions to air navigation, including tree topping or trimming activities for Part 77 requirements. Note: These actions may occur on or affect only airport property or FAA-owned or leased property.	310l. and 310z.

[3] General Permits included on a nationwide, regional, or State basis for particular categories of activities. (see Volume 61 *Federal Register*, No. 241, p. 65874).

Table 6-2 (continued). Airport-specific Categorically Excluded Actions That May Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to approve or change an ALP to…"	CITE FROM FAA ORDER 1050.1E
Ownership change by purchase or transfer.	acquire or transfer ownership or operation of an existing airport. Note: Here, the transfer of ownership is limited to right of ownership, right of possession and/or operating responsibility.	307m.
Parking areas.	build small aircraft parking ramps, vehicular parking areas, and garages.[2]	310f. and 310h.
Passenger handling building.	construct or expand a terminal passenger handling building at an existing commercial service airport that does not substantially expand the building.[2]	310h.
Radar installation.	install, repair, replace, move or upgrade radar equipment.	309d.
Releasing airport land.	release of an airport sponsor from Federal obligations the sponsor incurred when it accepted an AIP grant or Federal surplus property for airport purposes. Note: This includes FAA's consent to long-term (>20 years) leases allowing airport land use for non-aeronautical purposes.	307b.
Relocation.	move people and businesses to carry out a categorically excluded action.	310b.
Repair and maintenance.	repair and maintain existing roads, rights-of-way, trails, grounds, parking areas and utilities, including snow removal.	310w.
Replacement structures.	replace or rebuild terminals or other airport facilities of similar size and purpose. Must be on the same site as the existing facility.	310v. and 310w.
Restrictions, aircraft access.	restrict Stage 3 aircraft operations under for 14 CFR, Part 161. Note: The action cannot cause a significant noise impact at the airport seeking the restriction nor at other airports serving the restricted aircraft.	307u.

Table 6-2 (continued). Airport-specific Categorically Excluded Actions That May Involve Extraordinary Circumstances.

AIRPORT ACTION	ANNOTATED DESCRIPTION OF THE ACTION "Approving AIP funding for or a request to approve or change an ALP to…"	CITE FROM FAA ORDER 1050.1E
Runway threshold.	remove a displaced runway threshold	311l.
Security.	build or maintain fencing.	310f
Transfer land by long-term lease or acquisition.	transfer ownership or operation of an existing airport by acquisition or long-term lease. Here, the transfer is limited to ownership, right of possession and/or operating responsibility.	307m.
U.S. Waters, including wetlands, in which categorically excluded actions are proposed.	take an action that is normally categorically excluded and that unavoidably affects U.S. waters, including wetlands when avoidance of the waters or wetlands is not practical and the action qualifies for a Corps of Engineers General Permit (i.e., nationwide or regional permits). Fill material must be compatible with the site's natural features.	310k.
Utility line construction, temporary.	approve temporary removal or extension of utility lines to serve temporary construction.	310j.
Wildlife Hazard Management Plan implementation.	implement measures listed Table 6-2 that are included in an FAA-approved WHMP.	308.e

Table 6-3. An Annotated Summary of Extraordinary Circumstances.
(Note: The asterisk (*) signifies there is a special purpose law outside of NEPA that addresses this extraordinary circumstance. See paragraph 9.t for more information on special purpose laws. Smaller font provides information and agencies that may need to be consulted to comply with a particular special purpose law).

EXTRAORDINARY CIRCUMSTANCE	ANNOTATED DESCRIPTION	CITE FROM FAA ORDER 1050.1E
*** Air quality.**	An action that would violate applicable Federal, State, Tribal, or local air quality standards under the Clean Air Act of 1990, as amended. Note: Contact a State or Tribal air quality agency, as appropriate.	304g.
***Coastal zone areas.**	Federal actions in or affecting coastal resources must meet requirements of Coastal Zone Management Act programs. Note: Contact the State agency having authority for these programs.	304c.
Community disruption.	An action dividing[4] or disrupting[5] an established community or planned development, or that is inconsistent with plans or goals of a community where the project would occur. Note: Contact local land use authorities.	304d.
Cumulative impacts.	An action likely to cumulatively cause significant impacts.	304k.
*** Endangered species.**	An action that may affect listed or candidate species under the Endangered Species Act, including designated or proposed critical habitats. Note: Contact: the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. For state species, contact state agency.	304c.

Table 6-3 (continued). An Annotated Summary of Extraordinary Circumstances.

[4]"Dividing" would occur if a proposed action causes or requires purchasing homes and relocating their occupants on one side of a street, while the portion of the established or planned community on the other side of the street remains. An example is a neighborhood remnant that would lack the "neighborhood spirit" or "cohesiveness discussed below in "disruption."

[5] "Disruption" would occur if a proposed action would change an existing or planned community so drastically that the community would no longer meet planning criteria used to establish the community. Disruption would also occur if the action would drastically reduce community cohesiveness. Cohesiveness is a trait found most often in long-established communities. It is often ethnically, culturally, or racially-based. An example of community cohesiveness is often found where residents feel comfortable due to the community's unique amenities A project disrupts this cohesiveness when it requires relocating many residents of these neighborhoods, or it causes loss of community facilities.

EXTRAORDINARY CIRCUMSTANCE	ANNOTATED DESCRIPTION	CITE FROM FAA ORDER 1050.1E
*** Farmlands conversion.**	An action that would convert important farmland protected by the Farmland Protection Act Note: Contact the Natural Resources Conservation Service or state agricultural agency.	304c.
*** Floodplains.**	An impact on natural, ecological, or scenic floodplain resources of Federal, State, Tribal, or local significance caused by an action in the 100-year floodplain. Note: Contact local U.S. Army Corps of Engineers or Federal Emergency Management Agency offices for information on determining actions in the 100-year floodplain.	304c.
*** Hazardous materials.**	An action involving or causing contamination of areas, based on Phase I or II Environmental Due Diligence Audits. Note: Contact EPA's regional Office of Solid Waste and Emergency Response.	304k.
Highly controversial action.	See paragraph 9.i for more information on controversy.	304i.
*** Historic or cultural property.**	An action causing an adverse effect on historic or cultural property protected by Section 106 of the National Historic Preservation Act. Note: Consult FAA and the State or Tribal Historic Preservation Officer, as appropriate.	304a.
Inconsistency with applicable laws.	An action that is likely to be inconsistent with any applicable Federal, State, local, or Tribal law relating to the proposed action's environmental aspects.	304j.
Noise.	Noise impact on noise-sensitive areas. See paragraph 9.n for information on noise sensitive areas.	304.f.

Table 6-3 (continued). An Annotated Summary of Extraordinary Circumstances.

EXTRAORDINARY CIRCUMSTANCE	ANNOTATED DESCRIPTION	CITE FROM FAA ORDER 1050.1E
*** Section 4(f)**	An action having an impact on properties protected by DOT Act, Section 4(f) such as publicly-owned land in a park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or a historic site of national, state, or local significance. Note: Contact agency or entity with jurisdiction over the property.	304b.
Traffic congestion.	An action causing transportation congestion due to unacceptable Levels of Service. Note: Contact the transportation or highway agency having jurisdiction over the project-affected roadways.	304e.
*** U.S. waters, including jurisdictional wetlands.**	An action affecting these waters or wetlands that does not qualify for a U.S. Army Corps of Engineers General Permit under Section 404 of the Clean Water Act. Note: Consult the Corps of Engineers for information on project designs or actions that would qualify for an Individual Permit. Contact the appropriate U.S. Fish and Wildlife Service office and/or state agency responsible for protecting the resources the project would affect.	304c.
Water quality.	An impact on water quality, a sole source aquifer, a public water supply system or State or Tribal water quality or water standards established under the Clean Water Act or the Safe Drinking Water Act. Note: Contact the State agency responsible for enforcing State water quality standards.	304h.
***Wild and Scenic Rivers.**	An action affecting a river segment that is listed in the Wild and Scenic River System, the National Rivers Inventory, or a river that is eligible for the Inventory. Note: Contact U.S. Forest Service, National Park Service, Fish and Wildlife Service offices or Bureau of Land Management district offices.	304c.

	TABLE 7-1. SIGNIFICANCE THRESHOLDS	
RESOURCE CATEGORY	**ORDER 1050.1E THRESHOLD**	**FACTORS TO CONSIDER FOR AIRPORT ACTIONS**
Air quality.	When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS).	For **NEPA** purposes: The responsible FAA official must determine if air quality impacts of a reasonable alternative would exceed a National Ambient Air Quality Standard for the time periods analyzed. For **General Conformity** requirements under the Clean Air Act, as amended. Analyze only the proposed or preferred alternative.
Coastal Barriers.	None established.	FAA Order 1050.1E, Appendix A, Section 3 does not provide a threshold for these resources. After consulting with the jurisdictional U.S. Fish and Wildlife Service or Federal Emergency Management Agency office, the responsible FAA official should determine if the proposed action would cause either of the following conditions. • An unacceptable risks to human safety or property. • Adverse effects to the barrier's environmental resources that could not be satisfactorily mitigated.
Coastal Zone.	None established.	FAA Order 1050.1E, Appendix A, Section 3, does not provide a threshold for these resources. Because of the number of airports in coastal areas or that could affect coastal resources, ARP suggests the responsible FAA official consider the following factors, while addressing effects on coastal zone resources. • Did the CZM agency object to the sponsor's consistency certification? • If yes, has the sponsor changed the project so it is consistent with the applicable coastal zone management plan(s)? • If not, has the sponsor successfully appealed the CZM agency's consistency objection to the NOAA Assistant Administrator? • If the airport action includes facilities FAA will install, did the

		responsible FAA organization provide proof that it will install the necessary aviation facilities in a manner consistent with the approved coastal zone management plan to the maximum extent practicable? • Did the CZM agency agree or disagree with FAA's finding? • If not, has FAA changed the proposed installation to meet CZM plan?
Compatible land use.	See significance threshold for noise.	The responsible FAA official determine if any alternative would have land use consequences such as: • community disruption; • business relocations; • induced socioeconomic impacts; • wetland, or floodplain impacts; or • critical habitat alterations. Use the information from the factors addressing these specific issues to determine the severity of compatible land use effects.
Construction impacts.	See significance threshold for the resource(s) construction would affect.	Use the information for each applicable resource.
Section 4(f).	When the action's physical use would be more than minimal or its constructive use substantially impairs the 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	Determine if the proposed action or a reasonable alternative would eliminate or severely degrade the intended use of the Section 4(f) resource. That is would the proposed action or alternative physically or constructively use (i.e., substantially impair the use) that resource? The responsible FAA official should determine if mitigation is satisfactory to the agency having jurisdiction over the protected resource. If mitigation is unsatisfactory, more detailed, impact analysis is likely needed.

Farmlands.	When the total combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	
Fish, Wildlife and Plants.	For **Federally-listed species**: When the U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat. For **non-listed species**: Consider scientific literature on and information from agencies having expertise addressing on the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.	The responsible FAA official should consider the following factors in consultation with organizations having jurisdiction or special expertise concerning the protection and/or management of the affected species. The official should complete the added analysis for each reasonable alternative that would cause long-term (i.e., greater than 1 year) habitat impacts. • Consult with the appropriate agency(ies) to determine if an area sufficient to sustain species **commonly** found in the affected area would remain if the alternative were implemented. • Determine if the alternative would affect habitat supporting floral or faunal species **not** commonly occurring in the project area. If yes, In consultation with the appropriate agency(ies), determine if the alternative would affect a small tract of **sensitive** habitat needed for the survival or well-being of flora or fauna. Consider the locations of other nesting and breeding areas relative to the project's affected area and if resource agency(ies) indicate those areas could sustain the disturbed species.
Floodplains.	When notable adverse impacts on natural and beneficial floodplain values would occur.	The a responsible FAA official must decide if a "significant floodplain encroachment" would occur. To do so, the official must decide if the action's or reasonable alternative's floodplain encroachment would cause any of the following: • A considerable probability of loss of human life; • Future, extensive damage that would interrupt airport service or use of the proposed runway or other proposed airport facility. • A notable, adverse effect on the affected floodplain's natural and beneficial values. It is critical to note that an alternative causing a significant

		encroachment does not necessarily trigger a significant impact for NEPA purposes. That level of impact would occur **only** when an action would cause notable adverse impacts on the affected floodplain's natural and beneficial values. In those instances when no significant effect under NEPA would occur, the responsible FAA official must ensure the environmental document discloses action-induce effects on human life, NAVAIDS, and transportation facilities. In this case, the official should ensure the document clearly states those effects do not trigger a significant impact under NEPA.
Hazardous materials.	When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within a NPL site's boundary do not always trigger this significant threshold.	
Historical, architectural, archaeological, and cultural.	When an action adversely affects a protected property and the responsible FAA official determines that information from the State and/or Tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	
Light emissions and visual effects.	For **light emissions:** When an action's light emissions create annoyance to interfere with normal activities. For **visual effects:** When consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	
Natural resources and energy supply.	When an action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	

Noise.	For **most areas**: When an action, compared to the no action alternative for the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB is a significant impact. For **national parks, national wildlife refuges and historic sites, including traditional cultural properties**: FAA must give special consideration to these areas. The DNL 65 dB threshold may not adequately address noise effects on visitors to these areas. Consult the jurisdictional agency for more information to determine a significant noise impact.	ARP reminds the responsible FAA official that disclosing impacts having a DNL 3.0-dBA increase over noise-sensitive areas located between the DNL 60 and 65-dBA contours is for information purposes only. For NEPA purposes, those 3-dBA impacts do <u>not</u> cause significant adverse noise impacts below the DNL 65 dBA contour, except as noted in the 2nd column regarding national parks, etc.
Socioeconomic Environmental Justice, and Children's Health and Safety Risks.	For **Socioeconomic issues**: When an action would cause: • extensive relocation, but sufficient replacement housing is unavailable; • extensive relocation of community businesses that would cause severe economic hardship for affected communities; • disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities; • a substantial loss in community tax base. For **Environmental justice issues**: When an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. For **Children's Health & Safety Risks:** An action causing disproportionate health and safety risks to children, may indicate a significant impact.	

Solid waste.	None established.	ARP suggests that the responsible FAA official also determine if a reasonable alternative would cause one of the following conditions: • Airport-generated solid waste would exceed available landfill or incineration capacities or require extraordinary effort to meet applicable solid waste permit conditions or regulations. • Local, State or Federal agencies determine that substantial, unresolved waste disposal issues exist and may require more analysis.
Water Quality.	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	The responsible FAA official also consider if a proposed action or a reasonable alternative would threaten a public drinking water supply, sole source aquifer, or waters of national significance (e.g., Wild and Scenic Rivers, national refuges, etc.).
Wetlands, jurisdictional or non-jurisdictional.	When an action would: • Adversely affect a wetland's function to a protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer. • Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. • Substantially reduce the affected wetlands's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare. The last term includes cultural, recreational, and scientific public resources or property. • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber	

	resources of the affected or surrounding wetlands. • Promote development that causes any of the above impacts. • Be inconsistent with applicable State wetland strategies.	
Wild and scenic rivers.	None established.	

CHAPTER 7. THE ENVIRONMENTAL ASSESSMENT

700. THE ENVIRONMENTAL ASSESSMENT (EA). CEQ states that an EA is a "concise document" that takes a "hard look" at expected environmental effects of a proposed action. Depending on project scope and complexity, the EA should be no more than 15 pages.[1] To achieve this page limit:

a. The EA should summarize the most important facts and conclusions surrounding the proposed action and its reasonable alternatives, if any.

b. The EA should incorporate by reference the correspondence, relevant data, inventories, assessments, appendices, or other technical documents supporting those facts and conclusions. All appendices and references must be available to anyone wishing to review them**,** unless another law prohibits disclosure of certain information or contains confidentiality provisions.

c. The EA should cross-reference pages of the supporting documents noted in paragraph 700.b. This enables readers to review the basis for the facts or conclusions the EA contains.

701. PURPOSE OF THE EA. FAA may prepare an EA on any action at any time to assist agency planning and decision making (40 CFR 1501.3(b)). The responsible FAA official uses the EA to meet the requirements of this Order and NEPA as the basis for recommending the issuance of a Finding of No Significant Impact (FONSI) or the preparation of an environmental impact statement (EIS). If the approving FAA official determines that an EIS is needed, the responsible FAA official may use the EA prepared for the proposed action as a source of information during FAA's preparation of an EIS for that action.

702. AIRPORT ACTIONS NORMALLY REQUIRING AN EA. The responsible FAA official must ensure an airport sponsor or the sponsor's qualified consultant or the agency prepares an EA for the airport actions listed below. Conversely, if a responsible FAA official reviews a proposed action and finds it is likely to cause significant impacts, the EA may be omitted and FAA may begin the EIS process.

a. A normally categorically excluded action involving extraordinary circumstances. This is an action that is normally categorically excluded, but that the responsible FAA official deems appropriate for an EA due to an extraordinary circumstance. Here, the official would require an EA to more thoroughly analyze and understand the severity of the proposed action's environmental impacts relative to applicable extraordinary circumstance(s).

[1] Question # 36a of CEQ's *Forty Most Asked Question Concerning CEQ's National Environmental Policy Act Regulations*.

b. Helicopter facilities or operations. An EA is needed to approve helicopter facilities or operations at an existing airport when helicopters using the facilities or operating at the airport would cause noise over noise sensitive areas within DNL 65 dB contours. The EA would be used to determine if those helicopters would cause a DNL 1.5 dB increase over noise sensitive areas within that contour. In addition, an EA would likely be needed for helicopter operations causing noise over national parks, wildlife refuges, or other areas where a quiet setting is a recognized quality of those land uses and the DNL 65 dB standard may not apply.

Note: Contact the responsible FAA official for settings, such as national parks, wildlife refuges, or other areas where a quiet setting is a recognized feature where the DNL 65 dB standard may not apply.

c. Land acquisition. An EA is needed to acquire land for any airport action discussed in the subparagraphs of paragraph 702 if the acquisition is highly controversial because:

(1) The supply of comparable, decent, safe, and sanitary housing is not sufficient to accommodate displaced residents. or

(2) Project-induced major business disruptions (e.g., interference with or eliminating access to businesses) in the affected area occur.

d. New airport serving general aviation. An EA is needed to unconditionally approve an initial Airport Layout Plan (ALP) or initial airport location for a new airport that would serve only general aviation, regardless of the airport's location. This paragraph includes Requests for AIP funds or approvals for a PFC to finance such a project.

e. New airport location. FAA requires an EA to unconditionally approve an ALP depicting an airport that would serve commercial service aircraft or general aviation and commercial service aircraft when that airport would not be located in a Metropolitan Statistical Area. This paragraph includes requests for AIP funds or approvals for a PFC to finance such a project.

f. New runway. FAA requires an EA to unconditionally approve an ALP depicting a proposed runway at an existing airport that is not located in a Metropolitan Statistical Area or a request to use AIP funds or a PFC to finance that project.

g. Major runway strengthening or major a runway extension. FAA requires an EA to unconditionally approve an ALP depicting a project to strengthen or extend a runway that would involve one of the extraordinary circumstances listed in Table 6-3 of

this Order. This paragraph includes requests for AIP funds or approvals for a PFC to finance such a project.

h. Prime and unique farmland. FAA requires an EA for an airport project that would convert land protected under the Farmland Protection Act to non-agricultural use, when the total score on the USDA's Farmland Conversion Impact Rating Form (Form AD-1006) exceeds 200 points.

i. Waters or wetlands. The decision to prepare an EA does not depend on the Corps of Engineers' jurisdiction over these resources (i.e. "a navigable water of the United States."). Rather, that decision depends on the context and intensity of the impact to these resources or if the project's design meets potential design eligibility criteria for a Corps of Engineers General Permit. Therefore, FAA requires an EA if an airport project involves dredging or filling of <u>any</u> waterway or wetland <u>and</u>:

(1) The airport sponsor must apply for an individual permit under Section 404 of the Clean Water Act to dredge or fill navigable waters.

(2) The project is not normally categorically excluded (see Tables 6-1 and 6-2 of this Order). or

(3) The project is normally categorically excluded (see Tables 6-1 and 6-2), but in this instance, would not meet the design criteria of any Corps of Engineers General Permit.[2]

Note: FAA realizes an action involving dredging or filling of non-jurisdictional waters or wetlands would not require any permit under the CWA. However, to ensure actions occurring in non-jurisdictional waters or wetlands do not cause significant environmental effects, FAA will use the General Permit design criteria as guidance. Projects not meeting those design criteria may cause significant impacts; therefore, they require preparation of an EA.

j. Other circumstances. The responsible FAA official should consider the need for an EA in circumstances not addressed in paragraphs 703.a – i, particularly when controversy exists because the proposed action involves a special purpose law.

703. EA PREPARATION. Normally, the airport sponsor selects a qualified environmental consultant to prepare an EA for an airport action. But when the airport sponsor and/or FAA have substantial concern that the action could cause significant impacts that could not be mitigated below applicable significance thresholds, FAA should select the EA consultant. Here, FAA's consultant selection could save time if the EA shows an action would cause significant environmental impacts. This is because

[2] General Permits are issued on a nationwide, regional, or State basis for categories of activities the Corps of Engineers has determined do not normally cause significant impacts (See Vol. 61 FR, No. 241, p. 65874).

FAA must select the consultant (i.e., contractor) who will assist FAA in preparing the EIS (40 CFR 1506.5(c)) if the EA indicates the action would cause significant impacts. See paragraph 707.

Note: Paragraph 1003.a provides useful information on selecting contractors.

704. EA PREPARATION COORDINATION. Text at 40 CFR 1501.4(b) states:

> "The [Federal] agency shall involve environmental agencies, applicants, and the public, to the extent practicable, in preparing assessments required by [section] 1508.9(a)(1) [environmental assessment]."

a. Public input. EA preparers should coordinate with resource agencies, industry groups, and the affected community as practicable and necessary to ensure the EA addresses those issues of greatest public concern. Therefore, the responsible FAA official may wish to use information in paragraph 403 of this Order to decide if public review or coordination is needed during EA preparation. Although the information in paragraph 403 pertains to the need for public hearings, the responsible official may use that information and his or her discretion to decide if there are issues of major concern to the public that would benefit from public review of draft EAs. If Tribal consultation is needed, the airport sponsor must contact the responsible FAA official to comply with FAA Order 1210.20, *American Indian and Alaska Native Tribal Consultation Policy and Procedures,* dated January 28, 2004.

b. Adopting another Federal agency's EA. Order 1050.1E, paragraph 404d allows FAA to adopt another Federal agency's EA. Paragraph 1005 of this Order has information for adopting another Federal agency's EIS. FAA applies that information to EAs as well.

705. SCOPING ENVIRONMENTAL ASSESSMENTS. Although scoping is not required for EAs, scoping could enhance EA preparation and content. This is especially so when the proposed action is highly controversial or involves special purpose laws or other environmental concerns. Unlike scoping for an EIS, the airport sponsor or its consultant, not FAA, conduct EA scoping.

a. Conducting EA scoping. EA scoping may be a part of the agency coordination discussed in paragraph 704. FAA does not publish a Notice of Intent (NOI) (see paragraph 907) before EA scoping begins. Instead, the airport sponsor should use the local media or mail to notify the public that it is planning to conduct scoping for an EA. Although paragraphs 905 and 906 discuss EIS scoping, they provide helpful information for scoping EAs as well. If an airport sponsor requests scoping support, the responsible FAA official should aid the sponsor as needed.

b. EA scoping package. The Office of Airport (ARP) recommends that the airport sponsor provide information to scoping participants before EA scoping occurs. This helps interested parties participate productively. Information in paragraphs Chapter 9 is helpful in preparing for EA scoping.

706. EA FORMAT AND CONTENT. The following sample format may aid in preparing an EA. The suggested format also helps to integrate the NEPA process with special purpose laws outside NEPA's scope.

a. The EA cover sheet. The EA's cover must contain the words "Environmental Assessment." The cover should identify the proposed action and its geographic location. It must also contain the statement in paragraph 707.f of this Order. The cover must identify the EA's preparer. This may be the airport sponsor, a qualified environmental consultant,[3] or the responsible FAA official.

b. Purpose and Need. The airport sponsor, not FAA, proposes development at an airport. Consequently, the sponsor is the applicant seeking FAA approval: to change the sponsor's airport layout plan; for Airport Improvement Program funding; or to use AIP funding or passenger facility charges to build the project. The responsible FAA official and ARP airport planners should ensure the purpose and need is rational and supported by current, available data. If these criteria are not met, the responsible FAA official and ARP airport planners should consult the airport sponsor to resolve any identified problems. Upon completing that process, the responsible FAA official is assured that the proposed action and the reasonable alternatives, if any, the NEPA document discusses can achieve the purpose and need and meet applicable airport design and planning standards or qualify for waivers to those standards.

Note: Advisory Circular 150/5070-6, *Airport Master Planning*, and Chapter 5 of this Order provide more information on master planning and its link to the NEPA process.

(1) The purpose and need should be defined considering the statutory objectives of the proposed Federal actions as well as the sponsor's goals and objectives.

(2) The Purpose and Need statement should be one or two short paragraphs.[4] If specific background information is needed to support this concise Purpose and Need statement, the statement should refer the reader to the appropriate pages of an appendix or reference to the EA for more information. The Purpose and Need statement should be plainly-written so people unfamiliar with aviation can understand it. The statement

[3] When sub-consultants work with a prime consultant to prepare an EA, the EA cover sheet should name the prime consultant for brevity. The List of Preparers should identify each person who has prepared a section of the EA or a substantial background paper used in preparing the EA and that person's respective employer.

[4] "Memorandum on *Guidance for developing Purpose and Need Statements*, from the Manager, Community and Environmental Needs Division, dated November 4, 2003.

should summarize the benefits of FAA's decision, including a proposed time for carrying out the action.

(3) The Purpose and Need statement should be based on current aviation forecast data presented in an appendix to the EA. In developing an action's Purpose and Need statement, the airport sponsor's airport planners should coordinate with FAA and the responsible FAA. This coordination is necessary because the sponsor's forecasts must be reasonably consistent with FAA's Terminal Area Forecast (TAF). FAA uses the following guidelines to determine the acceptability of a sponsor's forecasts.

(a) A 5-year forecast should be within 10% of the TAF.

(b) A 10-year forecast should be within 15% of the TAF.[5]

(c) Forecasts not meeting these limits must be reconciled before FAA uses those data for environmental analyses. The responsible FAA official should ensure FAA and the sponsor's airport planners resolve the differences between those forecasts before completing the Purpose and Need.

c. The Proposed Action. This section should concisely describe the solution the airport sponsor wishes to implement to solve the problem(s) it is facing. It should also describe how the project, including the sponsor's proposed conceptual mitigation, fits into the airport layout plan (ALP) or the ALP amendment for which the airport sponsor seeks FAA's approval. This EA section should be written so an individual unfamiliar with aviation may understand the airport sponsor's proposal.

Note: See information on "connected actions" and "similar actions" in paragraph 905.c, as needed.

d. Alternatives. This section is based on the Purpose and Need statement. It is "the heart of the environmental document"(40 CFR 1502.14). This section compares the no action, the proposed action, and reasonable alternatives (if any), and each reasonable alternative's expected environmental effects. Tables or matrices summarizing the following information are good ways to present this comparison. Such comparisons sharply define the issues and provide the approving FAA official with a clear basis for choosing among these alternatives

(1) Why an alternative is or is not considered in detail.

(2) The statutory or regulatory requirements applicable to each alternative.

[5] December 23, 2004, memorandum from the Director, Airport Planning and Programming, entitled *Revision to Guidance on Review and Approval of Aviation Forecasts*.

(3) Each action's expected environmental impacts.

(4) Conceptual measures needed to mitigate those impacts.

(5) If there are no unresolved conflicts concerning alternative uses of available resources, the range of alternatives may be limited to the no action and proposed action alternatives (FAA Order 1050.1E, paragraph 405d.).

(a) Unresolved conflicts may exist between the project proponent and those wishing to use affected environmental resources for non-airport purposes. Typically, an unresolved conflict exists when an airport development project concerns involves one or more special purpose law (see paragraph 9.t). Each reasonable alternative description should contain only that information needed to explain it to someone unfamiliar with airport planning or operations and documentation to support it. An example of an unresolved conflict would be when an airport sponsor proposes locating a runway in a wetland, while a project opponent states the same wetland is valuable for flood retention.

(b) In addition to the unresolved conflicts noted in paragraph 706.d.(5)(a), an EA's range of reasonable alternatives may expand after considering:

1. The proposed action's complexity.

2. The variety of expected environmental impacts. or

3. Agency experience in dealing with the action's expected environmental issues.

(c) As the nation's Federal agency responsible for airport actions, FAA can help the airport sponsor develop reasonable alternatives. ARP suggests that airport sponsors or their consultants discuss alternatives with the responsible FAA official in the regional or district Airports office.

(6) After assessing items noted in paragraphs 706.d(5)(a) and (b), EA preparers should develop the reasonable alternatives comprising this EA section. The preparers should note that reasonable alternatives for NEPA purposes include ways to achieve the stated purpose and need that are within the sponsor's or FAA's purview, and those alternatives outside FAA's jurisdiction (Order 1050.1E, paragraph 506.e). After considering the alternative's technical, economic, and environmental factors, the EA evaluates the reasonable alternatives "in detail," in addition to the no action and proposed action. That is, the EA provides the analyses of potential environmental consequences for each alternative.

(7) When an alternative is considered but judged "not reasonable," the EA should concisely explain why the sponsor or FAA eliminated that alternative from further consideration. The EA does contain a discussion of a rejected alternative's environmental consequences.

e. Affected Environment. This section succinctly describes *only* those environmental resources the proposed action and its reasonable alternatives, if any, are likely to affect (FAA Order 1050.1E, paragraph 405e). The amount of information on a potentially affected resource is based on the extent of the expected impact and is commensurate with the impact's importance. For resources not affected, the following statement is sufficient:

> "The no action, proposed action, and reasonable alternatives would not affect: [list the resources.]"

(1) To complete the EA's cumulative analysis, the Affected Environment section should include critical background information of past, present, and reasonably foreseeable future actions.

Note: An action need not have Federal involvement to be included in a NEPA document's cumulative analysis.

(2) Include location map(s), vicinity map(s), an ALP, and photographs to help readers understand the affected area's characteristics.

(3) Provide information on existing and planned land uses and zoning for:

(a) The affected area's industrial and commercial activities and their growth characteristics.

(b) Residential areas, schools, places of worship or outdoor assembly areas used by churches or hospitals.

(c) Publicly-owned and used parks, recreational areas, wildlife and waterfowl refuges.

(d) Information on National and State forests, wilderness areas and eligible and designated wild and scenic rivers.

(e) Federally-listed threatened, or endangered species or their critical habitats or candidate species. Information on state-listed species is also important.

(f) Wetlands, floodplains, coastal zones, or coastal barriers.

(g) Historic, archeological, or cultural resources on or eligible for inclusion on the National Register of Historic Places (NRHP). These include Native American cultural sites meeting NRHP eligibility criteria.

(4) Political jurisdiction(s) the proposed action or its reasonable alternatives would affect. and

(5) When appropriate demographic information and population estimates for the affected area, including a Bureau of Census map.

f. Environmental Consequences. The EA must provide concise analyses *only* for the potential environmental impacts that the no action, proposed action and its reasonable alternatives, if any, may cause. The EA must show that FAA took the required "hard look" at these impacts to support an FAA decision to prepare a FONSI or an EIS.

(1) Impact descriptions. This information must discuss the environmental consequences of the no action, proposed action, and, if any, each reasonable alternative. Based on those consequences, the approving FAA official will determine if a FONSI is appropriate or if FAA must prepare an EIS. Impact descriptions must provide clear, concise information justifying the level of impact severity for each affected resource.

(2) Special purpose laws. The EA should integrate impact determinations for special purpose laws if the no action, proposed action, or reasonable alternatives would affect any resources those laws protect. Integrating NEPA and non-NEPA requirements helps the responsible FAA official determine impact significance for NEPA purposes. It is also a good way to streamline other environmental reviews for airport actions. To promote EA review and reduce EA bulk, follow these steps:

(a) The EA should discuss any special purpose law applicable to the proposed action or any reasonable alternative. ARP encourages using hyperlinks to web-based documentation when possible.

(b) To facilitate EA review and reduce EA bulk, the EA should cross-reference specific pages in the EA's appendices or readily-available references that address special purpose law requirements. The pages noted should contain:

1. The analysis needed to meet the requirements of applicable special purpose laws and list any permits, licenses, or approvals the law requires.

2. Information supporting impact determinations. and

3. Proof of agency consultation needed to meet the applicable special purpose law.

(3) Determining environmental consequences. To determine context, intensity, and significance of potential environmental consequences, the responsible FAA official must use information the EA contains. FAA Order 1050.1E, Appendix A, provides FAA's significance thresholds for many resources FAA actions often affect. For convenience Table 7-1 (at the end of this chapter) lists the thresholds. The Table also provides intensity factors and other information for many thresholds to help the responsible FAA official determine the significance of airport-related impacts. The responsible FAA official uses each applicable threshold (where FAA has established one), intensity factors, other relevant information and consultation with resource agencies to determine if the proposed action or a reasonable alternative would cause a significant impact. The EA's Environmental Consequences section must disclose this information.

g. Mitigation. This information is critical in determining the impact level the no action, proposed action, or the reasonable alternatives, if any, would cause. This EA section describes the conceptual measures the sponsor, proposes to mitigate the identified environmental impacts. Conceptual measures are preliminary, qualitative explanations of each mitigation measure the sponsor develops in consultation with the responsible FAA official and expertise or jurisdictional agencies. These explanations should describe each measure's benefits (Order 1050.1E, paragraph 405g) by noting how the measure would avoid or reduce the adverse environmental effects.

(1) EA format. The EA's Mitigation section may be a stand-alone section or it may be combined with the Environmental Consequences section. Combining the sections may help the reader better understand the relationship of anticipated environmental consequences and the measures the airport sponsor would fulfill to mitigate those consequences. If preparers combine the sections, the section of the document should be "Environmental Consequences and Mitigation." In either format, the mitigation discussion should state clearly why the mitigation would reduce impacts of the proposed action or reasonable alternatives below applicable significance thresholds.

(2) Proof of consultation. The EA should include proof that consultation with the appropriate resource agency(ies) on the proposed mitigation has occurred. Cross-reference summaries of this coordination to pages in the EA's appendices to reduce the EA's bulk.

(3) Incorporating Part 150 noise mitigation in a proposed action. A Noise Compatibility Plan under 14 CFR Part 150 may only be used to identify measures to mitigate noise if the airport sponsor completes that study *concurrently* with the EA (or EIS). In this instance, the airport sponsor would identify noise mitigation measures at the

same time that FAA makes its decision concerning the proposed action, not before FAA makes that decision. The sponsor must identify its proposed and meaningful noise mitigation during the NEPA process. In addition, mitigation measures identified in a FONSI (or Record of Decision) may be funded using the Airport Improvement Program's discretionary account under 49 USC 47117(e). Therefore, there is no need for airport sponsors to use Part 150 studies to gain access to discretionary funding for noise mitigation measures.

(4) Using an Environmental Management System (EMS). Paragraph 9.e of this Order defines an EMS. EMS information addressing the effectiveness of mitigation used in other FAA actions is helpful in determining impact significance for the alternatives analyzed in detail. The responsible FAA official, airport sponsor, and consulted agencies may use information from an airport sponsor's EMS or another EMS for similar airport actions to determine if mitigation the EA contains would likely prevent significant impacts.

h. Cumulative impact analysis. An EA may need to analyze impacts on resources due to the proposed action and impacts on the same resources due to past, present, and reasonably foreseeable actions (see Order 1050.1E, paragraphs 405f.(1)(c) and 500c). This "cumulative impact analysis" may be needed to determine if any significant impacts would occur when the proposed action's effects are added to those other actions. For more details, see paragraph 1007.i of this Order.

i. Agencies and people consulted. In an EA appendix, list the agencies and people consulted to develop the EA or the information supporting it.

707. FAA'S ROLE WHEN A SPONSOR OR ITS CONSULTANT PREPARES AN EA. For NEPA purposes, FAA must independently evaluate the EA and take responsibility for its scope and content (40 CFR 1506.5(b)).

a. Aid the airport sponsor or its consultant. The airport sponsor, or its consultant normally prepares the EA. However, when the sponsor requests, the responsible FAA official and FAA airport planners should provide assistance (40 CFR 1506.5(a)). This often assistance may include:

(1) Helping the sponsor define airport design and planning standards needed for a proposed action.

(2) Helping the sponsor develop a Purpose and Need.

(3) Helping the sponsor develop the reasonable alternatives that meet airport planning standards and the Purpose and Need.

(4) Outlining impact concerns based on the proposed action and the identified reasonable alternatives, if any. and

(5) Advising document preparers on consultation, coordination, or other information the EA should contain.

b. Review the EA. The responsible FAA official must independently evaluate the EA to:

(1) Determine the EA's accuracy.

(2) Take full responsibility for the scope and content that addresses FAA actions.

(3) Determine if the EA meets the requirements of NEPA, applicable special purpose laws, and this Order, including responses to public comments. If over 3 years have elapsed since the other federal agency issued its FONSI, but ARP has not yet issued its FONSI, the responsible FAA official must prepare a written re-evaluation of the other agency's EA per paragraph 1401 of this Order.

(4) Help ensure the necessary agency review and consultation has occurred and that the EA adequately addresses their comments and concerns.

Note: Responses to comments on draft EAs need not be as detailed or as comprehensive as those prepared for EIS, but they must adequately respond to the comment.

(5) Ensure the EA identifies EA preparers. and

(6) Ensure the EA is suitable for a public hearing, if one will occur.

c. Request correction of deficiencies. If the responsible FAA official determines the EA is inadequate or does not provide the information noted in paragraph 707.a(1) – (5) or other information needed for an informed decision, the official must request that the airport sponsor correct the identified deficiencies. The airport sponsor is responsible for submitting a revised EA addressing the official's comments to FAA for review. EA preparers should carefully respond to these comments to ensure they address the official's specific comments. This minimizes the extent of needed revisions. These steps are needed to support the cover page statement noted in paragraph 707.f of this Order.

d. Resolving outstanding issues. Sometimes, the airport sponsor does not accept certain recommendations Federal, State, local or Tribal agencies provide. In other instances, the sponsor may not resolve an issue before submitting an EA to FAA for

review. Here, the responsible FAA official may help develop an agreeable solution to resolve outstanding issues. If that effort does not produce a solution, then the airport sponsor must provide written rationale for rejecting the recommendations or solutions. The responsible FAA official must forward that explanation to the following people:

(1) The "single point of contact" (see paragraph 302.a.(2)) or, if a contact doesn't exist, the agency providing the comment or recommendation.

(2) DOT's Assistant Secretary for Administration.

(3) If necessary, a tribal representative.

A minimum of 15 days must elapse between the time responsible FAA official sends the sponsor's explanation to these parties and the date FAA takes final action on a proposal. If the responsible FAA official is unable to resolve outstanding issues, it should immediately alert APP-400 of this situation, summarize the issue(s) causing the controversy and provide that summary to APP-400. This will enable APP-400 to understand the issues and assist the responsible FAA official as needed complete the EA.

e. Regional Counsel review of EAs.

(1) Required review. The responsible FAA official must request Regional Counsel review of EAs for airport actions:

(a) Opposed by a Federal, State, or local agency or a Tribe on environmental grounds or opposed by a substantial number of people the project affects.

(b) Affecting resources protected under Section 106 of the National Historic Preservation Act. or

(c) Involving a determination of use of resources protected under Section 4(f) of the Department of Transportation Act (recodified at 49 USC section 303c).

(2) Optional review. The responsible FAA official may request Regional Counsel review of EAs for airport actions:

(a) Involving other special purpose laws not discussed in paragraph 707.e.(1)(a) - (c). or

(b) Involving other circumstances that may benefit from Counsel review.

f. Required EA adequacy statement. The responsible FAA official must independently evaluate and determine the adequacy of the EA. The official also must

take responsibility for the document's scope and content (40 CFR 1506.5). When the official accepts the EA, the bottom of the EA cover must contain this signed statement:

"This environmental assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

_____ _____
Responsible FAA Official Date"

g. Recommend a finding. Based on the accepted EA, the responsible FAA official will recommend to the approving FAA official issuance of a FONSI or that FAA prepare an EIS. To support either recommendation, the responsible FAA official should either attach the accepted EA to a draft copy of a recommended FONSI or attach a written explanation stating why an EIS is needed.

708. DISTRIBUTING DRAFT EAs.

a. When a public hearing will occur under 49 USC 47106(c)(A)(i). When the sponsor will conduct a public hearing for a new airport, a new runway or a major runway extension per 49 USC 47106(c)(A)(i) (paragraph 402 of this Order), the official must provide the draft EA to the public for review so the public may prepare for the hearing. However, before providing the EA, the airport sponsor must file a draft EA with FAA for review to ensure the EA accurately presents FAA policy and concerns. After the sponsor revises the draft EA to address FAA's comments, the sponsor must issue the revised EA at least 30 days before the hearing occurs.

b. NEPA and special purpose laws. If an airport action warrants public review under NEPA or a special purpose law (paragraph 403 of this Order), the responsible FAA official should consider issuing the draft EA for a 30-day public review period. ARP strongly urges responsible FAA officials to provide this 30-day review period for actions involving properties protected under Section 106 of the National Historic Preservation Act, Section 4(f), or floodplain or wetland resources. Doing so fulfills public involvement requirements for these sensitive properties or resources.

c. Distributing the draft EA. The responsible FAA official should follow the instructions in paragraph 804 of this Order as a guide when distributing draft EAs.

709. FILING THE FINAL EA WITH FAA.

If a public hearing is held, it must occur before the sponsor files the final EA with FAA. Before filing a final EA whose draft was circulated for public review, the sponsor should ensure the final EA addresses substantive public concerns noted during the public hearing or other public review processes. After revising the EA so it addresses those concerns, the airport sponsor should send the EA to FAA. The airport sponsor should do so during the project

formulation step that AIP funding requires as noted in paragraph 302.b, or not later than the time the airport sponsor does the following, as appropriate:

a. Sends a letter to FAA describing the proposed action and seeking AIP funding for the action.

b. Requests unconditional FAA approval of a new or revised ALP.

c. Requests FAA approval for any action normally requiring an EA (paragraph 702 of this Order). or

d. Requests FAA approval of conveyance of government lands for airport purposes under 49 USC 47125.

710. PROCESSING THE FINAL EA. The responsible and approving FAA officials have roles in this step.

a. The responsible FAA official. This official ensures:

(1) The revised EA addresses important environmental issues agencies or the public raised during the public hearing or public review processes.

(2) The EA meets the requirements of this Order. and

(3) Accepts the airport sponsor's EA and signs the statement noted in paragraph 707.f.

b. The approving FAA official. Based on the responsible FAA official's recommendation, the approving FAA official may:

(1) Issue a FONSI for the proposed action. or

(2) Require FAA to prepare an EIS.

711. PUBLIC DISTRIBUTION OF A FINAL EA. Because an EA normally provides the analyses to support a Finding of No Significant Impact, use paragraphs 708, 804, 806, and 807 of this Order as needed for information on distributing EAs for public information.

712. EA TIME LIMITS AND THE NEED TO RE-EVALUATE OR SUPPLEMENT AN EA. The responsible FAA official must comply with the time limit requirements noted in Chapter 14 of this Order to comply with FAA Order 1050.1E, paragraph 411.

713. RE-EVALUATING OR SUPPLEMENTING AN EA. Substantial new information or a change in the project may require the responsible FAA official to write a reevaluation of an EA or supplement one. Paragraph 1401 of this Order provides information on re-evaluating or supplementing NEPA documents.

714. – 799. RESERVED.

	TABLE 7-1. SIGNIFICANCE THRESHOLDS	
RESOURCE CATEGORY	**ORDER 1050.1E THRESHOLD**	**FACTORS TO CONSIDER FOR AIRPORT ACTIONS**
Air quality.	When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS).	For **NEPA** purposes: The responsible FAA official must determine if air quality impacts of a reasonable alternative would exceed a National Ambient Air Quality Standard for the time periods analyzed. For **General Conformity** requirements under the Clean Air Act, as amended. Analyze only the proposed or preferred alternative.
Coastal Barriers.	None established.	FAA Order 1050.1E, Appendix A, Section 3 does not provide a threshold for these resources. After consulting with the jurisdictional U.S. Fish and Wildlife Service or Federal Emergency Management Agency office, the responsible FAA official should determine if the proposed action would cause either of the following conditions. • An unacceptable risks to human safety or property. • Adverse effects to the barrier's environmental resources that could not be satisfactorily mitigated.
Coastal Zone.	None established.	FAA Order 1050.1E, Appendix A, Section 3, does not provide a threshold for these resources. Because of the number of airports in coastal areas or that could affect coastal resources, ARP suggests the responsible FAA official consider the following factors, while addressing effects on coastal zone resources. • Did the CZM agency object to the sponsor's consistency certification? • If yes, has the sponsor changed the project so it is consistent with the applicable coastal zone management plan(s)? • If not, has the sponsor successfully appealed the CZM agency's consistency objection to the NOAA Assistant Administrator? • If the airport action includes facilities FAA will install, did the

		responsible FAA organization provide proof that it will install the necessary aviation facilities in a manner consistent with the approved coastal zone management plan to the maximum extent practicable? • Did the CZM agency agree or disagree with FAA's finding? • If not, has FAA changed the proposed installation to meet CZM plan?
Compatible land use.	See significance threshold for noise.	The responsible FAA official determine if any alternative would have land use consequences such as: • community disruption; • business relocations; • induced socioeconomic impacts; • wetland, or floodplain impacts; or • critical habitat alterations. Use the information from the factors addressing these specific issues to determine the severity of compatible land use effects.
Construction impacts.	See significance threshold for the resource(s) construction would affect.	Use the information for each applicable resource.
Section 4(f).	When the action's physical use would be more than minimal or its constructive use substantially impairs the 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	Determine if the proposed action or a reasonable alternative would eliminate or severely degrade the intended use of the Section 4(f) resource. That is would the proposed action or alternative physically or constructively use (i.e., substantially impair the use) that resource? The responsible FAA official should determine if mitigation is satisfactory to the agency having jurisdiction over the protected resource. If mitigation is unsatisfactory, more detailed, impact analysis is likely needed.

Farmlands.	When the total combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	
Fish, Wildlife and Plants.	For **Federally-listed species**: When the U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat. For **non-listed species**: Consider scientific literature on and information from agencies having expertise addressing on the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.	The responsible FAA official should consider the following factors in consultation with organizations having jurisdiction or special expertise concerning the protection and/or management of the affected species. The official should complete the added analysis for each reasonable alternative that would cause long-term (i.e., greater than 1 year) habitat impacts. • Consult with the appropriate agency(ies) to determine if an area sufficient to sustain species **commonly** found in the affected area would remain if the alternative were implemented. • Determine if the alternative would affect habitat supporting floral or faunal species **not** commonly occurring in the project area. If yes, In consultation with the appropriate agency(ies), determine if the alternative would affect a small tract of **sensitive** habitat needed for the survival or well-being of flora or fauna. Consider the locations of other nesting and breeding areas relative to the project's affected area and if resource agency(ies) indicate those areas could sustain the disturbed species.
Floodplains.	When notable adverse impacts on natural and beneficial floodplain values would occur.	The a responsible FAA official must decide if a "significant floodplain encroachment" would occur. To do so, the official must decide if the action's or reasonable alternative's floodplain encroachment would cause any of the following: • A considerable probability of loss of human life; • Future, extensive damage that would interrupt airport service or use of the proposed runway or other proposed airport facility. • A notable, adverse effect on the affected floodplain's natural and beneficial values. It is critical to note that an alternative causing a significant

		encroachment does not necessarily trigger a significant impact for NEPA purposes. That level of impact would occur **only** when an action would cause notable adverse impacts on the affected floodplain's natural and beneficial values. In those instances when no significant effect under NEPA would occur, the responsible FAA official must ensure the environmental document discloses action-induce effects on human life, NAVAIDS, and transportation facilities. In this case, the official should ensure the document clearly states those effects do not trigger a significant impact under NEPA.
Hazardous materials.	When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within a NPL site's boundary do not always trigger this significant threshold.	
Historical, architectural, archaeological, and cultural.	When an action adversely affects a protected property and the responsible FAA official determines that information from the State and/or Tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	
Light emissions and visual effects.	For **light emissions:** When an action's light emissions create annoyance to interfere with normal activities. For **visual effects:** When consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	
Natural resources and energy supply.	When an action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	

Noise.	For **most areas**: When an action, compared to the no action alternative for the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB is a significant impact. For **national parks, national wildlife refuges and historic sites, including traditional cultural properties**: FAA must give special consideration to these areas. The DNL 65 dB threshold may not adequately address noise effects on visitors to these areas. Consult the jurisdictional agency for more information to determine a significant noise impact.	ARP reminds the responsible FAA official that disclosing impacts having a DNL 3.0-dBA increase over noise-sensitive areas located between the DNL 60 and 65-dBA contours is for information purposes only. For NEPA purposes, those 3-dBA impacts do <u>not</u> cause significant adverse noise impacts below the DNL 65 dBA contour, except as noted in the 2nd column regarding national parks, etc.
Socioeconomic Environmental Justice, and Children's Health and Safety Risks.	For **Socioeconomic issues**: When an action would cause: • extensive relocation, but sufficient replacement housing is unavailable; • extensive relocation of community businesses that would cause severe economic hardship for affected communities; • disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities; • a substantial loss in community tax base. For **Environmental justice issues**: When an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. For **Children's Health & Safety Risks:** An action causing disproportionate health and safety risks to children, may indicate a significant impact.	

Solid waste.	None established.	ARP suggests that the responsible FAA official also determine if a reasonable alternative would cause one of the following conditions: • Airport-generated solid waste would exceed available landfill or incineration capacities or require extraordinary effort to meet applicable solid waste permit conditions or regulations. • Local, State or Federal agencies determine that substantial, unresolved waste disposal issues exist and may require more analysis.
Water Quality.	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	The responsible FAA official also consider if a proposed action or a reasonable alternative would threaten a public drinking water supply, sole source aquifer, or waters of national significance (e.g., Wild and Scenic Rivers, national refuges, etc.).
Wetlands, jurisdictional or non-jurisdictional.	When an action would: • Adversely affect a wetland's function to a protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer. • Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. • Substantially reduce the affected wetlands's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare. The last term includes cultural, recreational, and scientific public resources or property. • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber	

	resources of the affected or surrounding wetlands. • Promote development that causes any of the above impacts. • Be inconsistent with applicable State wetland strategies.	
Wild and scenic rivers.	None established.	

CHAPTER 8. FINDING OF NO SIGNIFICANT IMPACT (FONSI)

800. FAA'S ENVIRONMENTAL FINDING. The responsible FAA official uses an FAA-approved environmental assessment (EA) to determine the severity of a proposed action's potential impacts and to aid in complying with NEPA when an EIS is not needed. The approving FAA official's issuance of a Finding of No Significant Impact (FONSI) or a FONSI/ROD, as discussed in paragraph 805 completes FAA's NEPA review process for a proposed action.

a. Impact factors. To determine the level of environmental consequences that a proposed action or its reasonable alternatives, if any, would cause, the responsible FAA official uses information in an FAA-approved EA. The official focuses on the EA's discussions on environmental consequence severity, context, and significance and how mitigation would reduce those factors. The responsible FAA official would recommend that the approving FAA official issue a FONSI when the EA indicates that the selected alternative would not cause any significant environmental consequences.

b. Reconsidering impact significance. Table 7-1 of this Order provides the thresholds and factors to consider when determining impact severity and context. If mitigation would not reduce impacts below applicable significance threshold(s), significant impacts may occur. However, before recommending that FAA prepare an EIS, the responsible FAA official should decide if further impact evaluation or consultation with agencies having jurisdiction by law or expertise for the affected resources would be helpful. This effort:

(1) May help reduce expected impacts below significance thresholds.

(2) May further show that impact context and severity do not indicate significant environmental effects would occur.

(3) Would be a final effort the airport sponsor, the responsible FAA official, and agencies make to decide if any design changes or mitigation not previously considered or discussed would lessen impact severity and intensity.

c. Completing the analysis of impact significance. If further evaluation as discussed in paragraph 800.b indicates the impacts of the proposed action are below the applicable significance threshold(s), the approving FAA official may issue a FONSI. However, the official must base that FONSI on a revised EA, if necessary. FAA would need a revised EA in this instance, if the results of the process discussed in paragraph 800.b yields information or mitigation the EA did not contain. If the sponsor, FAA, or the agencies do not develop design changes or mitigation to reduce the impacts below applicable thresholds, the responsible FAA official would recommend that FAA prepare an EIS.

801. IF FAA's PREFERRED ALTERNATIVE DIFFERS FROM THE SPONSOR'S PROPOSED ACTION.

a. General. After reviewing a proposed FONSI and its EA, the approving FAA official may select an alternative that differs from the sponsor's proposed action, provided FAA's preferred alternative meets the action's purpose and need.

b. Notify the airport sponsor. The approving FAA official should notify the airport sponsor as soon as the approving FAA official identifies a preferred alternative differing from the sponsor's proposed action. Here, the airport sponsor and the responsible FAA official should try to reach consensus on the alternative FAA will select as its preferred alternative. Because the airport sponsor (not FAA) decides whether to carry out the preferred alternative for airport development, the sponsor may make one of the following choices:

(1) Concur in and implement FAA's preferred alternative.

(2) Reject FAA's preferred alternative.

(3) Propose an alternative not previously presented.

(4) Take no action to address the purpose and need.

c. Further environmental processing. If the approving FAA official plans to select a preferred alternative differing from the sponsor's proposed action, the responsible FAA official must further review the EA. This ensures the EA underlying the FONSI adequately addresses the applicable consultation and analytical requirements for resources FAA's preferred alternative would affect, if the EA does not already do so. Conversely, the approving FAA official may determine the preferred alternative has the potential to significantly affect a resource. In that case, the approving FAA official must notify the airport sponsor of that determination. If the sponsor is willing to proceed with the proposed project, the responsible FAA official will issue a Notice of Intent to prepare an EIS and continue the EIS process.

802. FONSI CONTENT. When the approving FAA official agrees with the responsible FAA official's recommendation to issue a FONSI, the approving FAA official will issue that finding.

a. General. To reduce a FONSI's bulk and to avoid repeating information the underlying EA contains, the responsible FAA official should prepare a FONSI containing the information noted in paragraphs 802.b – g. Here, the official must also attach the EA supporting the FONSI. The FONSI's text should provide enough detail to explain why the preferred alternative would not cause significant impacts and cite the specific pages in the attached EA

that supports statements the FONSI contains. If the responsible FAA official does not attach the EA to the FONSI, the FONSI must provide sufficient information to summarize expected impacts and to thoroughly support the Finding.

b. Heading. The heading of a FONSI with an attached EA should read:

"**DEPARTMENT OF TRANSPORTATION**
FEDERAL AVIATION ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT"

c. Identify the airport. Provide the name and location of the airport where the action would occur.

d. The Proposed Action and its reasonable alternatives. Briefly describe the Purpose and Need, the Proposed Action, and the reasonable alternatives considered (if any) including the No Action Alternative.

e. Assessment. Because the EA prepared for the FONSI is attached, refer the reader to the EA's Environmental Consequences section. The FONSI should do the following:

(1) Summarize why the action would not significantly affect environmental resources.

(2) Refer the reader to particular pages in the attached EA providing the reasons for those findings.

(3) Highlight pages in the attachments to the EA that contain statements from State and local governments addressing the project's consistency or inconsistency with community planning. and

(4) Highlight pages in the attachments to the EA that contain Tribal statements, if an action would affect Tribal places of religious and cultural significance or Tribal interests.

f. Mitigation measures. The FONSI must list conceptual mitigation measures that are part of the preferred alternative. To reduce bulk, the FONSI should refer the reader to the pages of the EA that explain why that alternative would not cause significant environmental impacts. If the preferred alternative was modified or mitigation was added to the alternative after the sponsor sent the EA to FAA for review, the FONSI should discuss the changes or the added mitigation that would eliminate significant impacts. The approving FAA official must ensure that if the sponsor undertakes the project, the sponsor will complete the mitigation measures the FONSI contains. See paragraph 808 of this order for more on completing these measures.

g. The approving FAA official's statement of environmental finding. The FONSI must include the following statement. The approving FAA official must sign the appropriate line.

> "I have carefully and thoroughly considered the facts contained in the attached EA. Based on that information, I find the proposed Federal action is consistent with existing national environmental policies and objectives of Section 101(a) of the National Environmental Policy Act of 1969 (NEPA) and other applicable environmental requirements. I also find the proposed Federal action [If FAA issues a mitigated FONSI,[1] include this statement: "with the required mitigation referenced above"] will not significantly affect the quality of the human environment or include any condition requiring any consultation pursuant to section 102(2)(C) of NEPA. As a result, FAA will not prepare an EIS for this action.
>
> APPROVED: _____ Date: _____
> DISAPPROVED: _____ Date: _____"

803. COORDINATING A PROPOSED FONSI WITHIN FAA. Other FAA organizations responsible for approving actions needed for the proposed airport development or airport action must review a proposed FONSI.

a. Regional legal sufficiency review.

(1) Required review. The responsible FAA official must request Regional Counsel review of FONSIs (and their EAs) addressing airport actions:

(a) Opposed by a Federal, State, or local agency or a Tribe on environmental grounds or a substantial number of people affected by the project.

(b) Affecting resources protected under Section 106 of the National Historic Preservation Act. or

(c) Involving a determination of use of resources protected under Section 4(f) of the Department of Transportation Act (recodified at 49 USC 303).

(2) Optional review. The responsible FAA official may request Regional Counsel review of FONSIs (and their EAs) for airport actions:

(a) Involving other special purpose laws. or

(b) Involving other circumstances.

[1] A "mitigated " FONSI" references or contains mitigation that would reduce otherwise significant environmental effects below applicable significance thresholds. When, FAA prepares a "mitigated FONSI" it will also issue Record of Decision (see paragraph 805).

Note: The Airports and Environmental Law Division (AGC-600) is available to assist Regional Counsel with these reviews.

b. Approving FAA official's approval. The approving FAA official, who is normally the regional Airports Office Division Manager, signs a FONSI for an action involving only the regional and/or district Airports Office(s).

c. Regional Administrator's approval. Some airport actions involve FAA organizations in addition to ARP. When this occurs, the Regional Administrator overseeing the regional office responsible for the EA must sign the FONSI (FAA Order 1100.154A, *Delegations of Authority*). However, before sending the FONSI to the Regional Administrator, the Airports Division Manager must ensure that managers of the other involved LOBs agree with the FONSI.

(1) The responsible FAA official's duty. The responsible FAA official should ensure that each FAA organization having a role in a proposed action has an opportunity to review the proposed FONSI (FAA Order 1050.1E, paragraph 406c). This will ensure coordination with the various organizations so each one knows the commitments it will have for a proposed action.

(2) The approving FAA official's duty. When the responsible FAA official completes this intra-agency review, the Airports Division Manager would recommend issuance of a FONSI to the Regional Administrator.

d. APP-400 review. ARP's Airport Planning and Environmental Division (APP-400) will review a proposed FONSI and its EA only when the responsible FAA official or the approving FAA official requests that review. However, APP-400 need not concur with the FONSI and its EA when this review occurs. To request APP-400's review, the responsible FAA official should send one copy of the EA and the FONSI to APP-400. APP-400 will not distribute the FONSI and EA to other FAA headquarters organizations. Normally, APP-400's review will not exceed 30 days. The responsible FAA official may proceed if APP-400 does not provide comments or information within the 30-day review time.

804. EXTERNAL REVIEW OF A PROPOSED FONSI. Public review of a proposed FONSI and its underlying EA often provides important information to the airport sponsor and FAA. Therefore, the reviews discussed below need to occur before the approving FAA official makes a final decision on a proposed action. The reviews may run concurrently with other Federal reviews.

a. Required Federal agency review. The responsible FAA official must make the proposed FONSI and its EA available to a Federal agency having jurisdiction by law or regulation over the action. The reviewing agency has 30 days to review the documents.[2] Contact the reviewing agencies to determine the number of copies of the FONSI and EA the agency requires to efficiently review the document. The responsible FAA official should ask agency representatives if they would accept electronic versions of the documents.

b. Required public review. The responsible FAA official must make the proposed FONSI and EA available for a 30-day public review period when any of the conditions in paragraph 804.b.(1) – (3) apply to an action. The responsible FAA official should encourage electronic distribution of the proposed FONSI and its related materials to reduce paper and accelerate document distribution.

(1) FAA will make the EA/FONSI available for public review for the reasons stated in paragraphs 805.(a)(1) - (2) of this Order (per FAA Order 1050.1E, paragraph 406e.(1)(a) and (b)).

(2) The airport sponsor provides an opportunity for a public hearing (see Chapter 4 of this Order), or an agency with jurisdiction over an action requests a hearing and supports that request with reasons the hearing would be helpful (40 CFR 1506.6(c)(2)).

(3) The proposed action would involve special purpose laws having public notice requirements separate from NEPA (per Order 1050.1E, paragraph 406e.(2)). Examples of these laws include, but are not limited to:

(a) Executive Order 11988 section 2(a)(4) addressing floodplains.

(b) Executive Order 1990 section 2(b) addressing wetlands.

(c) The Endangered Species Act. and

(d) Section 106 of the National Historic Preservation Act.

[2]When FAA determines an action would use a resource for which a Department of the Interior (DOI) agency has jurisdiction or specialized expertise, DOT/FAA procedures provide the DOI agency 45 days to review the Section 4(f) Determination (this meets DOT Section 4(f) procedures). To the fullest extent possible, FAA integrates this DOI review with the NEPA review process so that it runs concurrently. Consult APP-400, Regional Counsel, or AGC-600 if the Determination is solely for a historic property outside DOI's jurisdiction or for which DOI has no specialized expertise.

c. Optional public review. The responsible FAA official may decide that public review of a proposed FONSI would be helpful in making determinations of impact severities for actions not addressed in paragraphs 804.b.(1) – (3). In such cases, the responsible FAA official should provide a 30-day review period.

d. Notifying the public about the availability of a proposed FONSI. The responsible FAA official should use the instructions in paragraph 807 of this Order to notify the public about the availability of a proposed FONSI.

805. THE APPROVED FONSI AND THE NEED FOR A RECORD OF DECISION. When a proposed airport action involves one of the situations in paragraph 805.a.(1) – (4), the approving FAA official must determine the need to document the appropriate conclusions, findings, and assurances in a Record of Decision (ROD) based on data in an EA/FONSI (FONSI/ROD). The approving FAA official must issue the FONSI/ROD immediately following or at the same time as the FONSI's approval.

a. When to prepare a FONSI/ROD. ARP recommends that an approving FAA official issue a ROD for a mitigated FONSI (a "FONSI/ROD") when any circumstance listed in paragraph 805.a(1)-(4) of this Order exists:

(1) When an action is similar to one normally requiring an EIS.

(2) For an action without precedent.

(3) For actions redefined to include mitigation necessary to reduce potential significant impacts below applicable significance thresholds.

(4) For actions that are highly controversial on environmental grounds (see paragraph 9.i). If in doubt, consult Regional Counsel or the Office of the Chief Counsel (AGC-600).

b. FONSI/ROD contents. Chapter 13 provides guidance on preparing a ROD for an EIS. However, the responsible FAA official may tailor that information for a FONSI/ROD, ensuring the FONSI/ROD addresses the circumstances relevant to the action. In addition, the FONSI/ROD must state it is a decision document and that it is an order subject to the exclusive judicial review under 49 USC 46110 by the:

(1) U.S. Circuit Courts of Appeals for the District Columbia. or

(2) U.S. Circuit Courts of Appeal for the circuit in which the person contesting the decision lives or has a principal place of business.

c. FONSI/ROD availability. Paragraph 1303 provides information about providing notice of the availability of a ROD. Although those instructions discuss RODs prepared for EISs, the responsible FAA official should use that information for FONSI/RODs.

806. DISTRIBUTING AN APPROVED FONSI. After the approving FAA official or Regional Administrator signs a FONSI, the responsible FAA official should distribute the approved FONSI and its underlying EA as described here.

a. The official should send one copy of the EA and FONSI to the airport sponsor and any reviewing agency or other organization or person who provided substantive comments on the proposed action.

b. The responsible FAA official need not distribute the EA and FONSI outside the responsible region's geographical area, but FAA must make them available to anyone requesting them (40 CFR 1506.6(b)(1)).

807. NOTIFYING THE PUBLIC OF AN APPROVED FONSI'S AVAILABILITY. The responsible FAA region must ensure the approved FONSI and the EA supporting it are available to the public. The regional FAA office responsible for the action announces that availability.

a. Announcement content. This announcement must state the location(s) where the public may review the FONSI and its EA. Normally, these locations are the FAA's regional or district Airports office responsible for the proposed action, the sponsor's office, and public locations in the project area such as libraries, city halls, or county complexes. When requested, the responsible FAA official or the airport sponsor should provide copies of the FONSI/EA to anyone seeking them. Officials should ask the person requesting the documents if he or she would accept the documents in electronic format. The official should provide the documents at no charge or at the cost to reproduce the document.

b. Announcement methods. The most effective method is for FAA and the airport sponsor to jointly notify the public of FONSI/EA availability, using media serving the project impact area. Text at 40 CFR 1506.6 (b) discusses the methods to announce FONSI availability. The sponsor may announce the FONSI's availability for FAA, but that announcement must mention FAA. Announcement methods include:

(1) Publishing the FONSI in a local newspaper.

(2) Publishing a notice about the FONSI's availability through local media. or

(3) Placing the announcement and notice on internet sites.

808. COMMITTING AN AIRPORT SPONSOR TO MITIGATION IN A FONSI. The regional Airports Division must ensure airport sponsors complete the mitigation in FONSIs if the sponsor undertakes a proposed action the FONSI addresses. To do so, the approving FAA official must include in the letter granting unconditional ALP approval for the proposed action the mitigation measures the FONSI contains and that are the basis for that Finding. Alternatively, if the action involves an AIP grant, the official may include the measures as special grant assurances.

a. Environmental Management System. Paragraph 9.e defines an Environmental Management System (EMS). The regional airports office responsible for the proposed action should track an airport sponsor's mitigation compliance via an EMS.

b. Sponsor failure to carry out mitigation. A sponsor's failure to carry out mitigation measures could annul FAA's FONSI. Also, failure to carry out mitigation identified as special conditions of the ALP approval letter or grant could cause the sponsor to be in noncompliance with its grant. This could also lead to FAA canceling the earlier project approval or funding (49 USC 47106(d)) until the sponsor or its consultant prepares a revised EA or FAA prepares an EIS.

809. CHANGING A FONSI. If events discussed in paragraphs 1401.c(1) – (3) or 1402.b(1) or (2) occur, and they could affect environmental resources, the approving FAA official may need to change an approved FONSI.

a. EA adequacy. Based on the changed scenario or information, the responsible FAA official must determine if the FONSI's underlying EA must be re-evaluated or supplemented.

b. Contacting headquarters. The approving FAA official should contact APP-400 and AGC-600 or Regional Counsel, if FAA is changing mitigation measures that were conditions of project approval (FAA Order 1050.1E, paragraphs 402, 410, and 411). This consultation is needed to discuss a process for re-evaluating or supplementing the EA prepared for the proposed action.

c. When EA changes are needed. If the responsible FAA official requires the airport sponsor to revise the approved EA, FAA organizations and resource agencies that reviewed the original FONSI and its EA must review the changed documents and the mitigation they contain. Here, the approving FAA official who approved the original EA and FONSI (or that person's successor) must approve the revised documents. The revised FONSI and the revised EA supporting it must be publicly available to anyone seeking those documents.

810. - 899. RESERVED.

CHAPTER 9. THE ENVIRONMENTAL IMPACT STATEMENT (EIS), SCOPING, AND COOPERATING AGENCIES

900. EIS PURPOSE. Text at 40 CFR 1502.1 states an EIS's primary purpose is to be an "action-forcing tool" to ensure Federal government programs and actions meet NEPA's goals and policies. The EIS allows the agency to take a "hard look" at the environmental impacts the no action, the proposed action, and its reasonable alternatives would cause.

901 . EIS CONTENT. An EIS describes and discusses the significant environmental impacts the no action, proposed action, and its reasonable alternatives would cause. To do this, the responsible FAA official must use an interdisciplinary approach integrating natural and social sciences and environmental design arts (40 CFR 1502.6). An EIS must be a concise, comprehensive document (40 CFR 1502.8). It should be plainly written to allow people unfamiliar with an action and its reasonable alternatives to understand the environmental issues concerning the public, alternative ways to achieve the purpose and need, and the environmental impacts associated with those alternatives.

902. FAA'S LEAD AGENCY RESPONSIBILITIES. FAA is the lead Federal agency for most proposed airport actions. In general, FAA officials are responsible for preparing EISs addressing those actions.

a. EIS content. These officials must ensure the EISs properly analyze and disclose potential significant individual and cumulative environmental impacts proposed airport actions and their reasonable alternatives would cause. They also ensure EISs clearly present the information needed for the public to understand the proposed action, its reasonable alternatives, and the potential environmental effects the action and its reasonable alternatives would cause.

b. EIS schedule. Further, at the airports sponsor's request, the responsible FAA officials should consult with interested parties and FAA organizations involved in the proposed action, to develop realistic EIS preparation schedules.

(1) These schedules are based on an action's complexities and the complexities of the necessary environmental analyses. But, even when thoughtfully developed, events beyond FAA's control can occur that would alter the proposed schedules. Therefore, airport sponsors and other interested parties should acknowledge that such events do occur, and that FAA officials need the flexibility to respond to those events. As needed, responsible FAA officials should exercise discretion to address unforeseen events by lengthening or shortening schedules as appropriate.

(2) Chapter 5 of this Order discusses the linkage between airport planning and the NEPA. It discusses how sponsors who responsibly plan their project improve FAA's ability to meet project schedules.

Note: Other paragraphs in this chapter discuss FAA EIS responsibilities in detail.

903. AIRPORT ACTIONS NORMALLY REQUIRING AN EISs. FAA normally prepares EISs for the following airport actions.

a. An environmental assessment signaling a significant impact. The responsible FAA official prepares an EIS after reviewing an EA that indicates that proposed mitigation would not reduce the action's environmental impacts below significant impact thresholds.

b. EISs without EAs. If a responsible FAA official reviews a proposed airport action and finds it is likely to cause significant impacts, the official may start the EIS process. This approach saves time because FAA begins the EIS instead of the sponsor preparing an EA. FAA experience shows the following airport actions normally require an EIS.

(1) A new commercial service airport in a Metropolitan Statistical Area (MSA).[1] Unconditionally approving or Federally funding the first Airport Layout Plan or airport location for a new commercial service in an MSA. or

(2) A new runway in an MSA. Unconditionally approving or Federally funding a new runway to accommodate air carrier aircraft at a commercial service airport located in an MSA.

c. Exceptions to paragraph 903.b. Although paragraph 903.b lists those airport actions normally requiring EISs, FAA need not prepare EISs for these actions in all cases. FAA need not prepare an EIS when the responsible FAA official and approving FAA official determine that a sponsor-prepared EA adequately supports a finding that these proposed actions would not cause significant environmental impacts. Also, FAA may stop its EIS preparation when further analyses indicate the action would not cause significant environmental effects (40 CFR 1501.7(c)).

904. STARTING THE EIS. For airport actions, FAA is normally the lead agency. Therefore, FAA is responsible for preparing EISs for those projects or actions (40 CFR 1508.16).

a. Early application of NEPA. As discussed in detail in Chapter 5, FAA should consult with airport sponsors to ensure the sponsors begin environmental studies at an early stage in the planning process so environmental factors can be considered (40 CFR §1501.2, of CEQ's *Forty Most Asked Question Concerning CEQ's National Environmental Policy Act Regulations*, Question # 8). When FAA expects to require the airport sponsor to file environmental data for possible use in preparing the EIS, FAA will aid the sponsor by outlining the types of information required (40 CFR 1506.5).

[1] A metropolitan statistical area is a core area containing a substantial population nucleus and those adjacent communities having a high degree of economic and social integration with that core (Census Bureau).

b. EIS timing. When a proposed airport action warrants an EIS, the responsible FAA official should begin preparing the EIS as soon as possible after the airport sponsor presents its proposal to FAA (40 CFR 1502.5).

(1) When a proposal exists. In determining whether a proposal exists, FAA will consider whether the sponsor provided sufficient planning data or information to meaningfully evaluate alternatives and their potential environmental effects (40 CFR 1508.23). During the past decade, ARP has found that a lack of well-conceived and well-developed airport planning information or failure to resolve planning issues have caused substantial delays in the NEPA process. Many times these delays were not NEPA-related, but were due to a lack of good planning data. This lack of data severely hampered FAA's ability to meaningfully evaluate project impacts and prepare the EIS.

Note: Chapter 5 discusses the need to integrate NEPA and airport planning.

(2) Good planning data. As discussed in Chapter 5, good planning data are essential to begin and properly scope an EIS because they allow FAA to:

(a) Define a purpose and need.

(b) Preliminarily identify obvious sensitive environmental resources in the area surrounding the airport.

(c) Preliminarily identify environmental impacts to those resources due to carrying out the proposal and its alternatives. and

(d) Prepare a preliminary list of permits or other authorizations that may be needed to carry out the proposal or its alternatives.

c. EIS topics. Each EIS must provide a full, fair discussion of significant environmental issues a proposed action and its reasonable alternatives would cause. It must also address issues of interest to affected parties (40 CFR 1502.1). This ensures decisionmakers and the public know about reasonable alternatives that would avoid or minimize those impacts or enhance environmental quality.

d. EIS schedule. If the airport sponsor requests a schedule for completing the EIS, then the responsible FAA official should set time limits that are appropriate to the proposed action, considering complexity and analytical requirements, the purposes of NEPA, and other important national policies (40 CFR 1501.8). Review paragraphs 902.b(1) and (2) for more information.

905. SCOPING. Scoping is very useful in completing the duties this chapter discusses; therefore, it is a critical part of the EIS process. Agency officials use this open

process to determine the array of important issues an agency's EIS will address (40 CFR 1501.7).[2] In summary, scoping:

a. Helps to identify potentially significant environmental impacts related to a proposed action and its reasonable alternatives.

b. Specifies the roles, duties, and information FAA expects the cooperating agency to provide throughout the environmental review process. and

c. Helps to set the bounds for cumulative effects analysis (see paragraph 1004.i of this Order) because information exchanged during scoping often highlights past, present, and reasonably foreseeable actions in the project area. It also helps to identify connected actions and similar actions the EIS may need to address.

(1) Connected actions. These are actions that are closely related to the proposed action and should be discussed in the same EIS. These actions:

(a) May automatically trigger other actions requiring EAs or EIS.

(b) Cannot or will not occur unless other actions occur at the same time or earlier. and

(c) Are independent parts of a large action but depend on the larger action for justification.

(2) Similar actions. These are actions, that when viewed with other reasonably foreseeable actions, have similarities that provide the basis for evaluating their total environmental consequences. Normally, these actions have common timing or geography**.**

d. Builds confidence, trust, and a solid working relationship among interested parties.

e. Helps to educate interested parties and reduce conflicts or misunderstandings that may occur among them. and

f. Helps to ensure FAA's NEPA effort will focus on and address environmental concerns of most importance to agency and public.

906. WAYS TO ENHANCE SUCCESSFUL SCOPING. Effective scoping ensures an EIS addresses key issues concerning the public, governmental agencies, and Tribes. Scoping is not just one meeting or one information gathering effort. Scoping is a continuous process that begins soon after FAA publishes its "Notice of Intent to prepare an EIS" in the *Federal Register* (see paragraph 907.b). Scoping encourages resource

[2] CEQ's April 30, 1981, *Memorandum on Scoping Guidance.*

agencies and the interested public to present their ideas, alternatives, and concerns before EIS preparation begins. Early identification of issues and potential impacts is critical to efficient, effective EIS preparation. This effort focuses EIS preparers on the significant issues the EIS will analyze (40 CFR 1501.7(a)(2)). As the lead Federal agency for most airport actions, FAA is responsible for completing the scoping process.

a. Scoping goals. To enhance EIS preparation and content:

(1) Clarify legal responsibilities. This helps ensure the EIS identifies all necessary permits, licenses, approvals, or authorizations and information needed to obtain them.

(2) Clarify areas of special expertise. This helps ensure the EIS addresses each expertise agency's concerns, consultation requirements, and data needs.

(3) Invite other agencies with jurisdiction by law or having special expertise to participate in scoping and the EIS process as cooperating agencies. Before beginning EIS preparation, the agency official should decide which agencies would be cooperating agencies. The official should make this decision based on each agency's jurisdiction by law or special expertise regarding affected environmental resources. This cooperating agency effort enhances information exchanges, document preparation, and eventual agency decision making, especially for resources of particular concern to other agencies or that involve special purpose laws.

(4) Provide proposed procedures for overseeing EIS progress. This includes describing coordination efforts designed to avoid unnecessary delays, duplication, and misunderstanding among parties. Lead agency oversight includes assigning responsibilities for preparing EIS sections to cooperating agencies.

(5) Give cooperating agencies opportunities to review their roles. Each lead agency expects each cooperating agency to fulfill important roles during EIS preparation. Therefore, before beginning this preparation, the lead agency should define each cooperating agency's respective responsibilities. Completing a Memorandum of Understanding (MOU) often helps to do so. The MOU is a good way to ensure the lead and cooperating agencies:

(a) Thoroughly understand and agree on their duties and responsibilities for EIS input and reviewing the EIS.

(b) Ensure the agencies focus on issues of concern to them.

(c) Understand the need for timely, complete, and clearly written input.

(d) Understand how the agencies will resolve issues that may arise and the timelines to do so.

(6) Give the public opportunities to provide input and concerns. This ensures the agency responsible for preparing the EIS is aware of the major issues concerning the public about the proposed action.

b. Scoping techniques. Scoping should be a continuous, candid, and focused process. The participants should exchange ideas openly. They should present recommendations to change designs and reduce environmental impacts and to thoroughly address any controversial actions. Focus scoping on the following issues as needed:

(1) The sponsor's proposals to solve the problems it is facing.

(2) Reasonable alternatives that could help the sponsor solve its problems.

(3) Design constraints considered when developing those alternatives.

(4) Potential impacts to human and natural environments.

(5) Possible measures to limit or mitigate those impacts.

c. Preparing for scoping. When preparing for scoping, a comprehensive, clearly written package helps all scoping participants understand the project and subsequent NEPA process. The package should include information about the project, the EIS process, the lead agency's role in that process, and the decision making process that agency will complete for the proposed action. This allows interested parties to provide informed contributions during the scoping process' open discussions. The scoping package should:

(1) Briefly describe the scoping's purpose and procedures.

(2) Briefly describe the proposed action.

(3) Provide a preliminary list of alternatives and impacts.

(4) Make available any maps, drawings, or references that may aid the public in understanding the proposed action. and

(5) Clearly state that the lead agency has not made a final decision on the EIS's content.

d. Using an existing EA for information. When developing scoping information, the lead agency may use an available EA as a reference. However, if an EA is more than 3 years old, ensure the EA's information remains valid (see paragraph 1401 of this Order).

(1) As appropriate, the agency official may discuss the reasonable alternatives the EA contains. If the lead agency plans to delete one of those alternatives, the

responsible FAA official should consult the airport sponsor before doing so. When deleting an alternative, the official should note that fact during scoping and briefly explain why the alternative is no longer reasonable. Officials should note that they may increase the range of alternatives the EIS would address to ensure the EIS presents an array of reasonable alternatives that suits the action's complexity and meets NEPA requirements.

(2) The agency official should review the EA's Environmental Consequences section. This review helps the official set up a starting point for EIS scoping on possible project impacts. This review should compare the impacts the previous EA contains to the significant impact thresholds (Table 7-1 of this Order) for each resource the proposed action and its reasonable alternatives would affect. For those resources not significantly affected, the agency official may use that information to support reasons the EIS need not discuss those effects in detail.

(3) The EA often provides information about an approved action and the past, present, and reasonably foreseeable actions considered in the EA's cumulative analysis section. That information is helpful in EIS scoping potential cumulative impacts.

e. When no EA is available. When an EA is not available, the lead agency's scoping package should:

(1) Describe the proposed action and reasonable alternatives.

(2) Summarize possible environmental impacts that the proposed action and the reasonable alternatives could cause.

(3) Contain maps or drawings depicting the proposed action and its alternatives. and

(4) Contain any other reference material that would improve a layperson's understanding of the proposed action and its reasonable alternatives.

907. SCOPING AND THE TIMING OF THE NOTICE OF INTENT (NOI) TO PREPARE AN EIS.

a. NOI timing. To comply with 40 CFR 1501.7, the responsible FAA official must prepare and publish the NOI in the *Federal Register* as soon as practicable after the FAA decides to prepare an EIS.

b. Scoping's timing. *Before* conducting scoping, 40 CFR 1501.7 requires the lead agency to publish a "Notice of Intent to Prepare an EIS" (NOI) in the *Federal Register*. Therefore, the responsible FAA official should start scoping as soon as possible after FAA publishes the NOI.

908. THE NOTICE OF INTENT (NOI). The NOI is the lead agency's notice telling the public the agency will prepare an EIS (40 CFR 1508.22).

a. NOI contents. The NOI must:

(1) Briefly describe the proposed action, the name of the project proponent, why the proponent wants to undertake the project, when and where the proposed action would occur, and the alternatives under consideration.

(2) Briefly describe an agency's proposed scoping process, including information about a scoping meeting (date, place, time), if the agency will hold one or more scooping meetings.

(3) Provide the name and telephone number of the responsible FAA official who will answer questions about the proposed action and the EIS. and

(4) If an EA was prepared, state whether that document is available and where the public may review it.

b. Publishing the NOI. As paragraph 907.a of this Order notes, FAA must publish the NOI in the *Federal Register* soon after deciding to prepare an EIS. In filing a NOI with the Office of the Federal Register, the responsible FAA official must follow the procedures the Office of the Chief Counsel's Regulations Division (AGC-200) has established. The official may use local media as other ways of alerting the affected area about the pending EIS.

909. WITHDRAWING AN NOI. Sometimes, after issuing an NOI, FAA's analyses suggest the proposed action and its reasonable alternatives would not cause significant impacts. In other cases, FAA may begin preparing an EIS because it is unsure that mitigation would effectively reduce expected adverse impacts below significance thresholds, but later finds that mitigation would eliminate the anticipated significant impacts. In either case, FAA may change its earlier decision to prepare an EIS (40 CFR 1501.7(c)).

a. Publish notice in the *Federal Register*. When this occurs, the responsible FAA official should publish a notice in the *Federal Register* and local media telling the public it is withdrawing its intent to prepare an EIS. The notice should tell the public that the sponsor, its consultant, or the consultant FAA selected to prepare the EIS will prepare an EA for the project. The notice should also clearly explain why FAA is not preparing an EIS.

b. Start an EA. After completing these steps or while doing so, the responsible FAA official should follow the EA process discussed in Chapter 7 of this Order. The responsible FAA official may later decide that circumstances warrant public review of a proposed FONSI pursuant to paragraph 804 of this Order.

910. RESPONSIBLE FAA OFFICIAL SCOPING DUTIES. To fulfill FAA's lead agency role and enhance scoping as discussed in paragraph 906, the responsible FAA official should do the following.

a. Determine interested parties. The official should contact ARP personnel and FAA organizations that will have a part in the proposed airport action. The official should also contact other Federal, State, and local agencies or Tribes having an interest or role in the proposed action. Contacting local officials about existing and future land uses and other projects in the airport vicinity is also very helpful. Many of these parties often suggest possible alternatives and identify potential environmental impacts, important issues, and conceptual mitigation. It is wise to include parties opposing the action and try to reach a consensus on issues the EIS will address. This last step may help improve the efficiency of EIS preparation because it ensures the EIS addresses views of affected parties.

b. Identify other requirements. The responsible FAA official working with Federal, State, local, or Tribal governments can identify environmental review or consultation requirements beyond NEPA. This step helps FAA to efficiently prepare the EIS. It also helps Federal agencies that are involved in the action prepare concurrent analyses or studies necessary to process other authorizations such as Clean Water Act Section 404 permits. This cooperation increases the number of legal requirements the EIS will address and allows approvals or authorizations to occur within similar timeframes. It also helps to reduce repeating efforts, data, and documentation.

c. Identify cooperating agencies. As the lead agency for most airport actions, FAA is ultimately responsible for an EIS's scope and content. However, the responsible FAA official should invite certain agencies or Tribes to be cooperating agencies. These parties normally have jurisdiction by law over the action's environmental issues or impacts. They typically include Federal, State, or local governmental agencies or Tribes having permitting, approval, or veto authority over some aspect of the proposed action.[3] The responsible FAA official may also invite agencies having special expertise to serve as cooperating agencies.

(1) Cooperating agencies aid FAA's EIS preparation and review by focusing on impacts to resources under their jurisdictions or for which they have expertise. Their input is critical, especially for the resources that special-purpose laws and regulations protect. The primary intent of this effort is to ensure EIS completeness, thereby allowing a cooperating agency to use FAA's EIS to meet the cooperating agency's environmental review needs.

(2) Cooperating agency input helps the responsible FAA official identify past, present, and reasonably foreseeable actions. The responsible FAA official should seek help from these agencies to identify public environmental documents that other agencies

[3] CEQ memorandum entitled, *Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act*, dated January 30, 2002, provides more information. http://ceq.eh.doe.gov/nepa/regs/cooperating/cooperatingagenciesmemorandum.html

have completed, are preparing, or will prepare. This step helps to more thoroughly define the EIS's scope of cumulative impacts.

d. Focus EIS content. Although FAA is ultimately responsible for EIS scope and content, earlier paragraphs stress the need to candidly discuss potential impacts with jurisdictional or expertise agencies. This effort is helpful to the responsible FAA official because it highlights the information and methods needed to scientifically and comprehensively analyze the action's impacts in proportion to their significance (40 CFR 1502.2(b)). This step also helps the responsible FAA official focus the EIS on those resources the proposed action and its reasonable alternatives would significantly affect.

e. Identify impacts that are not significant. The responsible FAA official should lead discussions to determine if scoping participants have concerns about FAA's preliminary analyses or methodologies. Based on preliminary analyses, the responsible FAA official should identify those resources FAA believes the proposed action is unlikely to significantly affect. For those resource impacts, the official should state that the EIS would provide only the information needed to show why the impacts are not significant. In fact, the information should be similar to that found in an EA to keep the EIS to a manageable size while allowing readers to focus on significant impacts.[4]

f. Explain the timing of FAA's Record of Decision. This explanation helps the public understand the decision process FAA completes for most airport actions that are subjects of EISs. The official should explain that FAA's completion of a final EIS does not mean the approving FAA official will immediately make a decision on the proposed action. Before doing so, FAA must prepare its Record of Decision (ROD) for the proposed action. During this "wait period," the responsible FAA official may review and consider any substantive comments that FAA received on the final EIS. The official must ensure the comments and FAA responses to are included in the ROD.

g. Determine other scoping needs. This helps determine if the following steps are needed to effectively complete the EIS process.

(1) Conduct other scoping opportunities to determine other substantive issues, or to integrate the environmental review with other FAA planning or administrative requirements.

(2) Setting time limits for providing input or completing reviews.

(3) Adopting procedures to combine EIS preparation processes. and

(4) Setting page limits.

[4] As an alternative, the responsible FAA official may wish to suggest referring readers to other documents that discuss the insignificant impacts and that FAA will include those references for the EIS.

h. How FAA will address comments an agency fails or refuses to provide during scoping. No agency or Tribe should deliberately withhold known critical information during scoping. Doing so with the intent to later delay or stop an action is unacceptable. A cooperating agency has a duty to raise issues or participate in scoping and EIS preparation if they can reasonably do so. Generally, if a cooperating agency fails to cooperate, the lead agency may not find the cooperating agency's comments persuasive at a later stage.[5] If this occurs, the responsible FAA official should document FAA efforts to coordinate with non-responsive agencies.

911. THE AIRPORT SPONSOR'S ROLE DURING SCOPING. The airport sponsor, not FAA, proposes airport development and decides if it will build and operate that development. Therefore, the airport sponsor plays a critical scoping role because it has knowledge about the airport's operations and its relationship with the surrounding affected community.

a. Review effects of various proposals on airport operations. The sponsor, other parties, and FAA's Air Traffic Office work together to safely and efficiently operate an airport.

(1) The airport sponsor should evaluate information discussed during scoping to help the responsible FAA official or FAA airport planners determine how impacts noted during scoping could potentially affect airport operations. Sponsor input will be important later when FAA develops the range of reasonable alternatives the EIS will analyze in detail.

(2) Sponsor awareness of and concurrence with potential mitigation concepts within its authority is crucial. These factors promote the sponsor's acceptance of the measures needed to reduce the action's environmental impacts and help make the environmental review and decision making processes more efficient.

b. Act as liaison. Often, the sponsor is the principal link between FAA and the affected communities. Therefore, the sponsor can fulfill important liaison roles during scoping.

(1) Inform the public. The airport sponsor is often the best entity to explain efforts that have occurred in the airport area to make the airport compatible with surrounding land uses. Providing that information and explaining its concerns about substantive issues allows the airport sponsor to tell the public it is aware of public concerns and is willing to address them.

(2) Exchange information. Information exchanges among the sponsor, interested parties, and FAA allow the public to fill important roles in the project review process. This effort may help the sponsor more clearly explain its rationale for doing or

[5] See *Forty Most Asked Question Concerning CEQ's National Environmental Policy Act Regulations*, Question 14.d.

not undertaking certain duties at its airport. Exchanging information allows people to feel they are participants, not spectators. As a result, they often have a sense of being part of the sponsor's effort to develop an airport action. Studies of past EIS Best Practices show such efforts often promote public acceptance of a proposed action, even if the action is unpopular. This acceptance occurs because the public is better able to understand what the airport sponsor and FAA need to do to operate the airport safely and efficiently.

912. FAA'S ROLES AS A COOPERATING AGENCY. FAA will be the lead agency for most airport actions. However, FAA may be a cooperating agency in special situations, such as reuse of a military base as a civilian airport or conveyance of Federally-owned land for an airport action. When this occurs, the responsible FAA official should review information in paragraphs 910.c(1) and (2) regarding a cooperating agency's roles during scoping.

913. – 999. RESERVED.

CHAPTER 10.
THE ENVIRONMENTAL IMPACT STATEMENT

1000. GENERAL. This chapter presents the content requirements for an environmental impact statement (EIS).

1001. EIS PURPOSE. Regulations at 40 CFR 1502.1 state that an EIS's primary purpose is to be an "action-forcing tool" to ensure Federal government programs and actions meet NEPA's goals and policies.

a. Through an interdisciplinary approach, integrating natural and social sciences and the environmental design arts (40 CFR 1502.6), an EIS allows agency decision makers to take a "hard look" at environmental impacts of major Federal actions under the agency's purview. These actions focus on the reasonable alternatives, which are developed during scoping that could solve operational, capacity, safety or security problems that airport sponsors encounter. EISs describe individual and cumulative significant environmental impacts those alternatives could cause and conceptual measures to mitigate their impacts.

b. An EIS is a vehicle for providing the interested public and agencies with details about a proposed Federal action's purpose and need.

c. An EIS must be a concise, plainly written document (40 CFR 1502.8). This enables those not taking part in EIS preparation to understand issues facing an airport sponsor and the environmental effects of the various reasonable alternative ways to address those issues.

d. The approving FAA official must identify the agency's preferred alternative in FAA's final EIS (see paragraph 1007.e.(7)).

e. The final EIS (FEIS) presents public comments on the draft EIS's (DEIS) content and FAA's responses to those comments.

1002. WHEN TO PREPARE AN EIS. The responsible FAA official should recommend an EIS after determining the severities of impacts discussed in an airport sponsor's EA. The official could recommend an EIS without an EA, after reviewing an airport sponsor's project proposal, or determining the proposed action normally requires an EIS (see paragraph 903). Quick decisions to prepare an EIS are critical. Such decisions help ensure the EIS is available to the approving FAA official when the official receives other important decisionmaking material about a proposed action.

1003. EIS PREPARATION. To meet 40 CFR 1506.5(c), FAA (as the lead agency) remains responsible for selecting an EIS contractor, leading scoping, providing guidance, participating in EIS preparation, and completing the NEPA process.

a. Contractor selection and oversight. As the lead agency for most airport actions, FAA is ultimately responsible for preparing an EIS addressing those actions and ensuring the validity of an EIS's scope and content. However 40 CFR 1506.5(c) allows Federal agencies to select contractors to help the agencies prepare EISs. Knowing that ARP retains final decision authority regarding the contractor it will select to help preparing the EIS per 40 CFR 1506.5(c), personnel should note the following:

(1) Airport sponsors can assemble a "short list" of contractors they believe are qualified to prepare an EIS.

(2) The responsible FAA official may select a contractor from that "short list," but the official is not obligated to limit his or her selection to that list.[1]

(3) Airport sponsors normally pay the contractor's costs during EIS preparation, but ARP later reimburses the sponsor for most of those expenses.

(4) Although sponsors initially finance the contractor's costs in preparing the EIS, FAA retains the authority and responsibility for overseeing and controlling the contractor's EIS-related work.

b. "NEPA-like" state or agency. See paragraph 9.m of this Order for information on how these arrangements affect EIS preparation. FAA urges these agencies or states to sign a Memorandum of Understanding (MOU) as discussed in paragraph 1003.c. The MOU will clearly define the environmental responsibilities FAA and the agency or state will complete as they work as joint lead agencies to analyze an action's environmental effects.

c. Memorandum of Understanding (MOU). This document is a contract that explains clearly the ground rules and arrangements that FAA (or the NEPA-like agency or state) and the airport sponsor agree to meet during the time FAA is preparing an EIS for an airport project. The MOU:

(1) Explains the relationship among FAA, a NEPA-like agency or state, if applicable, the airport sponsor, and the EIS contractor FAA selects to help it prepare the EIS.

(2) Specifies the duties and relationships among FAA, a NEPA-like agency or state, if applicable, the airport sponsor, and the EIS contractor during EIS preparation.

(3) Specifies that FAA selects the EIS contractor and only it directs the contractor's activities during EIS preparation (see footnote 1).

(4) Clarifies that the sponsor funds the contractor's work.

[1] FAA and NEPA-like agencies or states may jointly select an EIS contractor (40 CFR 1506.5(c)).

(5) Requires the selected contractor to prepare a Plan of Study.

(6) Contains terms for stopping or ending the MOU.

d. Disclosure statement. Before starting EIS preparation, the EIS contractor and the subcontractors working with it must verify to FAA that they have no financial interest in the outcome of the action the EIS will address. Consultants working on the EIS may not bid on any future actions the EIS addresses until the approving FAA official issues a Record of Decision based on that EIS. This prohibition does not prevent the airport sponsor from selecting the EIS contractor for later phases of the action. However, that selection must occur after free and open competition and there can be no implied or suggested guarantee that the sponsor would favorably consider the EIS contractor.

e. Payment for consultant work. To meet the sponsor's ordinary contract management practices and expenses, the sponsor must responsibly administer the EIS consultant's contract. To help the sponsor do so, the responsible FAA official should tell the sponsor when the contractor provides work FAA finds technically acceptable for the EIS. Normally, this will enable the sponsor to authorize payment to the contractor for that work. As an alternative and at the sponsor's request, the responsible FAA official may provide satisfactory contractor work to the sponsor before FAA publishes the work in a draft or final EIS. However, the sponsor should note that when FAA does so, the public might request that material under the Freedom of Information Act.

1004. LIMITATIONS ON ACTIONS DURING THE NEPA PROCESS. Based on regulations at 40 CFR 1506.1, there are limitations on the actions that FAA and the airport sponsor may take while FAA is preparing an EIS.

a. Actions having adverse effects or that limit alternatives. ARP and an airport sponsor may not take any action concerning a proposal that would cause adverse environmental effects or limit the range of reasonable alternatives the approving FAA official would consider while an EIS is being prepared. If the official learns that an airport sponsor is planning to take such an action within FAA's jurisdiction during EIS preparation, the approving FAA official will notify the sponsor that FAA will take appropriate action to ensure the objectives and procedures of NEPA are achieved (40 CFR 1506.1(b)).

b. ALP approvals and land purchases. See paragraphs 202.c(4) and 204 for limits on ALP approvals and land acquisitions, respectively, during EIS preparation.

c. Plans and designs for the NEPA process. Plans or designs for the proposed action and its reasonable alternatives must be developed to a level needed to properly analyze their environmental consequences. Normally, this analysis requires no more than 25 percent of an alternative's overall project design ("25% design level"). If FAA becomes aware that a sponsor is proceeding to final design level while an EIS is being prepared, the approving FAA official must do the following, unless the conditions in paragraph 1004.d apply:

(1) Notify the sponsor such actions may raise issues of compliance with 40 CFR 1506.1 and are taken at its own risk.

(2) Tell the sponsor that such action could undermine public confidence in the NEPA process, lead to a perception that ARP is pre-judging the proposed project's merits before it completes the NEPA process, and that this perception significantly increases the likelihood of adverse comments, opposition, and risk of legal challenge. Further, such actions are likely to require additional effort to complete the EIS process and could substantially delay ARP's decision.

(3) Tell the sponsor that ARP will not fund actions that would bring into question its credibility or the public's perception of ARP's objectivity and impartiality during the NEPA process. and

(4) Tell the sponsor that ARP does not and will not make any commitment for any project regardless of its level of design, except to proceed with the proper NEPA process, provided the proposed project remains viable, reasonable, and feasible.

d. Plans and designs needed for permits or assistance beyond NEPA. An airport sponsor may need to develop plans or designs beyond the "25% design level" noted in paragraph 1004.c. that may be needed to support an application for Federal, State, or local permits or assistance (40 CFR 1506.1(d)). In those cases, sponsors should consult with ARP and the permitting agencies to determine the level of plan or design needed to meet permitting or assistance requirements. This helps to streamline the NEPA process by integrating other environmental review requirements and NEPA. It also helps to reduce paperwork (40 CFR 1500.4(k)) and eliminate duplicating State and local procedures (40 CFR 1500.4(n)).

1005. ADOPTING ANOTHER FEDERAL AGENCY'S EIS. Text at 40 CFR 1506.3 allows ARP to adopt some or all of another Federal agency's draft or final EIS provided the EIS is acceptable under NEPA. When ARP adopts another agency's document, the responsible FAA official should complete these following steps.

a. Ensure the EIS meets FAA needs. The responsible FAA official must complete these following steps before adopting another Federal agency's EIS per Order 1050.1E, paragraph 404.d:

(1) Independently review the material and take full responsibility for the scope and content of information addressing FAA actions.

(2) Determine if the material adequately addresses airport development needs and the requirements of this Order.

(3) Request the lead agency responsible for the EIS to make the changes necessary to address ARP's concerns.

(4) If more than 3 years have elapsed since the other agency issued its FONSI and ARP has not yet issued its own FONSI, prepare a written re-evaluation of the other agency's EA. Follow the instructions in paragraph 1401 for re-evaluating NEPA documents.

(5) Prepare a supplement to the EIS if the lead agency will not revise the EIS to address FAA concerns. That supplement should contain only the information FAA determines necessary to comply with this Order or other information addressing safe, efficient airport operations.

b. Notify EPA. When FAA plans to adopt an EIS, the responsible FAA official must prepare a written notice and send it to EPA. The notice tells the public that FAA is adopting another Federal agency's EIS. EPA will publish a notice that FAA is adopting the EIS in the *Federal Register*.

c. Re-circulating an adopted EIS. This step varies with FAA's role and the document's content.

(1) When FAA is a cooperating agency. Here, FAA must independently review the document.

(a) If the responsible FAA official determines the EIS adequately addresses FAA's comments and concerns, it may adopt the EIS without re-circulating it.

(b) FAA may also adopt only a portion of a lead agency's EIS and reject that part of the document with which FAA disagrees. Here, the responsible FAA official must explain why FAA adopted only a portion of the EIS (40 CFR 1506.3(a)). If FAA needs to supplement the EIS because it does not address FAA concerns, FAA must circulate the supplement as a draft for public review and comment. When this occurs, FAA should circulate the adopted EIS portions with that supplement to ensure the reader understands the supplement's relationship to the adopted EIS and the EIS's content.

(2) When FAA adopts an EIS, but FAA is not a cooperating agency. This rarely occurs because an adopting agency normally acts as a cooperating agency. But if the situation arises, the responsible FAA official must do one of the following:

(a) If the proposed action FAA is considering is essentially the same as the lead agency's, the responsible FAA official may re-circulate the EIS as a final version and inform the public FAA is doing so.

(b) If the proposed action FAA is considering is not essentially the same as that of the lead agency, the responsible FAA official must circulate the EIS as a draft and follow the draft EIS review and processing procedures noted in Chapter 11.

d. When to file an adopted EIS with EPA. When FAA is a cooperating agency, the responsible FAA official need not file the adopted EIS with EPA for circulation. When FAA is not a cooperating agency, the responsible FAA official must file 5 copies of the adopted draft or final EIS with EPA (see paragraphs 1101 and 1211, respectively).[2]

Note: FAA may adopt information the airport sponsor or other parties provide for use in preparing an EIS. However, before doing so, the responsible FAA official must independently review that information and take responsibility for its scope and content.

1006. EIS CONTENT. An EIS focuses on significant environmental impacts. To do this, the responsible FAA official must use an interdisciplinary approach integrating natural and social sciences and the environmental design arts (40 CFR 1502.6). The EIS must be a concise, plainly written, comprehensive document (40 CFR 1502.8). This enables those not taking part in EIS preparation to understand the issues and intelligently analyze the no action alternative, the proposed action, reasonable alternatives, and the potential environmental impacts of those actions and alternatives.

1007. EIS FORMAT. When preparing an EIS, the responsible FAA official must follow the format described below (40 CFR 1502.10). This encourages good analyses and a clear presentation of the no action, the proposed action, and the reasonable alternatives FAA is considering. This format also provides the approving FAA official and interested parties with information they need to fully understand the proposed action, the reasonable alternatives, and their expected environmental impacts.

a. Cover sheet. Except for information in paragraph 1007.a(6), a cover sheet must include the information listed in 40 CFR 1502.11.

(1) At the top of the sheet, place these words:

"DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
(DRAFT, FINAL, or SUPPLEMENTAL) ENVIRONMENTAL IMPACT STATEMENT"

(2) Identify the lead agency and cooperating agency(ies), if any.

(3) Provide the title of the proposed action with the city(ies), state(s) and county(ies) where the action would occur.

(4) For a DEIS, add text similar to this:

"The FAA presents this environmental impact statement for review pursuant to the following public law requirements."

[2] Send 1 paper copy of the EIS and its appendices and 4 CD copies of those materials.

Note: Examples of those requirements include Section 102(2)(C) of the National Environmental Policy Act of 1969, the special purpose laws that apply to the proposed action , such as Section 4(f) of the DOT Act.

(5) Provide the name, mailing address, e-mail address, and telephone number of the responsible FAA official who can give further information about the proposed action.

(6) Regarding comment submittal, ARP bases its EIS comment submittal due date on the date EPA plans to publish the EIS's "Notice of Availability" in the *Federal Register*. Because EPA sometimes experiences problems publishing that Notice, we recommend not inserting the final comment due date on the EIS's title page. Instead, the responsible FAA official should place the date in the FAA cover letter sending the EIS to a recipient.

b. Summary. The Summary must stress the major conclusions, areas of controversy, if any, and issues the approving FAA official must decide (for example, the preferred alternative). The summary should not exceed 15 pages. For airport actions, the summary should highlight the following items:

(1) The sponsor's proposed action.

(2) Those parts of the EIS presenting the rationale for the proposed action.

(3) Major environmental concerns and how the EIS addresses them.

(4) Highly controversial issues (see paragraph 9.i. of this Order, if needed).

(5) Proposed conceptual mitigation measures. Specify those measures FAA expects to make conditions of approval, such as grant assurances. Include any monitoring requirements.

(6) Reasons FAA addressed certain items in detail, while it dismissed others from analyses.

(7) Any scoping process that occurred, including the time and place of a scoping meeting. Provide the following information:

(a) Major areas of concern.

(b) Items identified for detailed analyses.

(c) Reasonable alternatives considered and a summary of why those alternatives are reasonable.

(d) The process used to resolve issues. and

(e) The responsibilities assigned to scoping participants.

(8) The sponsor's proposed action preferred alternative and FAA's preferred alternative in the FEIS (paragraph 1007.e(7)). ARP encourages the responsible FAA official to identify the environmentally preferred alternative in the FEIS (CEQ's *Forty Most Asked Question Concerning CEQ's National Environmental Policy Act Regulations,* Question 6b**).**

Note: The FEIS must identify FAA's preferred alternative unless another law prevents FAA from doing so (40 CFR 1504.(e)). If FAA knows its preferred alternative when it prepares the DEIS, the DEIS must identify FAA's preferred alternative.

(9) The approving FAA official's reason for identifying the preferred alternative, unless another law prevents FAA from expressing that alternative (40 CFR 1502.14(e)).

(10) Information on the status of compliance or expected compliance with applicable permits, approvals, or license requirements. Include any known problems the airport sponsor may have in getting those authorizations.

(11) The FEIS summary must contain the following approval language:

> "After careful and thorough consideration of the facts contained herein, and following consideration of the views of those Federal agencies having jurisdiction by law or special expertise on environmental impacts described, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in section 101(a) of the National Environmental Policy Act of 1969."

c. Table of Contents. Text at 40 CFR 1502.10(c) requires a Table of Contents to help readers find major topics in the EIS. This should list the chapters, figures, maps, tables, and exhibits in the EIS. Include lists of appendices, acronyms, and references.

d. Purpose and Need. See paragraph 706.b of this Order for a general discussion on this topic. In addition, review the following information as appropriate.

(1) The purpose and need for streamlined airport actions under 49 U.S.C. Subpart III, section 47171(j). For projects addressing airport capacity enhancement projects at the nation's congested airports.[3] Federal reviewing agencies must give substantial deference to the purpose and need the DOT Secretary defines. However, this section requires the Secretary to request and consider comments on project purpose and need from interested people and governmental entities. This deference also applies to

[3] 49 USC 47175.(2) defines a congested airport as, "…an airport that accounted for at least 1 percent of all delayed aircraft operations in the United States in the most year for which data is available and an airport listed in table 1 of the Federal Aviation *Administration's Airport Capacity Benchmark Report 2001*." Contact ARP's Airport Planning and Environmental Division for more information if needed

aviation safety projects and aviation security projects (See 49 U.S.C. 47171(j)). Chapter 15 of this Order provides more information on streamlining.

(2) Sponsor prepared EAs. If the sponsor prepared an EA, FAA may use the EA's Need for the Proposed Action section for the EIS, but only if the responsible FAA official determines the EA fully explains why FAA is considering the proposed action.

e. Alternatives, including the No Action alternative. See paragraph 706.d of this Order for a general discussion of alternatives. In addition, for EIS preparation, review the following instructions and see paragraph 706.b(3) for aviation forecast standards applicable to alternatives.

(1) Alternatives for streamlined airport projects under 49 U.S.C. Subpart III, section 47171(k). For projects addressing airport capacity enhancement projects at the nation's congested airports (see footnote 3). Federal agencies must consider only the alternatives the DOT Secretary has determined reasonable. However, this section requires the Secretary to request and consider comments on project purpose and need from interested people and governmental entities. This deference also applies to aviation safety projects and aviation security projects (49 USC 47171(k)).

(2) Alternatives for airport projects not subject to streamlined review under 49 U.S.C. Subpart III, section 47171(k). This section should present the no action alternative, the proposed action, and the range of alternatives that are reasonable solutions to the problem(s) the sponsor wants to resolve and fulfill FAA's mission. Text at 40 CFR 1502.14(c) requires agencies to examine alternatives outside FAA's jurisdiction, if they are reasonable solutions to the sponsor's problem(s). This may include alternatives the public, an agency, or a Tribe proposed during scoping, provided the alternatives meet the purpose and need.

(3) If an EA precedes an EIS. If an EA precedes an EIS, the scoping process for the EIS must include the alternatives the EA discussed. The responsible FAA official must ensure the EIS identifies those alternatives FAA will no longer consider and the reasons for their dismissal.

(4) Actions involving new airports, new runways, or major runway extensions. 49 USC 47106.(c)(1)(B) states the Secretary of Transportation may approve a project grant application for a project involving a new airport, a new runway, or a major runway extension having significant adverse effects. However, the Secretary may do so only after finding that no possible and prudent alternative that meets the Purpose and Need exists and making a finding that all possible planning to minimize harm has been taken. The terms "possible" ("feasible") and "prudent" have separate meanings as noted here.

-

(a) The term "possible" ("feasible") refers to sound engineering principles. A construction alternative may be possible if, as a matter of sound engineering principles, it can be built.

- **(b)** The term, "prudent" refers to rationale judgment. See paragraph 1007.e(5)(a) for more information. Although the term is defined relative to Section 4(f), the definition is very useful for these three major airport development projects.

(5) Airport actions resulting in use of Section 4(f)-protected resources. FAA EISs will address these actions when a proposed airport project would significantly affect Section 4(f)-protected resources. The responsible FAA official must ensure the EIS prepared for these actions evaluates the existence of prudent and feasible alternatives that avoid using Section 4(f) protected resources.

(a) The EIS must contain information showing FAA has considered all feasible and prudent alternatives meeting the project's purpose and need that avoid using the 4(f) resource. If none exists, FAA will include all possible planning to minimize harm to the protected resources. The term, "prudent" refers to rationale judgment.[4] A project may be possible, but not prudent when one considers its safety, policy, environmental, social, or economic consequences. Use the following factors to decide if an alternative is prudent:

1. Does it meet the project's purpose and need?

2. Does it cause extraordinary safety or operational problems?

3. Are there unique problems or truly unusual factors present with the alternative?

4. Does it cause unacceptable and severe adverse social, economic, or other environmental impacts?

5. Does it cause extraordinary community disruption?

6. Does it cause added construction, maintenance, or operational costs of an extraordinary magnitude? or

7. Does it result in an accumulation of factors that collectively, rather than individually, have adverse impacts that present unique problems or reach extraordinary magnitudes?

[4] See, *Section 4(f) Policy Paper*, dated March 1, 2005. Review the paper's "Section 4(f) Evaluation" section focusing on Examples of Alternative Selection Process. *http://environment.fhwa.dot.gov/projdev/4fpolicy.asp#alternatives.*

(b) To meet Section 4(f) needs, an EIS must explain why a rejected alternative presents unique problems or explain the cost to carry out the action or its resultant community disruption is extraordinary. Although this requirement is similar to that in paragraph 1007.e (4), notice Section 4(f) applies to *any* airport action using 4(f)-protected land. Paragraph 1007.e(4) applies to analysis of alternatives for a new airport, a new runway, or a major runway extension that has significant adverse effects on natural resources.

(6) Airport actions involving floodplains, wetlands, or conflicts with other laws. The EIS should list the Federal, State, Tribal, or local laws, regulations, or permits that apply to each reasonable alternative the EIS analyzes in detail. Conflicts with those laws focus on the reasonableness of each alternative, so a conflict may prevent a sponsor from carrying out an alternative. For example, Executive Orders protecting floodplains and wetlands and Clean Water Act section 404 requirements for wetlands of the United States require FAA to determine that no practicable alternatives exist before FAA can approve an action encroaching on a floodplain or affecting wetlands (jurisdictional or non-jurisdictional).

(7) The FAA's preferred alternative. This alternative may be the environmentally preferred alternative, but it need not be. The approving FAA official selects the preferred alternative after reviewing each alternative's ability to fulfill the agency's mission while considering their economic and environmental impacts, and technical factors. The FEIS must identify FAA's preferred alternative, unless another law prohibits expressing it (40 CFR 1502.14(e)).

Note: The DEIS must identify FAA's preferred alternative, if FAA knows it when it is preparing the DEIS.

f. Affected Environment. See paragraph 706.e for a general discussion of the affected environment. For EIS preparation, review the following information.

(1) This section's primary role is to describe the existing environmental conditions that the proposed action and its reasonable alternatives would *affect*. Text at 40 CFR 1502.15 requires the EIS to describe succinctly the environmental resource characteristics the proposed project and the reasonable alternatives would affect. It should not describe the impacts the no action, proposed action, or the reasonable alternatives would cause.

(2) Focus on resources the no action, the proposed action, and the reasonable alternatives would significantly affect. The description for each affected resource should be proportional to the extent of potential impact on that resource. That is, the EIS should provide less detail for those resources that would not be significantly affected. Usually, if the sponsor prepared an EA for the proposed action, that document's Affected Environment section would normally be sufficient for those affected resources.

(3) If the sponsor prepared an EA, the responsible FAA official should examine the EA's Affected Environment section. This review is needed to determine the

extent of additional information the EIS will require to more fully describe the significant impacts the no action, the proposed action, and the reasonable alternatives would cause. To do so, consider the following items.

(a) An airport layout plan and map depicting the project location and the surrounding airport vicinity.

(b) Descriptions of the environmentally sensitive resources, existing and planned land uses, and zoning the proposal and alternatives under consideration would affect. As needed, describe those resources that special purpose laws protect (e.g., wildlife refuges, recreational areas, wetlands, etc.). Depending on the resources affected, the geographical area described may vary.

(c) If an EA is being used as a reference, include future actions in the Affected Environment section the EA does not address.

(d) When preparing the EIS's Affected Environment section, preparers should review material other agencies, organizations, or private parties have prepared. This information is helpful in addressing cumulative impacts. Data sources may include environmental documents or permit applications of other Federal, State, or local agencies. These document are valuable because they address past, present, or reasonably foreseeable developments in the proposed project's affected area that are not part of the proposed action. Project examples include highway projects, housing developments, or relocation needs related to those non-FAA actions. Examine the impacts those projects cause and determine if they affect the same resources the proposed alternatives would affect. Select the documents that point to impacts on the same resources. Incorporate by reference the readily available documents used to prepare this section.

Note: The references must be available to the public during the EIS review period.

g. Environmental Consequences. See paragraph 706.f for a general discussion of this section, then, to prepare an EIS, review the following information.

(1) The section should discuss the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity. To do so, examine trade-offs between short-term environmental gains at the expense of long-term losses or long-term gains at the expense of short-term losses as needed. Include the extent to which the proposal forecloses or broadens future options.

(2) This section should describe impacts of the no action, proposed action, and each reasonable alternative on affected resources and the consequences of those impacts. Alphabetically arranged impact discussions are *not* required. Often, doing so may not be the best way to present that information in a cohesive, understandable manner.

(3) EIS preparers should determine the information necessary to explain clearly impacts and consequences (40 CFR 1500.4 and 1502.2)). To reduce bulk and improve its understanding, EIS text should summarize impacts and their consequences. Discussions should provide accurate cross-references to the specific appendices and page numbers that provide the basis for determining the severity of impacts and their consequences. This section should not repeat information in the Alternatives section. Instead, it should be the source of information used to prepare the Alternatives section's summary table. It should outline each reasonable alternative's environmental impacts.

(4) Use concise discussions of impacts and consequences that are not significant. Provide only the information needed to show why they are not significant. In most cases, if the sponsor prepared an EA for the proposed action, information in that document's Environment Consequences section would normally be sufficient for those resources.

(5) Discuss the status of consultation the applicable special purpose laws require (see Chapter 1, Table 1-1 of this Order).

(6) Discuss possible conflicts between the proposed action and the objectives of Federal, State, regional, or local land use plans, policies, or controls in the affected area. Consider Tribal or Native Hawaiian plans, policies, and controls when the action would affect a reservation, tribal trust, or other resources important to those peoples.

(7) Discuss the irreversible and irretrievable commitments of natural resources and energy requirements each reasonable alternative would require. Analyze any project-caused depletion of materials in short supply or substantial, irreversible changes to the natural or cultural environment the reasonable alternatives would cause.

(8) Discuss any National Register-eligible or listed historic and cultural resources the proposed action or reasonable alternatives would affect or destroy and the potential for reusing or conserving these resources. For Section 4(f) purposes, note any historic resources of State or local significance.

(9) Ensure the EIS clearly states where information is lacking or uncertain when evaluating reasonably foreseeable significant adverse effects (40 CFR 1502.22). See paragraph 1007.o for more information on this.

(10) Incorporate by reference or appendix any cost-benefit analysis that is relevant to the choice among environmentally different alternatives, to meet 40 CFR 1502.23 (see 1007.n).

h. Mitigation. Describe conceptual mitigation measures that are not parts of the proposed action. Consultation with the sponsor, FAA organizations, Tribes, or resource agencies is helpful when developing this mitigation. Reviewing Environmental Management Systems (EMS) provides information about effective ways to mitigate

significant environmental impacts due to airport actions. Examples of mitigation concepts include:

(1) Design or construction measures avoiding or reducing impacts.

(2) Management actions to reduce operational impacts.

(3) Reuse, restoration, preservation, or compensation measures.

Note: EIS preparers may make this section a separate EIS chapter, or they may combine it with each section of the Environmental Consequences section discussing each affected environmental resource. In addition, preparers should summarize mitigation in a matrix placed in the EIS Alternatives section (see Figure 7-1, pg. 4, Table 1).

i. Cumulative impact. CEQ 1508.25 defines three types of actions one should consider when determining the scope of a NEPA process. One of the types involves cumulative actions (the others are connected actions and similar actions) CEQ 1508.7 states that a cumulative impact is the environmental effect resulting from the incremental effects of the proposed action when added to the effects of past, other present, and reasonably foreseeable future actions, regardless of the entity (i.e., Federal or non-Federal) or person that would carry out those actions. In some cases, individually minor but collectively significant actions occurring over a defined period of time can cause cumulative impacts.

(1) When an airport action affects certain resources, the effects of that action can be limited to the extent that a FONSI or a categorical exclusion would appear to be appropriate. However, when analysts cumulatively consider the project's impacts with those of past, present and reasonably foreseeable actions on or off-airport (paragraph 9.q), those impacts may exceed one or more significant impact thresholds. Therefore, EA and EIS preparers must consider the impacts the airport project and the complex of past, present, and reasonably foreseeable projects affecting the same resources. Here are some examples of this principle.

(a) Buying land and a reasonably foreseeable runway extension (i.e., a cumulative action).

(b) Runway extension and moving an access road to accommodate the extension (i.e., a connected action).

(c) Apron work needed to move a terminal, which in turn, requires moving housing (i.e., a connected action).

Note: Here, terminal area relocation is the principal action justifying the project, but the effects due to disrupting the community or other impacts due to highway or housing relocation must be part of the total proposal.

(d) An initial runway extension and a second phase extension that is part of a firm development program or reasonably foreseeable (i.e., a similar action).

(2) When considering any past, present, or reasonably foreseeable actions the airport vicinity that affect the same resources the airport action would affect, analysts must determine if those actions and the airport action would cause significant cumulative impacts. For example, building a new highway and expanding an airport may, when considered together (cumulatively), cause significant air quality impacts. This is because extensive earthmoving activities these projects cause can increase dust due to land disturbance or substantial equipment exhaust emissions.

j. List of preparers. An EIS must provide information on those who prepared it. If possible, the list should not exceed 2 pages (40 CFR 1502.17). That information should include:

(1) The name(s) of FAA personnel responsible for: overseeing and guiding the EIS's development, scope and content, and independently reviewing the EIS for accuracy and compliance with CEQ regulations.

(2) Those responsible for preparing various EIS sections. Specify the document section(s) for which each person is responsible. This includes authors of background papers used in any analysis.

(3) Each preparer's qualifications (i.e., professional discipline, area of expertise, and years of experience).

k. List of EIS recipients. Providing information to interested parties is critical to meeting NEPA's public involvement requirement. Therefore, an EIS must contain a list of agencies, organizations, and people to whom FAA sent the EIS for review (Order 1050.1E, paragraph 506j). According to 40 CFR 1502.19, the recipients normally include:

(1) Any Federal agency having jurisdiction by law or special expertise on environmental impacts resulting from the no action, proposed action, or reasonable alternatives. The mailing list should include State, Tribal, or local agencies authorized to develop or enforce environmental standards.

(2) The applicant (i.e. the airport sponsor).

(3) Any person, organization, or agency asking for the entire EIS.

Note: Responsible FAA officials may use CDs or websites to distribute EISs as well as hard copies. ARP encourages electronic distributions to recipients. This reduces costs, delivery time, and environmental concerns (energy, material, transportation, etc.) that accompany hard copy distributions.

l. Index. Text at 40 CFR 1502.10(j) requires an EIS index. This allows the reader to easily find pages containing key terms and specific data, topics, or other important information the EIS presents.

m. Comments. See paragraph 1201.

n. Appendices incorporated by reference in an EIS. The EIS must include the studies, memoranda, and technical information prepared in connection with an EIS that are reasonably necessary to support the analyses and conclusions in an EIS (40 CFR 1502.18). Circulation and review are important parts of NEPA's attempt to ensure informed decisionmaking. Appendices improve reader understanding of the analyses and make the document easier to review. Since information in an appendix is extremely relevant to the EIS and FAA's decision process, the responsible FAA official must circulate the material with the EIS or make the appendices available to the public(40 CFR 1502.18(d)). ARP encourages distribution of appendices with the EIS using compact disk (CD) format. Incorporating material by reference that was not prepared in conjunction with an EIS reduces EIS bulk. Such material should be made reasonably available to the public for inspection during the comment period (40 CFR 1502.2). Use appendices or references to:

(1) Describe various models such as the Integrated Noise Model or the Emissions Dispersion Modeling System and provide the models' input data.

(2) Provide the detailed descriptions of analytical results and project impacts. This reduces EIS bulk as 40 CFR 1500.4 requires, while allowing the EIS to summarize or highlight the most important information the appendices or references contain. This effort requires accurate cross-referencing to specific portions of the respective appendix or reference material supporting the EIS text.

(3) Show proof of consultation and to present documentation, memorandums of agreement, or other information needed to meet special purpose laws.

o. Incomplete or unavailable information. When evaluating significant effects, ensure the EIS clearly states where information is lacking or uncertain (40 CFR 1502.22). If certain information is essential to FAA's reasoned choice among reasonable alternatives and the cost to get it is not excessive, the agency should obtain it. If the information is essential, but cost to get it is excessive or the means to get it are unknown (i.e., beyond the state-of-the art), the agency must weigh the need for the action against the risk of possible adverse effect, if the action continues with this uncertainty.

1008. - 1099. RESERVED.

CHAPTER 11. PROCESSING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

1100. INTERNAL AGENCY REVIEW OF A PRELIMINARY DRAFT EIS. Before completing the draft EIS (DEIS), FAA normally prepares a preliminary draft EIS (PDEIS) for internal review. This provides FAA organizations having responsibilities for actions related to the proposed airport action or other interests in that action the opportunity to review a DEIS before FAA issues it for public review. During this internal review, FAA organizations must determine if the PDEIS contains the analyses needed for those organizations to make their findings and if the document adequately covers the their respective actions and concerns. Coordination is also necessary to ensure that other FAA organizations having responsibilities related to the proposed action fulfill those responsibilities if FAA approves the proposed action.

a. PDEISs for streamlined airport projects. Chapter 15 of this Order discusses the streamlining requirements Congress mandated in *Vision 100 - Century of Aviation Reauthorization Act* (Vision 100). That Act focused on airport capacity, safety, and security projects. A part of that legislation (49 USC 47171.(b)) discusses streamlining aviation projects at congested airports.[1] When preparing a PDEIS for a congested airport, the responsible FAA official must internally distribute the PDEIS to the FAA organizations represented on the FAA "EIS Team" assembled for that project. Normally, these "Teams" include legal and technical personnel from various FAA organizations at the district, regional, and headquarters levels.

b. PDEISs for airport projects that are not streamlined. Airport actions not requiring streamling may be coordinated and reviewed internally using a different process than discussed in 1100.a. The responsible FAA official must ensure the intra-agency, PDEIS review involves regional and district office personnel from the various FAA organizations having an interest in the proposed action. The responsible FAA official may use discretion when determining if the Airport Planning and Environmental Division (APP-400) or other headquarters organizations should review a PDEIS.

1101. DISTRIBUTING THE DEIS FOR AGENCY AND PUBLIC REVIEW. The responsible FAA official must provide Federal, State, tribal, and local agencies with jurisdiction by law or special expertise and the public the opportunity to comment on a DEIS (40 CFR 1503.1).

a. When to seek comments on a DEIS. Text at 40 CFR 1503.4 requires FAA to consider substantive comments on a DEIS and respond to them in the final

[1] According to Vision 100, section 47175(2), a congested airport accounts for 1% of all delayed aircraft operations in the U.S. using the FAA's the 2001 *Airport Capacity Benchmark Report*. Contact ARP's Airport Planning and Environmental Division, if needed. Chapter 15 of this order provides more information on streamlining.

EIS (FEIS). As a result, the responsible FAA official must specifically request comments during the DEIS review period (40 CFR 1503.1(a)) from the following parties.

(1) Any Federal agency having jurisdiction by law or special expertise for an environmental impact the proposed action or its reasonable alternatives would affect, or that is authorized to develop and enforce environmental standards.

(2) Appropriate State and local agencies authorized to develop and enforce environmental standards or agencies requesting receipt of a DEIS. These agencies could include state transportation departments or municipalities having an interest in an action or significant impacts that would occur within their jurisdictions.

(3) Indian tribes and native organizations when effects may be on a reservation or affect tribal trust resources.

(4) The airport sponsor proposing the project.

(5) The public, including non-governmental organizations, having an interest in the proposed action.

b. Where to coordinate and deliver a DEIS. FAA must distribute the DEIS to the affected public and those agencies having an interest in the proposed action. Those agencies may include Metropolitan Planning Organizations or state transportation departments. To save money and resources, the responsible FAA official should consider delivering the document electronically (web sites and CDs) to those willing to review the DEIS in those formats.

(1) Availability to agencies. The responsible FAA official must coordinate the DEIS with the regional offices of the Federal, State, tribal, and local agencies having jurisdiction by law or expertise for affected resources. When the official requests comments on the DEIS from any agency of the Departments of Commerce, Energy, or Interior, the official must follow the following procedures. Before sending documents, the official should check with the appropriate agency to determine if it will accept the EIS and its appendices in electronic format.

(a) The Department of Commerce (DOC). Send 1 copy to DOC headquarters and 1 copy to the Ecology and Conservation Division in the National Oceanic and Atmospheric Administration.

(b) The Department of Energy (DOE). For actions having major energy-related effects, coordinate with DOE's Office of NEPA Policy and Assistance, EH-42, 1000 Independence Ave., S.W. Washington, D.C. 20585. Provide one copy of the DEIS for review.

(c) The Department of the Interior (DOI). Refer to paragraphs *1.* through *3.* below to determine the number of DEIS copies FAA must file with the DOI for comment. The responsible FAA official should send copies to the Director, Office of Environmental Policy and Compliance (OPEC), 1849 C Street, S.W., Washington, D.C. 20240. The Director will deliver the document to the proper regional office.

1. For projects in Alaska, provide 16 copies.

2. For projects in the eastern United States, including Arkansas, Iowa, Louisiana, Minnesota, and Missouri, provide 12 copies.

3. For projects in the western United States, that is, areas west of the western boundaries of AR, IA, LA, MN, and MO, provide 18 copies.

(d) The Environmental Protection Agency (EPA). When filing the DEIS with EPA, the responsible FAA official must certify to EPA that FAA has provided the DEIS to the public and all interested agencies. Simultaneous distribution to all parties ensures everyone interested in the action has the same amount of time to review the document. The responsible FAA official should use the following standard language in its certification to EPA and press releases announcing the DEIS's availability for comment and public hearing(s) for the proposed project:

> "FAA encourages all interested parties to provide comments concerning the scope and content of the Draft EIS. Comments should be as specific as possible and address the analysis of potential environmental impacts and the adequacy for the proposed action or merits of its alternatives and the mitigation being considered. Reviewers should organize their participation so that it is meaningful and makes the agency aware of the viewers' interests and concerns using quotations and other specific references to the text of the Draft EIS and related documents. Matters that could have been raised with specificity during the comment period on the Draft EIS may not be considered if they are raised for the first time later in the decision process. This commenting procedure is intended to ensure that substantive comments and concerns are made available to the FAA in a timely manner so that the FAA has an opportunity to address them."

(1) Regional office(s). The responsible FAA official must coordinate the DEIS with the proper EPA regional office and request comments on the document. Provide 1 copy of the DEIS to the regional EPA office.

(2) Headquarters offices. The responsible FAA official must file 5 copies of the DEIS and its appendices with EPA's HQ Office. In doing so, the official must file 1 paper copy of the documents, while the 4 remaining copies may be in electronic format (i.e., compact disk). Every Friday, EPA publishes a "Notice of Availability" (NOA) for each DEIS filed by Friday of the ***previous*** week. Publishing this NOA starts the DEIS public review and comment period. Once started, the approving FAA official may not make a decision on the proposed action, until 90 days after the date of the NOA of the DEIS (40 CFR 1506.10). As indicated below,

notice that the address for filing DEIS's varies with the method used to deliver the DEIS to EPA's HQ.

i. DEISs filed with EPA via the *U.S. Postal Service*. The FAA official should file the DEIS at:

EPA Office of Federal Activities, EIS Filing Section, Ariel Rios Building (South Oval Lobby), Mail Code 2252-A, 1200 Pennsylvania Ave., N.W., Room 7220, Washington, D.C., 20460.

ii. DEISs filed with EPA via *commercial shipping company or hand delivery*. The FAA official should file the DEIS at:

EPA Office of Federal Activities, EIS Filing Section, Ariel Rios Building (South Oval Lobby), 1200 Pennsylvania Ave., N.W., Room 7220, Washington, D.C., 20004.

(2) Public availability. When providing copies of the EIS and its appendices to the public, ask requestors if they will accept an electronic copy of the documents. As an alternative, provide the web site where those documents are available for public review.

(3) Notice of Public Availability (NOA). Title 40 CFR 1506.6(b) requires Federal agencies to notify the public of the availability of environmental documents. This is to inform people and agencies interested in the project or affected by it.

(a) Text at 40 CFR 1506.6(b) states that when actions cause effects primarily of local concern, the agency may publish the notice in local newspapers having general circulation or notifying the public through some other local media.

(b) When publishing the notice in local newspapers, the responsible FAA official should send a press release discussing the DEIS's public availability to local media serving the project area. The official should request that newspaper(s) publish the notice of the DEIS's availability on the same date EPA expects to publish its notice in the *Federal Register*.

(c) The notice should identify the FAA employee who will answer the public's questions about the DEIS's status or other information about the action. Normally, this is the responsible FAA official. FAA must provide a copy of either the *Federal Register* NOA or media notice to anyone requesting it.

(4) DEIS distribution for FAA review. The responsible FAA official must send 3 copies of the DEIS, to the Airports Planning and Environmental Division, APP-400. APP-400 will deliver the DEIS to the Office of the Chief Counsel and, if necessary, other reviewing offices.

1102. TIME LIMITS FOR REVIEWING THE DEIS. The Responsible FAA Official must provide the agencies and the interested public a minimum of 45 days to review the DEIS (40 CFR 1506.10(c)).

a. Resource agency and public review. Text at 40 CFR 1506.10(a), requires agencies to begin the DEIS review period on the date EPA publishes the "Notice of Availability" in the *Federal Register*. If a commenter does not reply within the review period, the responsible FAA official may assume the entity has no comments. Normally, FAA will grant a 15-day extension when a commenting agency requests more time to review a DEIS.

b. Altering the DEIS review period. DEIS review periods may change as noted here.

(1) Extending the DEIS review period. FAA may extend the 45-day DEIS review period (40 CFR 1506.10(d)). To do so, the responsible FAA official must inform EPA of this extension so EPA may place a notice of the extension in the *Federal Register*. In addition, EPA may extend the initial 45-day review period, if it determines another Federal agency has compelling reason of national policy concerns (40 CFR 1506.10(d)). However, in this case, EPA may do so only after consulting with FAA. Failure to file timely comments is not a sufficient reason to extend the comment period (40 CFR 1506.10(d)).

(2) Reducing the DEIS review period. EPA may reduce the 45-day DEIS review period, if FAA provides compelling reasons of national policy to do so. APP-400 will coordinate these reduced times with DOT before contacting EPA.

c. Washington headquarters review. APP-400 will provide The Office of the Chief Counsel's Airports and Environmental Law Division (AGC-600) with a 30-day period to review the DEIS. APP-400 will also send a copy of the DEIS to FAA's Office of Environment and Energy for information purposes.

(1) Headquarters review period begins on the date APP-400 requests comments from AGC-600. AGC-600 will review the document and provide its comments to APP-400. APP-400 will consolidate its comments with those of AGC-600.

(2) APP-400 may discuss some of the comments with the responsible FAA official before sending those comments to the responsible FAA official. This is to ensure there that headquarters reviewers misunderstands about the comments or information in the DEIS do not occur.

(3) APP-400 will send the comments to the responsible FAA official in memo format within the DEIS's 45-day review period (or an extended period, if one exists). APP-400's delegation memo for approval of the final EIS to the responsible

FAA official signals the region has adequately addressed headquarters' comments on the DEIS.

1103. DEIS COMMENTS. Usually, entities reviewing the DEIS will provide comments directly to the FAA regional or district Airports office responsible for preparing the document. Text at 40 CFR 1503.3 requires commenters to be as specific as possible when expressing their concerns on the DEIS's adequacy. Commenting agencies should focus on the merits of the alternatives discussed in the DEIS and their environmental impacts.

a. Comments received from agencies. If the responsible FAA official decides a commenting agency has not followed the intent of 40 CFR 1503.3,[2] the official should consult that agency to resolve the issue. The extent of an agency's comments should be equal to the agency's involvement during the scoping process. If during the comment period, an agency restates problems resolved during scoping, the responsible FAA official should find out why resolutions developed during scoping remain problematic at the DEIS stage. The official should try to resolve those problems before FAA completes the final EIS.

b. Comments received from EPA. When EPA reviews a DEIS, it uses a DEIS rating system. EPA bases each DEIS rating on its findings regarding the proposed action's environmental impact severities and the DEIS's adequacy in addressing them.

1104. RE-CIRCULATING THE DEIS. According to 40 CFR 1502.9.(a), a DEIS must fulfill and satisfy, to the fullest extent possible, the requirements established for FEISs. FAA must prepare and re-circulate a new draft of the portion(s) of a DEIS judged "inadequate as to preclude meaningful analysis" (40 CFR 1502.9(a)). After revising the DEIS to provide the needed information, the responsible FAA official must re-circulate the complete, updated DEIS as discussed in paragraphs 1101 and 1102 of this Order.

1105. - 1199. RESERVED.

[2] Comments on EISs or a proposed action must be as specific as possible. They may address either the EIS's adequacy or the merits of the EIS's alternatives (see 40 CFR 1503.3(a)).

CHAPTER 12. PROCESSING THE FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)

1200. THE FEIS AND COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS). The final EIS (FEIS) must contain FAA responses to all substantive comments on the draft EIS (DEIS) to comply with 40 CFR 1503.4(a).

a. The responsible FAA official must consult the airport sponsor, if in response to a comment, FAA is considering asking the sponsor to commit to change the proposed airport, its operations, or proposed mitigation measures.

b. The responsible FAA official must ensure all substantive comments are attached to the FEIS, whether or not the comment is considered to merit an individual response. The FEIS may summarize similar comments when the number of comments on the DEIS is voluminous.

c. Where FAA has established a schedule for completing an EIS, the responsible FAA official must advise the airport sponsor when the nature or volume of comments on the DEIS are likely to require an adjustment to the schedule.

1201. COMMENT RESPONSE OPTIONS. The responsible FAA official must respond to comments on the DEIS by using one or more of the options noted in paragraphs 1201.a – f (40 CFR 1503.4(a)). The official should consult the airport sponsor as noted in paragraph 1200.a, or if an issue is raised for the first time during the DEIS review period.

a. Modify the alternatives the DEIS discusses, including the proposed action.

b. Develop and evaluate any alternative FAA has not seriously considered.

c. Supplement, improve, or modify the analyses.

d. Make factual corrections.

e. Explain why certain comments do not warrant a response, citing the sources, authorities, or reasons supporting FAA's position. If suitable, point out those circumstances that would trigger agency reappraisal of the comment or further response. The responsible FAA official should explain how the comment is being interpreted to establish the foundation for the response.

f. The responsible FAA official may use an errata sheet if document changes in response to comments are minor and address only the information noted in paragraphs 1201.d and e (40 CFR 1503.4(c)). The official should attach the errata sheet to the statement instead of re-writing the draft statement. In this case, the

responsible FAA official must circulate only the comments, comment responses, and any changes to the FEIS.

1202. FAA'S PREFERRED ALTERNATIVE. The responsible FAA official must ensure the FEIS identifies FAA's preferred alternative (paragraph 1007.e.(7)), unless a law forbids FAA from doing so (40 CFR 1502.14(e)). If the approving FAA official intends to identify a preferred alternative differing from the sponsor's proposed action, the official should notify the sponsor as early as possible. The approving FAA official should then follow the steps in paragraph 801 of this Order. That paragraph addresses a comparable situation for a proposed FONSI and its EA.

Note: FAA must identify the preferred alternative in the DEIS, if the agency has already selected one, unless a law forbids that disclosure.

1203. FEISs PREPARED FOR AIP-ELIGIBLE AIRPORT DEVELOPMENT PROJECTS. An FEIS addressing airport development actions for which the sponsor will seek Federal financial aid under the Airport Improvement Program (AIP) must also contain the information listed below. That information provides evidence to satisfy agency determinations and sponsor certifications under 49 USC 47106 and 47107. The approving FAA official will include the determinations and sponsor certifications in the Record of Decision (ROD) (Chapter 13 provide information on RODs).

a. **Airport development projects.** The FEIS addressing a project for which an airport sponsor intends to seek AIP funding, must contain the following evidence:

(1) The proposed action is reasonably consistent with existing plans of public agencies responsible for development in the area (49 USC 47106.(a)(1)).

(2) The Secretary is satisfied the interests of communities in or near the project location have been given fair consideration (49 USC 47106.(b)(2)).

(3) To the extent reasonable, the airport sponsor has taken or will take actions to restrict land uses in the airport vicinity, including the adoption of zoning laws, to ensure the uses are compatible with airport operations (49 USC 47107.(a)(10)).

b. Airport development involving a new airport, a new runway, or a major runway extension. An FEIS addressing a new airport, new runway, or major runway extension for which an airport sponsor intends to seek AIP funding should also provide the following information:

(1) A certification from the airport sponsor that it has provided an opportunity for a public hearing. The hearing is offered to consider economic, social, and environmental effects of the location and the location's consistency with the

objectives of any planning that the community (i.e., jurisdictional authority) has carried out (49 USC 47106.(c)(1)(A)(i)).

(2) A certification from the airport sponsor that the airport management board has voting representation from the communities in which the project would be located or that the sponsor has advised communities they have the right to petition the Secretary of Transportation about a proposed project (49 USC 47106.(c)(1)(A)(ii)).

(3) From a sponsor of a large or medium hub airport who proposes a new airport, a new runway, or a major runway extension, a certification verifying that, on request from the metropolitan planning organization (MPO) in the area where the project is located (if an MPO exists), the sponsor has made the following information available to the MPO (49 USC 47106.(c)(1)(A)(iii)):

(a) A copy of the proposed ALP amendment depicting the proposed action. and

(b) A copy of any airport master plan describing or depicting the action.

(4) When the proposed action would cause significant adverse effects on natural resources, including fish and wildlife, natural, scenic, and recreational assets, including water and air quality, and other factors affecting the environment, a finding that no possible and prudent alternative to the project exists and that every reasonable step has been taken to minimize adverse effects (see 49 USC 47106.(c)(1)(B)). (Paragraphs 1007.e(4)(a) and (b) of this Order discuss possible and prudent alternatives).

1204. ACTIONS INVOLVING THE USE OF RESOURCES PROTECTED UNDER SECTION 4(f). FEISs prepared for airport actions that would use resources protected under Section 4(f) must contain evidence to support both of these conclusions for the ROD:

a. There is no prudent and feasible alternative to using the protected resource. In deciding if there is a prudent alternative, the responsible FAA official should note that there are times where important, non-4(f) impacts must be considered when determining the most prudent alternative.[1] In these situations, the official should exercise caution if the alternative that avoids use of a Section 4(f)-protected resource or that would minimize effects to that resource differs from the alternative that is necessary to avoid or minimize impacts to resources protected under other special purpose laws (see footnote 1). Here, the responsible official should carefully evaluate both alternatives. If needed, consult ARP's Airport Planning and Environmental Division (APP-400), Regional Counsel, or the Chief Counsel's Airports and

[1] See, *Section 4(f) Policy Paper*, dated March 1, 2005. Review the paper's "Section 4(f) Evaluation" section focusing on Examples of Alternative Selection Process. *http://environment.fhwa.dot.gov/projdev/4f policy.asp#examples.*

Environmental Law Division (AGC-600). The approving FAA official should also alert the sponsor to the situation.

b. The project includes all possible planning to minimize harm to the protected resource resulted from the use.

1205. ACTIONS DISPLACING PEOPLE AND BUSINESSES REQUIRING THEIR RELOCATIONS. FEISs prepared for these actions must contain the following assurances for inclusion in the ROD:

a. Fair and reasonable relocation payments and aid will be available under Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

b. For housing relocation, comparable, decent, safe, and sanitary housing[2] is available for occupancy on the open market or will be built, if necessary, before affected people are displaced.

1206. ACTIONS INVOLVING CONSTRUCTION DIRECTLY OR INDIRECTLY AFFECTING WETLANDS. An FEIS addressing actions affecting jurisdictional or non-jurisdictional wetlands must contain evidence to make the following findings (Executive Order 11990, *Wetlands*) in the ROD:

a. There is no practicable alternative to FAA's preferred alternative. and

b. The preferred alternative includes all practicable measures to minimize resultant unavoidable harm to wetlands.

1207. ACTIONS SIGNIFICANTLY ENCROACHING ON A FLOODPLAIN. FEISs prepared for a proposed action that encroaches on a base floodplain (i.e., the area the 100-year flood engulfs) must contain evidence to make the following findings (Executive Order 11988, *Floodplains*) in the ROD:

a. There is no practicable alternative to the FAA's preferred alternative. and

b. The preferred alternative conforms to applicable state and/or local floodplain protection standards.

1208. ACTIONS IN OR AFFECTING COASTAL ZONE AREAS. FEISs prepared for an airport action in or affecting the coastal zone of a state having an approved coastal zone management plan (CZMP) must contain information from the state agency responsible for the CZMP. As explained below, that information varies, depending on the activity proposed.

[2] See 49 Code of Federal Regulation, Part 24.2.

a. FAA approvals for sponsor-proposed airport actions. FAA must ensure the requirements of 15 CFR, Subpart D, *Consistency for Activities Requiring a Federal License or Permit*, are completed for approvals addressing airport actions when the CZMP specifically lists those activities. For unlisted activities, compliance with Subpart D is also necessary when the responsible State agency specifically advises the sponsor or FAA that approval for an action would affect coastal zone resources and that it intends to review the approval. This is because funding and airport layout plan activities requiring "Federal license or permit" as defined in 15 CFR Part 930.51. Here, the FEIS must contain the following information:

(1) The following sponsor certification to comply with 15 CFR 930.57(b):

> "The proposed activity complies with the enforceable policies of (name of State) approved management program and will be conducted in a manner consistent with such program."

(2) A notice from the State agency responsible for the State's approved CZMP that the State concurs with or objects to the sponsor's consistency certification. See 15 CFR 930.63(a) for the timing of the State's response. Assume State agency concurrence if that agency does not issue a concurrence or objection within 6 months following the start of the CZM agency's review (15 CFR 63(a)).

NOTE: If the responsible State agency determines the proposed action is not consistent with the approved CZMP, the approving FAA official cannot approve the action. In that case, FAA approval may occur if the Secretary of Commerce grants the sponsor's appeal of a State's non-concurrence. In granting the appeal , the Secretary of Commerce would find the proposed action is consistent with the purposes of the Coastal Zone Management Act or the action is necessary for national security.

b. FAA actions. Some airport actions require FAA to install navigational equipment, develop flight procedures, or take other actions to promote safe, efficient airport operation. Because FAA itself will undertake these actions, they are "Federal activities" under 15 CFR, Subpart C, *Consistency for Federal Activities*. That is, they are "functions performed by or on behalf of a Federal agency in the exercise of its statutory responsibilities" (15 CFR 930.31(a)). Therefore, FEISs prepared for airport actions that include FAA activities must contain the following information, unless the requirements of an existing law applicable to FAA's operations prohibit compliance with Subpart C (see 15 CFR 930.32).

(1) An FAA determination stating that FAA will undertake the proposed action in a manner consistent to the maximum extent practicable with the State's approved CZMP. FAA must also include a detailed description of the FAA's activity, the facilities it needs, and coastal zone effects. Added information is needed as noted in 15 CFR 930.39(a).

(2) The State agency's agreement or disagreement with FAA's consistency determination. Review 15 CFR 930.41 for the timing of the State's response.

1209. ACTIONS INVOLVING A DISPROPORTIONATELY HIGH AND ADVERSE IMPACT TO MINORITY OR LOW-INCOME POPULATIONS. FEISs prepared for a proposed action that will result in a disproportionately high and adverse impact on a minority or low-income population must contain evidence to make the following findings (DOT Order 5610.2, *Department of Transportation Order to Address Environmental Justice in Minority Populations and Low-Income Populations*):

a. For actions that will have a disproportionately high and adverse effect on either a minority population or a low-income population, a finding that further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effect are not practicable. In determining whether a mitigation measure or an alternative is "practicable," the social, economic (including costs) and environmental effects of avoiding or mitigating the adverse effects will be taken into account.

b. For actions that will have a disproportionately high and adverse effect on a population protected by Title VI of the Civil Rights Act of 1964, a finding that:

(1) A substantial need for the action exists, based on the overall public interest. and

(2) Alternatives that would have less adverse effects on protected populations (and that still satisfy the need identified in paragraph 1209.a), either:

(a) Would have other adverse social, economic, environmental or human health impacts that are more severe. or

(b) Would involve increased costs of extraordinary magnitude.

1210. APPROVING THE FEIS. The Secretary of Transportation has delegated FEIS approval authority to the FAA Administrator. The Secretary's concurrence is required only if the Secretary requests an opportunity to review and concur in the FEIS, or if FAA requests the Secretary's review and concurrence.

a. Airports Program approval authority. Under FAA Order 1150.154A, *Delegation of Authority*, dated June 12, 1990, the FAA Administrator has delegated authority to approve FEIS's to the Associate Administrator for Airports (ARP-1). ARP-1 has authority to approve FEISs addressing the actions listed in paragraph (1) – (3) below. ARP-1 may delegate that authority to the region on a case-by-case basis. If APP-400 determines the FEIS is acceptable, APP-400 will inform ARP-1. ARP-1 will decide if it will delegate FEIS approval authority for those actions to the regional Airports Division Manager. APP-400 on ARP-1's behalf will send a memo delegating that authority to the Manager if the FEIS is sufficient. Otherwise, ARP-1 will retain that authority.

(1) A new airport in a metropolitan area, unless specifically directed otherwise. For purposes of this Order, a metropolitan area is a metropolitan statistical area (MSA).[3]

(2) A new runway or major runway extension at a commercial service airport located in an MSA.

(3) Any action a Federal, State, or local government agency, or Tribe opposes on environmental grounds.

b. Approval declaration. To approve an FEIS, the responsible FAA official must ensure the FEIS summary contains the language presented in paragraph 1007.b.(11) of this Order.

c. Signature block. The responsible FAA official must ensure a signature block for the approving FAA official appears immediately below the approval declaration noted above.

1211. ANNOUNCING AND DISTRIBUTING APPROVED FEISs.

a. FEIS distribution. The regional or district Airports office responsible for preparing the FEIS is responsible for distributing that document as discussed below. Distribution to parties should occur simultaneously. The responsible FAA official must notify APP-400 the responsible FAA region has distributed the FEIS. If the comments received on the FEIS require FAA to prepare minor revisions to the FEIS, the responsible FAA official may choose to circulate only the changed portions of the FEIS using procedures in 40 CFR 1503.4(c).

b. Comments on an FEIS. An agency may request comments on an FEIS (40 CFR 1503.1(b)) before issuing its decision.

c. Extending the 30-day "wait period" between FEIS release and the agency's decision. FAA may extend the 30-day "wait period" between EPA's publication of the FEIS's "Notice of Availability" in the *Federal Register* and the final agency decision an extra 30 days (40 CFR 1506.10(d)). The responsible FAA official must inform EPA of this extension so EPA may place a notice of the extension in the *Federal Register*. After consulting with FAA, EPA may also extend the initial 30-day review period, "upon a showing by any other Federal agency of compelling reasons of national policy" (40 CFR 1506.10(d)). Failing to file timely comments is not sufficient reason to extend the comment period (40 CFR 1506.10(d)).

[3] A metropolitan statistical area is a core area containing a substantial population nucleus and those adjacent communities having a high degree of economic and social integration with that core (U. S. Census Bureau).

d. Distribution to commenting parties. Except as noted in paragraphs 1211.e and 1205.f, the responsible FAA official must send one copy of the FEIS to the agencies, organizations, and individuals who provided substantive comments on the DEIS. If the number of commenters makes the distribution impractical, the responsible FAA official should consider delivering the document in electronic format**.**

e. Distribution to regional EPA offices. The responsible FAA official must send 1 copy of the FEIS to the proper EPA regional office, if EPA rated the DEIS "Lack of Objections" (LO-1). Otherwise, the official must file 5 copies of the document with the regional EPA office. If EPA has comments on the FEIS, the responsible FAA official must make a reasonable effort to resolve conflicting issues. The responsible FAA official must refer unresolved issues to APP-400**.**

f. Distribution to EPA headquarters. To comply with 40 CFR 1506.9, the responsible FAA official must file 5 copies of the approved FEIS with EPA's headquarters office at the address given in paragraph 1101.b.(4)(b)(1) or (2) of this Order. Upon receipt, EPA will publish a "Notice of Availability" in the *Federal Register.*

g. Distribution to the DOI. The responsible FAA official must file the correct number of copies of the FEIS with DOI's headquarters office at the address given in paragraph 1101.b.(1)(c). DOI headquarters will deliver the FEIS to the correct DOI office. Refer to items (1) – (3) here to determine the number of FEIS copies the FAA should file at DOI headquarters when an action occurs in a particular state:

(1) Alaska: 8 copies.

(2) Eastern United States, including Arkansas, Iowa, Louisiana, Minnesota, and Missouri: 6 copies.

(3) Western United States (areas west of the western boundaries of AR, IA, LA, MN, and MO): 9 copies**.**

h. Distribution to FAA headquarters. The responsible FAA official must file 1 copy of the FEIS with APP-400 for information and future reference. This filing is not necessary when the Associate Administrator for Airports (ARP-1) approves the FEIS.

i. Public notice and availability. Besides the interested parties mentioned above, the responsible FAA official must ensure copies of the approved FEIS are available to the public at publicly accessible locations. The official should use the local media to announce the FEIS is available. To do so, the responsible FAA official should use a process similar to that used for notifying the public of the DEIS's availability (paragraph 1101.b.(3)).

1212. FEIS REFERRALS TO CEQ.

a. General. CEQ NEPA regulations at 40 CFR Part 1504 provide procedures for Federal agency EIS referrals to CEQ. The CEQ referral process permits federal agencies to bring to CEQ interagency disagreements concerning proposed major federal actions that might cause "unsatisfactory environmental effects."

(1) Who may refer? Under CEQ regulations, any Federal department or agency may refer a proposed major Federal action to CEQ. The EPA Administrator has broader authority, under section 309 of the Clean Air Act, to refer to CEQ any proposed legislation, action, or regulation that he or she deems unsatisfactory when considering public health or welfare or environmental quality.

(2) Time limit for filing referrals. An agency will refer an FEIS not later than 25 days after the lead agency makes the FEIS available to the public, commenting agencies, and EPA (40 CFR 1504.3(b). If FAA has issued an extension of that initial review period, CEQ will accept a referral after the 25th day (40 CFR 1504.3(b)).

(3) Notifying the lead agency about the referral. A Federal agency that intends to refer a proposal to CEQ must notify the lead agency of its intentions at the earliest possible time. If the issues are not resolved between the agencies after publication of the FEIS, and the referring agency wishes to refer the proposal to CEQ, that agency must send a letter and a statement to CEQ and the lead agency. That statement must contain the referring agency's request that the lead agency take no action regarding the project until CEQ acts on the referral.

b. Addressing a referral notice. When the regional Airports office receives a notice of intended referral for an Airports Program EIS, the responsible FAA official must send a copy of the referral notice to APP-400. APP-400 will contact DOT's Office of the Assistant Secretary for Transportation Policy about the referral. FAA has 25 days to respond to the referring agency's letter and statement.

c. Resolving referrals. If FAA and the referring agency resolve the issue, FAA's ROD must contain a letter from the referring agency. The letter will state the agency and FAA have resolved the disputed issue. FAA's response to CEQ requires concurrence from the Office of the Assistant Secretary for Transportation Policy.

1213. - 1299. RESERVED.

CHAPTER 13. THE RECORD OF DECISION

1300. DECISION ON THE FEDERAL ACTION. The approving FAA official must wait a minimum of 30 days after EPA publishes an FEIS's "Notice of Availability" in the *Federal Register* before making a decision on a proposed action (40 CFR 1506.10(b)(2)).[1] After that period passes, the approving FAA official may sign a Record of Decision (ROD), which becomes a part of the agency's administrative record for the action.

1301. ROD CONTENT. The responsible FAA official uses an FEIS as the primary reference and basis to prepare a ROD for the approving FAA official's signature. The ROD provides the public with the approving FAA official's rationale for approving or not approving a proposed action. It also references the environmental documents prepared for or used to support the proposed action as well as the FEIS. A ROD should contain the following information.

a. A brief description of the airport sponsor's proposed action. This should clearly describe what the airport sponsor is proposing and why the proposal is necessary. This section should also include the action's location and information on when the action would occur.

b. A summary of the necessary Federal actions. This section summarizes the actions FAA and other Federal agencies (if necessary) must complete before the airport sponsor may begin the proposed action. Examples include grant issuances, permit issuances, other authorizations, or specific mitigation measure requirements.

c. A summary of the alternatives considered. The ROD briefly describes the various reasonable alternatives the FEIS analyzed in detail. It should focus on these alternatives because they are the choices the approving FAA official considers when deciding how to address the purpose and need.

(1) The environmentally preferred alternative. The ROD must identify the environmentally preferred alternative (40 CFR 1505.2(b)). In identifying environmentally preferred alternative, the approving official chooses the alternative that, with mitigation, would:

(a) Promote the national environmental policy NEPA describes.

[1] Also, see Question 10.a of *Forty Most Asked Questions Concerning National Environmental Policy Act Requirements* (Vol. 46 FR No. 55, p. 18026, 3/23/1981.)

(b) Cause the least damage to the natural, biological, and physical environments. and

(c) Best protects, preserves, or improves historic and cultural resources.

(2) Proposed action. The ROD must identify the airport sponsor's proposed action.

(3) The preferred alternative. Identify FAA's preferred alternative (paragraph 1007.e.(7)). The Airports Program's statutory mission is to provide leadership in planning and developing a safe, efficient national airport system to satisfy the needs of the aviation interests of the United States. In accomplishing this mission, ARP will consider economics, environmental compatibility, and local proprietary rights, and safeguard the public investment.[2] ARP gives this mission appropriate weight in any final decisions regarding a proposed action.

(a) In some cases, FAA's preferred alternative might differ from the environmentally preferred alternative or the sponsor's proposed action. When that occurs, the ROD should clearly present the approving FAA official's reasons for selecting the preferred alternative (40 CFR 1505.2(b)).

(b) If the approving FAA official selects an alternative differing from the sponsor's proposed action, the official should immediately contact the airport sponsor to discuss this decision.

(c) In the rare instances when the approving FAA official selects a reasonable alternative that is not the preferred alternative the FEIS identifies, the responsible FAA official must complete the following steps. Before selecting the preferred alternative in this case, the decision maker must coordinate a draft ROD for concurrence with the same FAA and DOT organizations (if any) that reviewed the FEIS. Those offices may do one of the following:

(1) Concur without comment.

(2) Concur on the condition the ROD contain specific mitigation measures.

(3) Request preparation and circulation of a supplement to the FEIS. or

[2] http://www.faa.gov/about/office_org/headquarters_offices/arp/.

(4) Not concur with the approving FAA official's choice. When this occurs, the approving FAA official cannot approve the Federal action over this non-concurrence.

(d) If the FEIS indicates FAA did not comply with the requirements of the special purpose law (see paragraph 9.t) applicable to the selected alternative, the responsible FAA official must complete the evaluation and consultation the applicable law requires. Usually, this requires supplementing the FEIS. When FAA supplements a FEIS, the responsible FAA official must ensure the supplement undergoes the same review process used for the FEIS.

d. A summary of information needed to address resources protected under special purpose laws or airport legislation. Summarize the information the FEIS contains to address affected resources that special purpose laws or airport legislation protect. Refer to paragraphs 1203 to 1209 of this Order for the environmental determinations and certifications the ROD must contain to comply with 49 USC 47106.(c). This information helps ensure the approving FAA official will include special conditions in unconditional ALP approval letters or grant assurances necessary to protect environmental resources certain approved airport actions would affect.

e. A summary of mitigation measures in the approved FEIS. The ROD must summarize all environmental impacts the FEIS discusses and the mitigation measures under the respective regulatory jurisdictions of various agencies that have reviewed the proposed action. The ROD must also state if FAA has adopted all practicable means to avoid or minimize the preferred alternative's environmental harm and, if not, why (40 CFR 1505.2(c)).

f. Changes to mitigation in the approved FEIS. If FAA changes or deletes any mitigation the approved FEIS contains, the responsible FAA official must review those changes. The responsible FAA official must present the changes to the approving FAA official for consideration. When the approving FAA official changes or deletes mitigation measures, the ROD must clearly explain the official's reasons for doing so. This ensures the administrative record describes why the approving FAA official decided the changes were necessary, and who is responsible for carrying out the new or modified mitigation.

g. Completing required mitigation. FAA must ensure the mitigation requirements in a ROD are monitored and completed. The EMS is also an excellent way to track the sponsor's compliance with required mitigation and promote Executive Order 13148, *Greening the Government Through Leadership in Environmental Management*. To ensure the airport sponsor knows it is responsible for carrying out most mitigation, the approving FAA official should include special conditions in legal documents authorizing an airport development project or airport action. Those documents may be grants, unconditional ALP approvals, property conveyances, deeds, releases, other approvals, or contract plans and specifications.

When preparing special environmental assurances for these documents, the approving FAA official must:

(1) Include actions or commitments critical to FAA's decision that the airport sponsor must implement.

(2) Include substantial measures to mitigate adverse impacts.

(3) Include actions the sponsor must take to identify mitigating measures or to encourage others to take those measures.

(4) Decide if an airport sponsor, to the extent reasonable, has included or will include actions to promote land uses in or next to the airport that are compatible with normal airport operations.

(5) Not include in grant agreements standard items that project plans and specifications incorporate.

(6) Ensure grant assurances do not reduce aviation safety.

h. Other information. Provide a line for the approving FAA official's signature. Include that official's title, address, and telephone number.

1302. ROD SIGNATORY.

a. General. Normally, a proposed airport action involves more than one FAA program office. Therefore, the Regional Administrator will sign the ROD. When the Office of Airports is the only FAA program office responsible for a proposed airport action, the Airports Division manager would sign the ROD (see Paragraph 7.s of FAA Order 1100.154A, *Delegation of Authority*).

b. Regional Airports Division Manager duties. The regional Airports Division Manager responsible for an airport action determines if a ROD requires a Regional Administrator's signature. This manager is responsible for ensuring the appropriate coordination with other affected FAA program offices has occurred before presenting the ROD to the Regional Administrator for signature.

(1) Normally, the responsible FAA official will request that the respective FAA division manager or a manager of an FAA organization involved in the action (other than the Airports Division) and the Regional Counsel initial a grid copy of the ROD, but this may vary by region. The process is needed to ensure that those respective FAA division managers agree with the decision and that Regional Counsel has completed its legal review of the ROD.

(2) The Airport Division Manager must obtain these concurrences and initial the grid ***before*** the Regional Administrator signs the ROD.

1303. ISSUING THE ROD. The approving FAA official cannot issue the ROD until a minimum of 30 days have elapsed from the date EPA publishes the FEIS's "Notice of Availability" in the *Federal Register* (40 CFR 1506.10(b)(2)). The official may issue the ROD any time after that "wait period" ends.

a. Reducing the 30-day "wait period." EPA may reduce the 30-day "wait period," if FAA shows compelling reasons of national policy to do so (40 CFR 1506.10(d)).

b. Extending the 30-day "wait period." EPA may extend the 30-day "wait period," if a Federal agency provides compelling reasons of national policy supporting that extension. However, EPA may do so only after consulting with FAA. EPA may not extend the "wait period" more than addition 30 days, if FAA does not agree with a longer extension (40 CFR 1506.10(d)).

1304. ROD PUBLIC AVAILABILITY. CEQ regulations do not require Federal agencies to publish RODs, unless a ROD addresses issues of national concern. But to keep the public informed about Federal decisions having environmental impacts, CEQ urges agencies to publish a notice of a ROD's availability in the *Federal Register*. ARP agrees with CEQ's suggestion because it is a way to inform the public about ARP decisions on major airport actions having significant environmental impacts. Therefore, the responsible FAA official should publish a notice of ROD availability in the *Federal Register* within 30 days of ROD approval.

1305. - 1399. RESERVED.

CHAPTER 14. SPECIAL INSTRUCTIONS ON RE-VALUATING, SUPPLEMENTING, AND TIERING NEPA DOCUMENTS, AND ADDRESSING EMERGENCIES

1400. GENERAL. This chapter discusses NEPA document longevity, the need to re-evaluate those documents, and the need to supplement them. The chapter also provides information about when tiering is appropriate and the NEPA process for emergency situations. The responsible FAA official should inform the airport sponsor when addressing the issues this chapter discusses. The official does so to keep the sponsor informed about the status of NEPA documents supporting airport development projects that the sponsor has not begun.

1401. TIME LIMITS FOR EAs AND EISs AND THE NEED FOR WRITTEN RE-EVALUATIONS.

a. General. After FAA approves an environmental document but before major steps toward implementing the proposed action have begun (see paragraph 1401.c(1)), significant project design changes, environmental conditions in a project area, or legal requirements pertaining to a project may change. Therefore, the responsible FAA official has the discretion to determine if a written re-evaluation of a NEPA document is needed.[1]

(1) Re-evaluations ensure the draft or final EIS continues to provide accurate, applicable, and valid information for pending agency actions since environmental or legal conditions may change over time.

(2) Re-evaluations ensure approving FAA officials base their decisions regarding agency actions on EAs and EISs that accurately reflect existing environmental conditions and legal requirements.

(3) When determining the need for a re-evaluation, the responsible FAA official should use the information in paragraphs 1401.b and 1401.c.

b. Draft EAs and draft EISs. FAA considers draft EAs and draft EISs to remain valid for a 3-year period (FAA Order 1050.1E, paragraphs 402a and 514a).

(1) For EAs, that period begins when the responsible FAA official completes FAA's review of the draft EA. Draft EIS time begins on the date the approving FAA official signs the document's "Notice of Availability."

(2) If the final EA or EIS is not completed within 3 years from the applicable dates noted in paragraph 1401.b(1), the responsible FAA official must determine if a written re-evaluation is needed.

[1] CEQ regulations include no specific requirement to apply time limits to, or prepare supplements for EAs, but it is FAA policy to apply the same requirements to EAs (Order 1050.1E, paragraph 402).

(3) If a re-evaluation is needed, the official will determine if the alternatives, the affected environment, environmental impacts, and mitigation in the document remain applicable, accurate, and valid. If the responsible FAA official determines substantial changes in these factors have occurred, the sponsor or FAA, will supplement the draft EA or DEIS, respectively, or prepare new document sections to address the changed conditions.

(4) The responsible FAA official must circulate the supplement or changed document sections as discussed in paragraph 1101 of this Order.

c. Final EAs or final EISs. FAA considers a final EA or final EIS valid for 3 years. For final EAs, the 3-year period begins when the responsible FAA official accepts the final EA as a Federal document. For FEISs, the start time is the date the approving FAA official signs the FEIS's "Notice of Availability." The responsible FAA official should consider the following facts signaling project start when determining if a final EA or final EIS requires re-evaluation. If the sponsor has begun the approved project within the time frame mentioned below the responsible FAA official need not re-evaluate the document.

(1) Major steps toward implementation of the proposed action. Major steps toward implementation of the proposed action include starting construction, substantial land acquisition, or moving people or businesses. If none of these actions occurs, the responsible FAA official must prepare a written re-evaluation to determine if the final EA or EIS remains accurate, adequate, and current. The responsible FAA official should focus on the affected environment, anticipated project impacts, and mitigation measures. If substantial change occurs involving these issues or other issues the responsible FAA official determines critical to the approving FAA official's decision, a supplement to the EA or EIS will be needed.

(2) Substantial changes in the proposed action. If substantial changes in an action occur, the responsible FAA official should determine if the changes are relevant to environmental concerns. That determination should focus on the affected environment and anticipated impacts due to the changes and how they would relate to the proposed action or proposed mitigation. The official must decide if the resultant environmental impacts present significant new circumstances or information relevant to those environmental concerns bearing on the proposed action or impacts. The official should use his or her professional judgment to determine if a written re-evaluation is needed.

(3) Staged projects or projects requiring successive Federal approvals. Some airport actions occur in stages or require successive Federal approvals. Here, the responsible FAA official must prepare a written re-evaluation if more than 3 years elapse between the date of a final EA or EIS and one of those stages. The re-evaluation should focus on the document's continued adequacy, accuracy, and validity. If needed, the responsible FAA official must prepare a

supplemental document for those parts of the final EA or EIS that no longer provide acceptable or accurate information.

d. Format and circulation. The responsible FAA official should develop a format to prepare a written re-evaluation. The re-evaluation should be reviewed internally. The responsible FAA official should place a copy of the re-evaluation in the project's administrative file. The responsible FAA official need not make the written re-evaluation available to the public. However, that document may be made available to the public at the discretion of the responsible FAA official.

1402. SUPPLEMENTING A NEPA DOCUMENT.

a. General. As discussed in paragraph 1401, the responsible FAA official must decide if an EA or EIS needs to be supplemented.

b. Circumstances requiring a supplement. Text at 40 CFR 1502.9(c) discusses the need for supplementing EISs. Based on that regulation, the following situations require FAA to supplement EAs and EISs.

(1) The airport sponsor or FAA makes substantial changes in the proposed action that could affect the action's environmental effects. or

(2) Significant new changes, circumstances or information relevant to the proposed action, its affected environment, or its environmental impacts becomes available.

c. Content of a supplement. The content of a supplement to a NEPA document varies with the degree of change that has occurred since the NEPA document was prepared. Typically, FAA will supplement only those document sections needing updating. To ensure a document remains current and accurate, the responsible FAA official may supplement a NEPA document in one of these ways:

(1) Prepare a separate document discussing the changed circumstances. When this occurs, identify the parts of the original document for which new data are presented. or

(2) Prepare new pages for the original document. Here, replace the specific pages of the original document or add new pages to it.

d. Preparing a supplement. The responsible FAA official preparing a supplement need not conduct scoping. But the official must ensure the supplement meets the same circulation and filing requirements used for the original environmental document.

(1) The approving FAA official who signed the original NEPA document (or his or her successor) should approve or disapprove the supplement, unless the supplement presents a new issue requiring higher-level approval.

(2) The approving FAA official must use the supplement in the decision making process.

(3) The approving FAA official must issue a new Finding of No Significant Impact (FONSI) or Record of Decision (ROD) when FAA supplements a final EA or EIS, respectively. The official may issue the ROD after the FEIS's required review period elapses (see paragraph 1303 of this Order). The new FONSI or ROD may incorporate the previous versions of those decision documents and should clearly discuss how it differs from the FAA's earlier decision document.

1403. TIERING.

a. General. Text at 40 CFR 1508.28 defines tiering as covering a general program in a broader-focused EIS, then, preparing later EISs or EAs for specific, follow-on actions that are parts of that program. Tiered EISs or EAs move from a broad scope to narrow scope, or from "program analysis" to "project analysis." Incorporating information from the broader-focused EIS by reference into an EIS or EA addressing a specific action avoids repetitive discussions of similar issues common to various program elements at various locations. This allows the decision maker to focus on those actions that are ripe for decision (40 CFR 1500.4(i), 1502.4(d) and 1502.20). Tiered and programmatic EISs are prepared, circulated, and filed using the same procedures for DEISs and FEISs (see paragraphs 1101 and 1211 of this Order, respectively).

b. An example of tiering. An example of tiering would be selecting an airport site from various possible locations, then eventually building a new airport at one of those sites. Here, FAA would prepare a "first-tier EIS" to compare the different sites to disclose likely environmental impacts at the various sites to the decision maker and public. The impacts would be based on a generic airport designed to serve a certain number of passengers. A follow-on or "second-tier EIS" focuses on alternative layouts specific to the selected site and the likely environmental effects those layouts would have on that particular site and its surrounding area.

1404. ADDRESSING EMERGENCY SITUATIONS. A national emergency, disaster, or another event of great urgency may require ARP to take actions that normally require an EIS. In these situations, FAA must not delay those actions that are immediately necessary to secure lives and public safety, but FAA must complete the steps in paragraphs 1404.a – c. as soon as possible. When FAA officials receive information on an emergency involving an Airports Program EIS, the responsible FAA official must notify ARP's Airport Planning and Environmental Division (APP-

400). APP-400 will contact DOT's Office of the Assistant Secretary for Transportation Policy and CEQ.

a. Alternative arrangements. Text at 40 CFR 1506.11 permits CEQ to grant alternative arrangements for, but not eliminate, NEPA compliance. CEQ may reduce processing times, or if the emergency warrants, condense EIS preparation and processing. These "alternative arrangements" take the place of an Environmental Impact Statement and only apply to Federal actions with "significant environmental impacts." Lesser actions may be subject to FAA NEPA procedures.

b. Developing alternative arrangements. Factors to address when developing alternative arrangements include:

(1) The nature and scope of the emergency.

(2) Actions necessary to control the immediate impacts of the emergency.

(3) Potential adverse effects of the proposed action.

(4) Parts of the NEPA process that can be followed and provide value.

(5) Duration of the emergency. and

(6) Potential mitigation measures.

c. CEQ notice. Once the alternative arrangements are established, CEQ will provide DOT with written information describing those arrangements and the considerations used to develop them.

1405. - 1499. RESERVED.

CHAPTER 15. ENVIRONMENTAL STEWARDSHIP AND STREAMLINING FOR AIRPORT DEVELOPMENT PROJECTS

1500. GENERAL.

a. Vision 100. *Vision 100 -- Century of Aviation Reauthorization Act* (Public Law 108-176, Vision 100) was signed into law on December 12, 2003. Besides many environmental provisions within Vision 100, Title III specifically addresses environmental stewardship and streamlining for airport capacity projects at congested airports, aviation safety projects, and aviation security projects.

b. Streamlining. Title III of Vision 100 is the *Aviation Streamlining Approval Process Act of 2003*. In Title III, Congress found that FAA, airport authorities, communities, and other Federal, State, and local government agencies needed to work together to protect the environment, while sustaining the economic vitality continued aviation growth would provide to the Nation. To do this, the above parties must work cooperatively to develop a plan to enhance aviation, set and achieve milestones and deadlines to address a plan's resultant environmental effects, and work to protect the environment.

c. Directions to the Secretary of Transportation. Title III directs the Secretary of Transportation (Secretary) to develop and carry out an expedited and coordinated environmental review process for airport capacity projects at congested airports, aviation safety projects, and aviation security projects. This chapter focuses on environmental streamlining for airport-specific projects.

1501. STREAMLINING POLICY. FAA's Office of Airports (ARP) will adhere to the high standards of environmental review described in Order 1050.1E and this Order for projects subject to environmental streamlining under Vision 100. ARP will comply with all environmental requirements, maintain the environmental process' integrity, and respect the environmental responsibilities of other agencies. ARP will use the environmental streamlining process to:

a. Give priority review to certain projects.

b. Promote public review and comment.

c. Manage timelines during the review process.

d. Improve and expedite interagency coordination.

e. Reduce undue delays. and

f. Stress quality and accountability.

1502. RELATIONSHIP OF THIS ORDER TO OTHER REQUIREMENTS. The specific terms in Vision 100 addressing how the Secretary will carry out this mandate are consistent with DOT/FAA responsibilities under NEPA as described in this Order. This Order supplements Order 1050.1E and focuses ARP personnel on Vision 100 compliance specifically for airport projects. Executive Order 13274, *Environmental Stewardship and Transportation Infrastructure Project Reviews,* and FAA administrative streamlining practices supplement Title III of Vision 100.

1503. PROJECTS SUBJECT TO STREAMLINING IN VISION 100. Title III of Vision 100 addresses streamlining the environmental process for three categories of aviation projects.

a. Airport capacity project at a congested airport. An airport capacity project is a project involving the construction or extension of a runway, including any land acquisition, taxiway, or safety area associated with such projects. Airport capacity projects may include other airport development projects if the Secretary determines they promote reductions in air traffic congestion and delays. Under Vision 100, a congested airport is an airport that accounted for at least 1 percent of all delayed aircraft operations in the Nation, and is an airport listed in Table 1 of FAA's *Airport Capacity Benchmark Report 2001*. Delayed aircraft operations by airport are based on the most recent year for which data are available (from the FAA's OPSNET).

b. Aviation safety project. This is an aviation project chiefly purposed to reduce the risk of injury to people or damage to aircraft and property. The FAA Administrator makes the determinations for these projects. These projects are either needed to respond to a National Transportation Safety Board recommendation as determined by the FAA Administrator, or they are necessary for airport sponsor compliance with 14 CFR Part 139 (airport certification).

c. Aviation security project. This is a security project at an airport required by the Department of Homeland Security.

Note: Unlike airport capacity projects, streamlined aviation safety and aviation security projects may occur at any airport, not just congested airports as defined in paragraph 1503.a.

1504. PROJECT DESIGNATION. This section focuses on how projects are designated as streamlined projects.

a. An airport capacity project at a congested airport. Title III more clearly describes airport capacity projects at congested airports than it defines aviation safety or security projects. That Title clearly states its provisions will apply to an airport capacity project at a congested airport, even if the Secretary does not designate the project as a high priority transportation infrastructure project under Executive Order 13274. Title III further requires a coordinated and expedited environmental review process for airport capacity projects at congested airports.

(1) Runway construction or expansion projects. The FAA's Associate Administrator for Airports (ARP-1) is responsible for designating runway construction and extension projects, consistent with the definition in Title III of Vision 100.

(2) Other projects. ARP-1 is responsible for recommending to the Secretary (or the Secretary's designee) other airport development projects for environmental streamlining; however, the projects' primary purposes must be to reduce air traffic congestion and delays. In this process, the Regional Airports Division Manager submits a project through APP-400. The submittal must contain the Manager's reasons why the project would reduce congestion and delays. Alternatively, the Manager may cite how such a project would benefit from streamlining the environmental review or analysis the project must undergo to complete environmentally related permitting, licensing or other approval requirements.

b. Aviation safety or security project. The FAA Administrator has the discretion to designate an aviation safety or security project. The Administrator may not delegate this authority. Once the Administrator makes this project designation, the project must undergo the coordinated and expedited environmental review process Title III of Vision 100 requires. The Administrator's designation is subject to all the following guidelines:

(1) Project importance or urgency.

(2) The potential for undertaking the environmental review under NEPA's existing emergency procedures. Consult 40 CFR 1506.11 and paragraph 1404 for more information on this.

(3) The need for Federal or State agency cooperation and concurrent reviews of project-related information.

(4) The potential for undue delay, if the project were not designated for priority review.

(5) The views of the Department of Homeland Security for aviation security projects.

c. ARP and AEE responsibilities for safety and security projects. In some cases, ARP may be the lead FAA office for an aviation safety or security project under Vision 100. In these instances, ARP's Airport Planning and Environmental Division (APP-400) will review the regional recommendation to place these projects under Vision 100. If APP-400 concurs with the Regional recommendation, ARP-1 will send the recommendation and rationale to the Office of Environment and Energy (AEE), the FAA office responsible for uniformly interpreting and applying the subject guidelines for aviation safety and security projects. AEE will review the recommended designation and provide advice on project designation to the Administrator.

1505. THE COORDINATED AND EXPEDITED ENVIRONMENTAL REVIEW PROCESS. For each airport development project that has been designated for the coordinated and expedited environmental review process under Title III of Vision 100, the provisions below apply.

a. Identify Federal and State jurisdictional agencies. As soon as practicable, the responsible FAA official will identify all Federal and State agencies that:

(1) May have jurisdiction over environmentally related matters the project may affect.

(2) May be required by law to conduct an environmentally related review or analysis of the project.

(3) Must decide whether to issue an environmentally related permit, license, or approval for the project.

b. Federal and State agency participation. The responsible FAA official will contact, either individually or together in a facilitated group meeting, those Federal and State agencies that meet the criteria outlined above. The proposed project and the provisions of Title III of Vision 100 should be discussed.

(1) It is important that each identified Federal and State agency understand its role and responsibility under the Act. They should be given the opportunity to join in setting up procedures enabling the agency to take part in the coordinated review process. These procedures must ensure completion of environmental reviews, analyses, opinions, permits, licenses, and approvals in a timely and environmentally responsible manner.

(2) State agency participation is at the discretion of the Governor of the State where the project would be located. Consistent with State law, a Governor may choose to participate in the coordinated review process and require all identified State agencies to be part of the streamlining process. While State participation under Title III of Vision 100 is strictly voluntary, experience has shown that State participation in a coordinated environmental review process is critical, and FAA should strongly pursue that participation. Direct contact with the Governor's Office may be necessary. To do so, it may be helpful to secure the airport sponsor's support and assistance.

c. Coordinated and expedited review process. Title III of Vision 100 directs the Secretary to develop and carry out a coordinated, expedited environmental review process for designated projects. This review process must provide for better coordination among the Federal, State, regional, and local agencies concerned with preparing EISs or EAs. The process must provide for all project environmental reviews, analyses, opinions, permits, licenses, and approvals that are the responsibilities of a participating Federal or State agency or the airport sponsor. The agencies must accomplish these duties concurrently, to the maximum extent practicable, and complete the necessary activities within the time period established. Other Title III provisions to support and improve a

coordinated and expedited environmental review process are described below. ARP may supplement the process with best practice measures consistent with environmental laws, regulations, and policies.

d. High priority for environmental reviews. Under Title III of Vision 100 each Federal agency is directed to give the highest possible priority to projects designated for coordinated review under the Act. They must conduct their review, analysis, opinion, permit, license, or approval functions efficiently. Participating State agencies are expected to perform similarly.

e. Memorandum of Understanding. The coordinated environmental review process discussed throughout this chapter may be detailed or explained in a Memorandum of Understanding (MOU). Although the use of an MOU is discretionary, ARP experience:

(1) Suggests that an MOU is a very effective way to coordinate and document agency roles, responsibilities, deadlines, and other administrative and processes when a small number of agencies is involved in the streamlining process.

(2) Shows that FAA and other participating Federal and State agencies normally sign an MOU. However, given the roles airport sponsors fulfill for most airport development actions, ARP encourages airport sponsors to be MOU signatories as well.

f. Streamlining Agreement. Like an MOU, a Streamlining Agreement (SA) is another excellent way to coordinate the review processes needed for environmental streamlining. Like the MOU, this SA is discretionary, rather than required.

(a) An SA is a useful when a large number of Federal and State agencies will participate in the streamlining process.

(b) ARP and other participating Federal and State agencies and, if applicable, the airport sponsor should be participants in developing the agreement. They should also be signatories to the SA. Due to the large number of entities involved, experience has shown that the use of a professional facilitator is extremely useful in reaching consensus on what is an acceptable and effective agreement.

(c) At a minimum, the SA should include:

(1) An Overview.

(2) Annotated goals.

(3) Consensus points for Purpose and Need, Range of Reasonable Alternatives, Efforts to Minimize Impacts, Mitigation Requirements, and Stewardship Opportunities.

(4) A dispute resolution process.

(5) Milestone dates.

(6) Short, clear explanations of each signatory's roles and responsibilities of including those the airport sponsor will fulfill. and

(7) Signatory pages.

If needed, the responsible FAA official may contact APP-400 for help in developing an SA or MOU for environmental streamlining projects.

g. Interagency EIS teams. For streamlined projects, ARP may, but is not required to, use an interagency EIS team to coordinate and expedite the environmental review process and to help prepare the EIS. If using an EIS team, the responsible FAA official must invite Federal and State agencies and Tribes having jurisdiction by law to participate on the team as cooperating agencies. Agencies with special expertise may be invited to participate on the team as cooperating agencies too. To promote timely, efficient environmental reviews, the team members may use a MOU to agree on the following items:

(1) Agency or Tribal points of contact.

(2) Protocols for communicating among agencies.

(3) Setting up deadlines for necessary actions by each individual agency. These actions include:

(a) Completing reviews of environmental analyses.

(b) Conducting required consultation and coordination.

(c) Issuing environmental opinions, licenses, permits, and approvals.

The responsible FAA may contact APP-400 for help in developing an MOU.

h. Lead agency responsibilities. Title III of Vision 100 identifies FAA as the lead agency for airport projects deemed appropriate for a coordinated and expedited environmental review process. Title III specifies that FAA is responsible for defining an EIS's scope and content, consistent with CEQ regulations. Title III further states that any other Federal or State agency taking part in the coordinated environmental review process must give substantial deference, to the extent consistent with applicable law and policy, to FAA's aviation expertise. FAA is responsible for assuring the integrity of aviation data used for environmental analyses and agency decision making.

i. Purpose and Need. Federal or State agencies participating in a coordinated environmental review often are required to analyze a project's purpose and need.

(1) Under Title III of Vision 100, all agencies in a streamlined review process are bound by the project purpose and need the Secretary defines, notwithstanding any other provision of law.

(2) Title III requires the Secretary to request and consider comments on project purpose and need from interested people and governmental entities according to the NEPA process. The Secretary may do so through normal, NEPA-related public and agency review procedures.

(3) This provision of law does not change ARP's responsibilities described in this Order for determining a project's purpose and need. ARP will cooperatively review proposed project Purpose and Need statements with other participating agencies having jurisdiction and decision making roles for the proposed airport action. In doing so, ARP will attempt to accommodate other agency needs, consistent with CEQ regulations and guidance, FAA program responsibility and FAA's substantive aviation expertise.

j. Alternatives. Similar to the project purpose and need provision discussed in paragraph 1505.i(1) – (3), Title III of Vision 100 authorizes the Secretary to determine the reasonable alternatives for a designated, streamlined, aviation project.

(1) Any Federal or State agency participating in the coordinated environmental review process must consider only those alternatives the Secretary determines reasonable.

(2) The remainder of the guidance in paragraphs 1505.i(2) and (3) applies to the alternatives analysis for streamlined projects. The provisions include requesting and considering comments, using normal NEPA procedures, complying with this Order's instructions, and consulting and cooperating with other agencies.

k. Reporting and correcting a failure to meet a project milestone. In preparing an SA or MOU for an airport action, ARP will work with the potential signatories to set a reasonable milestone schedule. The schedule will list the dates the participants must complete environmental reviews or analyses, prepare opinions, or issue permits, licenses, or approvals.

(1) If an agency, including FAA, or an airport sponsor participating in a streamlined project fails to meet a milestone date, ARP must report that incident to the Secretary. Title III of Vision 100 requires the Secretary to notify Congress within 30 days of determining a missed deadline. FAA must send the report to the Senate Committee on Commerce, Science, and Transportation, the House Committee on Transportation and Infrastructure and CEQ. FAA must also send a copy to the agency or sponsor involved regarding the failure to meet the milestone.

(2) Title III of Vision 100 directs the party failing to meet the milestone to prepare a report explaining why it did not achieve the milestone and how it plans to complete the required assignment. The party must file that report with the Secretary, the Senate Committee on Commerce, Science, and Transportation, the House Committee on Transportation and Infrastructure, and CEQ. The filing must occur within 30 days after the party receives notice that it missed the milestone.

(3) To ensure a timely submission of a report to the Secretary, the FAA official responsible for the project must prepare and submit a missed project milestone report to APP-400 within 10 days of the missed milestone date. The report must identify the agency at fault, the established deadline that was missed, and any circumstances or facts relative to why the deadline was missed. As a matter of practice, ARP will make every effort to help streamlining participants meet milestones or to correct those missed deadlines as quickly as possible.

1506. OTHER VISION 100 PROVISIONS. Vision 100 included other administrative provisions that may assist in promoting environmental streamlining.

a. Airport funding for FAA staff and consultants. In some cases, streamlined airport projects may require more personnel and/or other resources to complete timely reviews, processing, or other environmental activities. Through reimbursable agreements, the FAA Administrator may accept funds from an airport sponsor to hire more staff or to obtain the services of environmental consultants needed to expedite environmental activities associated with an airport development project. Besides its own money, an airport sponsor may use Airport Improvement Program (AIP) funds to finance such agreements. Contact APP-400 for reimbursable agreement guidance.

b. Air traffic procedures for airport capacity projects at congested airports. Sometimes, an airport capacity project at a congested airport involves a new runway or runways or reconfiguring existing runways. During the environmental planning process for these projects, FAA may consider changing flight procedures to avoid or minimize significant noise impacts those projects may cause. If the Administrator determines that noise mitigation flight procedures are consistent with the safe and efficient use of the navigable airspace, the Administrator may commit to include the procedures in any Record of Decision (ROD) approving the project. The Administrator may do so at the airport sponsor's request in a manner consistent with applicable Federal law. The responsible FAA official must work closely with FAA's Air Traffic Organization, the FAA office responsible for developing and approving noise mitigation flight procedures.

c. Flexible noise mitigation funding for airport capacity projects or other airport development projects. Vision 100 contains provisions enabling ARP to quickly issue AIP funding for noise mitigation contained in a Record of Decision. These provisions allow ARP to use AIP noise set-aside money to fund that mitigation without ARP approval under 14 CFR Part 150 (Noise Compatibility Program). Contact ARP's Programming Office (APP-500) for AIP funding guidance or more information.

d. Voluntary air quality initiatives. Vision 100 provides funding and air quality emission credit incentives for commercial service airports in air quality nonattainment and maintenance areas. These credits encourage airport sponsors to voluntarily reduce emissions from ground equipment servicing aircraft. Emission credits granted to airports under this program may be used for current or future general conformity determinations under the Clean Air Act. As a result, these provisions can reduce delays in meeting air quality requirements during environmental reviews that could otherwise delay FAA's decision on an airport congestion project. ARP has issued very detailed guidance in cooperation with EPA. Contact APP-400 for program technical guidance and APP-500 for funding guidance.

1507. – 1599. RESERVED.

APPENDIX 1.

Flow charts depicting steps for completing:

Categorical exclusions.

Environmental assessments.

Findings of No Significant IMPACT.

Environmental Impact Statements. and

Records of Decision.

CHART 1. CATEGORICAL EXCLUSIONS. CHAPTER 6

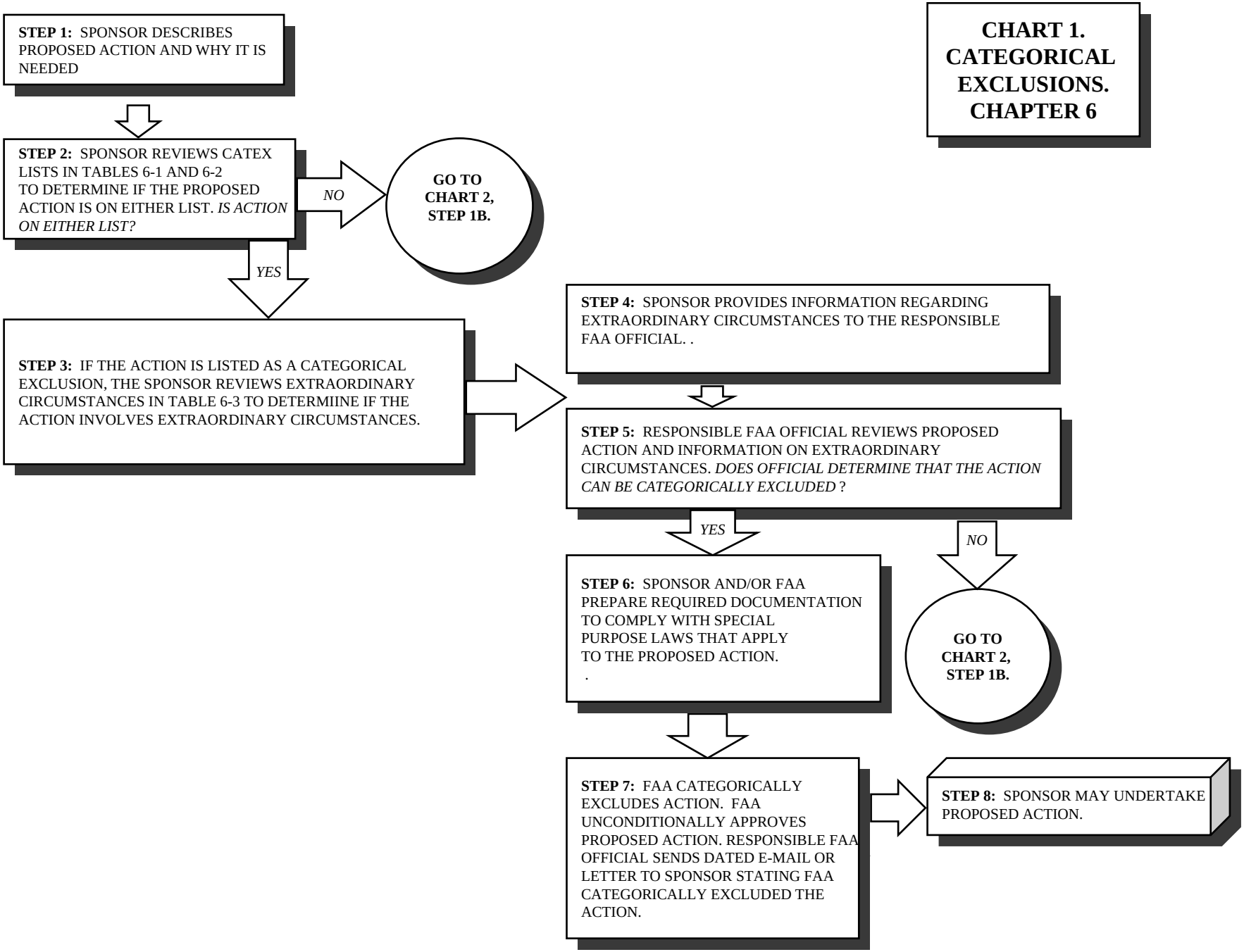
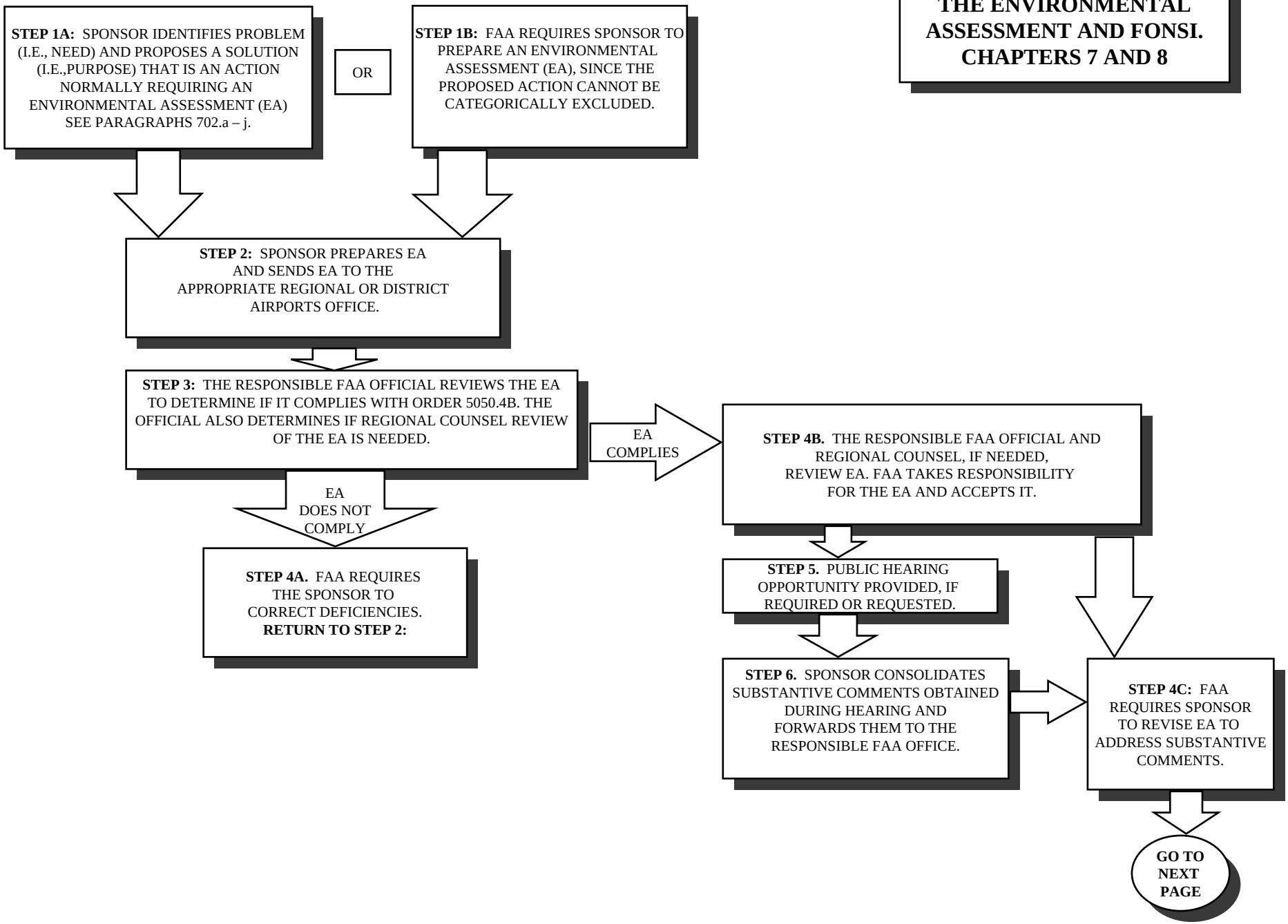


CHART 2.
THE ENVIRONMENTAL ASSESSMENT AND FONSI.
CHAPTERS 7 AND 8



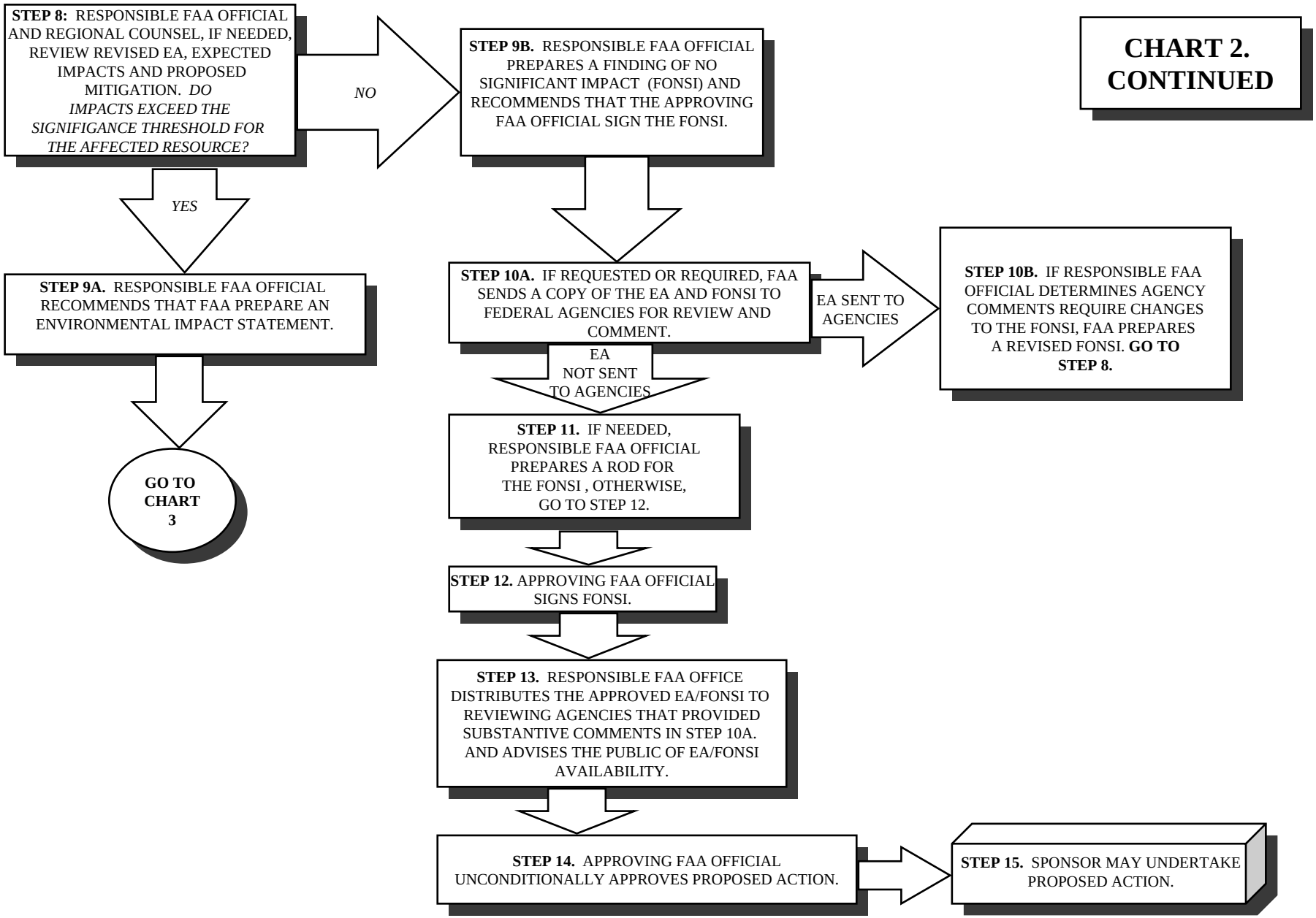

CHART 2. CONTINUED
STEP 8: RESPONSIBLE FAA OFFICIAL AND REGIONAL COUNSEL, IF NEEDED, REVIEW REVISED EA, EXPECTED IMPACTS AND PROPOSED MITIGATION. DO IMPACTS EXCEED THE SIGNIFIGANCE THRESHOLD FOR THE AFFECTED RESOURCE?
NO
YES
STEP 9B. RESPONSIBLE FAA OFFICIAL PREPARES A FINDING OF NO SIGNIFICANT IMPACT (FONSI) AND RECOMMENDS THAT THE APPROVING FAA OFFICIAL SIGN THE FONSI.
STEP 9A. RESPONSIBLE FAA OFFICIAL RECOMMENDS THAT FAA PREPARE AN ENVIRONMENTAL IMPACT STATEMENT.
GO TO CHART 3
STEP 10A. IF REQUESTED OR REQUIRED, FAA SENDS A COPY OF THE EA AND FONSI TO FEDERAL AGENCIES FOR REVIEW AND COMMENT.
EA SENT TO AGENCIES
STEP 10B. IF RESPONSIBLE FAA OFFICIAL DETERMINES AGENCY COMMENTS REQUIRE CHANGES TO THE FONSI, FAA PREPARES A REVISED FONSI. GO TO STEP 8.
EA NOT SENT TO AGENCIES
STEP 11. IF NEEDED, RESPONSIBLE FAA OFFICIAL PREPARES A ROD FOR THE FONSI , OTHERWISE, GO TO STEP 12.
STEP 12. APPROVING FAA OFFICIAL SIGNS FONSI.
STEP 13. RESPONSIBLE FAA OFFICE DISTRIBUTES THE APPROVED EA/FONSI TO REVIEWING AGENCIES THAT PROVIDED SUBSTANTIVE COMMENTS IN STEP 10A. AND ADVISES THE PUBLIC OF EA/FONSI AVAILABILITY.
STEP 14. APPROVING FAA OFFICIAL UNCONDITIONALLY APPROVES PROPOSED ACTION.
STEP 15. SPONSOR MAY UNDERTAKE PROPOSED ACTION.

CHART 3. THE ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION. CHAPTERS 9-13

STEP 1: RESPONSIBLE FAA OFFICIAL DETERMINES AN EIS IS NEEDED BECAUSE AN EA INDICATED SIGNIFICANT IMPACT WOULD OCCUR (SEE (**CHART 2, STEP 9A**), OR THE PROPOSED ACTION NORMALLY REQUIRES AN EIS. SEE PARAGRAPHS 902.a – c.

STEP 2: RESPONSIBLE FAA OFFICE PUBLISHES "NOTICE OF INTENT TO PREPARE AN EIS" IN THE *FEDERAL REGISTER.*

STEP 3: RESPONSIBLE FAA OFFICIAL DEVELOPS SCOPING TOPICS, CONDUCTS SCOPING, AND IF NEEDED, ASSIGNS RESPONSIBILITY FOR EIS INPUT TO VARIOUS COOPERATING AGENCIES.

STEP 4: FAA SELECTS A CONTRACTOR TO HELP FAA PREPARE THE EIS. THE CONTRACTOR MUST SIGN A DISCLOSURE STATEMENT.

STEP 5: RESPONSIBLE FAA OFFICIAL COMPLETES DRAFT EIS (DEIS) AND DISTRIBUTES IT FOR PUBLIC REVIEW. OFFICIAL SENDS DEIS COPIES TO APP-400. REVIEWS LAST AT **LEAST 45** DAYS.

STEP 6A: FAA CERTIFIES TO EPA THAT FAA HAS DISTRIBUTED THE DEIS FOR PUBLIC REVIEW AND COMMENT. EPA PUBLISHES "NOTICE OF AVAILABILITY OF DEIS" IN *FEDERAL REGISTER.*

STEP 6B: APP-400 CIRCULATES DEIS WITHIN FAA.

STEP 7. PUBLIC HEARING OPPORTUNITY PROVIDED IF REQUIRED. IF REQUESTED, HEARING HELD AT LEAST 30 DAYS AFTER SPONSOR PUBLISHES MEETING SCHEDULE IN LOCAL MEDIA.

GO TO NEXT PAGE

CHART 3.
CONTINUED

STEP 8: APP-400 FORWARDS COMMENTS FROM FAA HQ TO RESPONSIBLE FAA OFFICIAL

STEP 9: FAA PREPARES FINAL EIS (FEIS) BY:
REVIEWING COMMENTS ON THE DEIS AND PUBLIC HEARING;
REVISING EIS AS NEEDED;
AND PREPAING RESPONSES TO PUBLIC COMMENTS ON THE DEIS.

STEP 10: RESPONSIBLE FAA OFFICE SENDS FEIS TO APP-400 FOR REVIEW.

STEP 11: APP-400 REVIEWS FEIS. APP-400 RECOMMENDS THAT ARP-1 APPROVE FEIS OR INFORMS ARP-1 THAT EIS APPROVAL IS ALREADY DELEGATED TO THE REGION RESPONSIBLE FOR THE PROPOSED ACTION.

STEP 12: EITHER ARP-1 OR THE APPROVING FAA OFFICIAL APPROVES FEIS. RESPONSIBLE FAA OFFICIAL DISTRIBUTES FEIS.

STEP 13: EPA PUBLISHES "NOTICE OF AVAILABILITY OF THE FEIS" IN *FEDERAL REGISTER.* 30-DAY "WAIT PERIOD" BEGINS.

STEP 14: DURING 30-DAY PERIOD, FAA PREPARES RECORD OF DECISION (ROD). REGIONAL FAA APPROVING OFFICIAL OR ARP-1 WILL SIGN ROD, DEPENDING UPON DELEGATION DECISION IN STEP 11.

STEP 15: REGIONAL APPROVING FAA OFFICIAL OR ARP-1 UNCONDITIONALLY APPROVES ACTION, DEPENDING ON DELEGATION DECISION.

STEP 16: SPONSOR TAKES ACTION.

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS	**Date:** 8/28/2007	**AC No:** 150/5200-33B
	Initiated by: AAS-300	**Change:**

1. PURPOSE. This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICABILITY. The Federal Aviation Administration (FAA) recommends that public-use airport operators implement the standards and practices contained in this AC. The holders of Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D (Part 139), may use the standards, practices, and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. Airports that have received Federal grant-in-aid assistance must use these standards. The FAA also recommends the guidance in this AC for land-use planners, operators of non-certificated airports, and developers of projects, facilities, and activities on or near airports.

3. CANCELLATION. This AC cancels AC 150/5200-33A, *Hazardous Wildlife Attractants on or near Airports*, dated July 27, 2004.

4. PRINCIPAL CHANGES. This AC contains the following major changes, which are marked with vertical bars in the margin:

a. Technical changes to paragraph references.

b. Wording on storm water detention ponds.

c. Deleted paragraph 4-3.b, *Additional Coordination.*

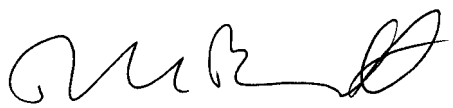
5. BACKGROUND. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1

ranks the wildlife groups commonly involved in damaging strikes in the United States according to their relative hazard to aircraft. The ranking is based on the 47,212 records in the FAA National Wildlife Strike Database for the years 1990 through 2003. These hazard rankings, in conjunction with site-specific Wildlife Hazards Assessments (WHA), will help airport operators determine the relative abundance and use patterns of wildlife species and help focus hazardous wildlife management efforts on those species most likely to cause problems at an airport.

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area (AOA). Constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports.

6. MEMORANDUM OF AGREEMENT BETWEEN FEDERAL RESOURCE AGENCIES. The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) in July 2003 to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation’s valuable environmental resources.



DAVID L. BENNETT
Director, Office of Airport Safety
and Standards

Table 1. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.[1]

Species group	Ranking by criteria			Composite ranking[2]	Relative hazard score[3]
	Damage[4]	Major damage[5]	Effect on flight[6]		
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39
Osprey	8	4	8	8	39
Turkey/pheasants	9	7	11	9	33
Herons	11	14	9	10	27
Hawks (buteos)	10	12	12	11	25
Gulls	12	11	13	12	24
Rock pigeon	13	10	14	13	23
Owls	14	13	20	14	23
H. lark/s. bunting	18	15	15	15	17
Crows/ravens	15	16	16	16	16
Coyote	16	19	5	17	14
Mourning dove	17	17	17	18	14
Shorebirds	19	21	18	19	10
Blackbirds/starling	20	22	19	20	10
American kestrel	21	18	21	21	9
Meadowlarks	22	20	22	22	7
Swallows	24	23	24	23	4
Sparrows	25	24	23	24	4
Nighthawks	23	25	25	25	1

[1] Excerpted from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003".* Refer to this report for additional explanations of criteria and method of ranking.

[2] Relative rank of each species group was compared with every other group for the three variables, placing the species group with the greatest hazard rank for $\geq$ 2 of the 3 variables above the next highest ranked group, then proceeding down the list.

[3] Percentage values, from Tables 3 and 4 in Footnote 1 of the *Special Report*, for the three criteria were summed and scaled down from 100, with 100 as the score for the species group with the maximum summed values and the greatest potential hazard to aircraft.

[4] Aircraft incurred at least some damage (destroyed, substantial, minor, or unknown) from strike.

[5] Aircraft incurred damage or structural failure, which adversely affected the structure strength, performance, or flight characteristics, and which would normally require major repair or replacement of the affected component, or the damage sustained makes it inadvisable to restore aircraft to airworthy condition.

[6] Aborted takeoff, engine shutdown, precautionary landing, or other.

This page intentionally left blank.

Table of Contents

SECTION 1. GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. 1

1-1. INTRODUCTION 1

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT 1

1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT 1

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE 1

SECTION 2. LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE 3

2-1. GENERAL 3

2-2. WASTE DISPOSAL OPERATIONS 3

2-3. WATER MANAGEMENT FACILITIES 5

2-4. WETLANDS 8

2-5. DREDGE SPOIL CONTAINMENT AREAS 9

2-6. AGRICULTURAL ACTIVITIES 9

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS 10

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES 11

SECTION 3. PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS 13

3.1. INTRODUCTION 13

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS 13

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL 13

3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139 13

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP) 14

3-6. LOCAL COORDINATION 14

3-7. COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS 14

SECTION 4. FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS 15

4-1. FAA REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS 15

4-2. WASTE MANAGEMENT FACILITIES 15

4-3. OTHER LAND-USE PRACTICE CHANGES 16

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR 19

This page intentionally left blank.

SECTION 1.

GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. INTRODUCTION. When considering proposed land uses, airport operators, local planners, and developers must take into account whether the proposed land uses, including new development projects, will increase wildlife hazards. Land-use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife strikes.

The FAA recommends the minimum separation criteria outlined below for land-use practices that attract hazardous wildlife to the vicinity of airports. Please note that FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA). (See the discussion of the synergistic effects of surrounding land uses in Section 2-8 of this AC.)

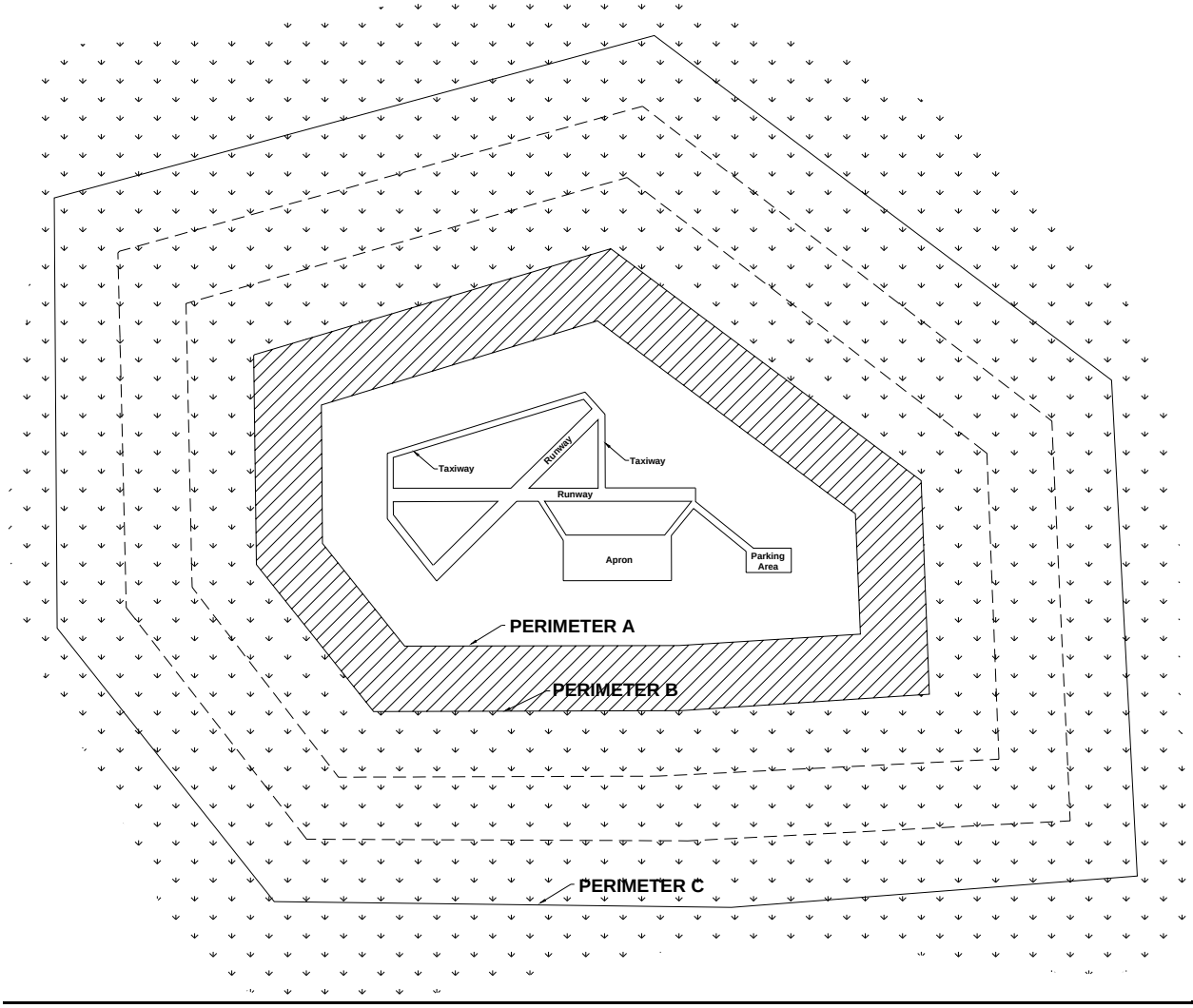
The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet and 90 percent occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT. Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance measured from the nearest aircraft operations areas.

1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT. Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance from the nearest aircraft movement areas.

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE. For all airports, the FAA recommends a distance of 5 statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

Figure 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



PERIMETER A: For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B: For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C: 5-mile range to protect approach, departure and circling airspace.

SECTION 2.

LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment vary considerably, depending on several factors, including land-use practices on or near the airport. This section discusses land-use practices having the potential to attract hazardous wildlife and threaten aviation safety. In addition to the specific considerations outlined below, airport operators should refer to *Wildlife Hazard Management at Airports,* prepared by FAA and U.S. Department of Agriculture (USDA) staff. (This manual is available in English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov.). And, *Prevention and Control of Wildlife Damage,* compiled by the University of Nebraska Cooperative Extension Division. (This manual is available online in a periodically updated version at: ianrwww.unl.edu/wildlife/solutions/handbook/.)

2-2. WASTE DISPOSAL OPERATIONS. Municipal solid waste landfills (MSWLF) are known to attract large numbers of hazardous wildlife, particularly birds. Because of this, these operations, when located within the separations identified in the siting criteria in Sections 1-2 through 1-4, are considered incompatible with safe airport operations.

a. Siting for new municipal solid waste landfills subject to AIR 21. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) (AIR 21) prohibits the construction or establishment of a new MSWLF within 6 statute miles of certain public-use airports. Before these prohibitions apply, both the airport and the landfill must meet the very specific conditions described below. These restrictions do not apply to airports or landfills located within the state of Alaska.

The airport must (1) have received a Federal grant(s) under 49 U.S.C. § 47101, et. seq.; (2) be under control of a public agency; (3) serve some scheduled air carrier operations conducted in aircraft with less than 60 seats; and (4) have total annual enplanements consisting of at least 51 percent of scheduled air carrier enplanements conducted in aircraft with less than 60 passenger seats.

The proposed MSWLF must (1) be within 6 miles of the airport, as measured from airport property line to MSWLF property line, and (2) have started construction or establishment on or after April 5, 2001. Public Law 106-181 only limits the construction or establishment of some new MSWLF. It does not limit the expansion, either vertical or horizontal, of existing landfills.

NOTE: Consult the most recent version of AC 150/5200-34, *Construction or Establishment of Landfills Near Public Airports,* for a more detailed discussion of these restrictions.

b. Siting for new MSWLF not subject to AIR 21. If an airport and MSWLF do not meet the restrictions of Public Law 106-181, the FAA recommends against locating MSWLF within the separation distances identified in Sections 1-2 through 1-4. The separation distances should be measured from the closest point of the airport's AOA to the closest planned MSWLF cell.

c. Considerations for existing waste disposal facilities within the limits of separation criteria. The FAA recommends against airport development projects that would increase the number of aircraft operations or accommodate larger or faster aircraft near MSWLF operations located within the separations identified in Sections 1-2 through 1-4. In addition, in accordance with 40 CFR 258.10, owners or operators of existing MSWLF units that are located within the separations listed in Sections 1-2 through 1-4 must demonstrate that the unit is designed and operated so it does not pose a bird hazard to aircraft. (See Section 4-2(b) of this AC for a discussion of this demonstration requirement.)

d. Enclosed trash transfer stations. Enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ). These facilities should not handle or store putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA's definition of fully enclosed trash transfer stations. The FAA considers these facilities incompatible with safe airport operations if they are located closer than the separation distances specified in Sections 1-2 through 1-4.

e. Composting operations on or near airport property. Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any AOA or the distance called for by airport design requirements (see AC 150/5300-13, *Airport Design*). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic. On-airport disposal of compost by-products should not be conducted for the reasons stated in 2-3f.

f. Underwater waste discharges. The FAA recommends against the underwater discharge of any food waste (e.g., fish processing offal) within the separations identified in Sections 1-2 through 1-4 because it could attract scavenging hazardous wildlife.

g. Recycling centers. Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, or aluminum, are, in most cases, not attractive to hazardous wildlife and are acceptable.

h. Construction and demolition (C&D) debris facilities. C&D landfills do not generally attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, C&D landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, C&D landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities. Therefore, a C&D landfill co-located with another waste disposal operation should be located outside of the separations identified in Sections 1-2 through 1-4.

i. Fly ash disposal. The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they are maintained in an orderly manner, admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria outlined in Sections 1-2 through 1-4.

2-3. WATER MANAGEMENT FACILITIES. Drinking water intake and treatment facilities, storm water and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. To prevent wildlife hazards, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of storm water management facilities on or near all public-use airports to ensure a safe airport environment.

a. Existing storm water management facilities. On-airport storm water management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect storm water, protect water quality, and control runoff. Because they slowly release water

after storms, they create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a Wildlife Hazard Management Plan (WHMP) in accordance with Part 139, the FAA requires immediate correction of any wildlife hazards arising from existing storm water facilities located on or near airports, using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

Where possible, airport operators should modify storm water detention ponds to allow a maximum 48-hour detention period for the design storm. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat.

When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wires grids, pillows, or netting, to deter birds and other hazardous wildlife. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

The FAA recommends that airport operators encourage off-airport storm water treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into storm water treatment facility operating practices when their facility is located within the separation criteria specified in Sections 1-2 through 1-4.

b. New storm water management facilities. The FAA strongly recommends that off-airport storm water management systems located within the separations identified in Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages

the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

c. Existing wastewater treatment facilities. The FAA strongly recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport. Where required, a WHMP developed in accordance with Part 139 will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should encourage wastewater treatment facility operators to incorporate measures, developed in consultation with a wildlife damage management biologist, to minimize hazardous wildlife attractants. Airport operators should also encourage those wastewater treatment facility operators to incorporate these mitigation techniques into their standard operating practices. In addition, airport operators should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

d. New wastewater treatment facilities. The FAA strongly recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in Sections 1-2 through 1-4. Appendix 1 defines wastewater treatment facility as “any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes.” The definition includes any pretreatment involving the reduction of the amount of pollutants or the elimination of pollutants prior to introducing such pollutants into a publicly owned treatment works (wastewater treatment facility). During the site-location analysis for wastewater treatment facilities, developers should consider the potential to attract hazardous wildlife if an airport is in the vicinity of the proposed site, and airport operators should voice their opposition to such facilities if they are in proximity to the airport.

e. Artificial marshes. In warmer climates, wastewater treatment facilities sometimes employ artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. The FAA strongly recommends against establishing artificial marshes within the separations identified in Sections 1-2 through 1-4.

f. Wastewater discharge and sludge disposal. The FAA recommends against the discharge of wastewater or sludge on airport property because it may improve soil moisture and quality on unpaved areas and lead to improved turf growth that can be an attractive food source for many species of animals. Also, the turf requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw, both of which can attract hazardous wildlife. In addition, the improved turf may attract grazing wildlife, such as deer and geese. Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

2-4. WETLANDS. Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species (Table 1).

NOTE: If questions exist as to whether an area qualifies as a wetland, contact the local division of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or a wetland consultant qualified to delineate wetlands.

a. Existing wetlands on or near airport property. If wetlands are located on or near airport property, airport operators should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations. At public-use airports, the FAA recommends immediately correcting, in cooperation with local, state, and Federal regulatory agencies, any wildlife hazards arising from existing wetlands located on or near airports. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

b. New airport development. Whenever possible, the FAA recommends locating new airports using the separations from wetlands identified in Sections 1-2 through 1-4. Where alternative sites are not practicable, or when airport operators are expanding an existing airport into or near wetlands, a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the state wildlife management agency should evaluate the wildlife hazards and prepare a WHMP that indicates methods of minimizing the hazards.

c. Mitigation for wetland impacts from airport projects. Wetland mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects or projects required to correct wildlife hazards from wetlands. Wetland mitigation must be designed so it does not create a wildlife hazard. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4.

(1) Onsite mitigation of wetland functions. The FAA may consider exceptions to locating mitigation activities outside the separations identified in Sections 1-2 through 1-4 if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge, which cannot be replicated when moved to a different location. Using existing airport property is sometimes the only feasible way to achieve the mitigation ratios mandated in regulatory orders and/or settlement agreements with the resource agencies. Conservation easements are an additional means of providing mitigation for project impacts. Typically the airport operator continues to own the property, and an easement is created stipulating that the property will be maintained as habitat for state or Federally listed species.

Mitigation must not inhibit the airport operator's ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided. The FAA will review any onsite mitigation proposals to determine compatibility with safe airport operations. A wildlife damage management biologist should evaluate any wetland mitigation projects that are needed to protect unique wetland functions and that must be located in the separation criteria in Sections 1-2 through 1-4 before the mitigation is implemented. A WHMP should be developed to reduce the wildlife hazards.

(2) Offsite mitigation of wetland functions. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4 unless they provide unique functions that must remain onsite (see 2-4c(1)). Agencies that regulate impacts to or around wetlands recognize that it may be necessary to split wetland functions in mitigation schemes. Therefore, regulatory agencies may, under certain circumstances, allow portions of mitigation to take place in different locations.

(3) Mitigation banking. Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning. This last benefit is most helpful for airport projects, as wetland impacts mitigated outside of the separations identified in Sections 1-2 through 1-4 can still be located within the same watershed. Wetland mitigation banks meeting the separation criteria offer an ecologically sound approach to mitigation in these situations. Airport operators should work with local watershed management agencies or organizations to develop mitigation banking for wetland impacts on airport property.

2-5. DREDGE SPOIL CONTAINMENT AREAS. The FAA recommends against locating dredge spoil containment areas (also known as Confined Disposal Facilities) within the separations identified in Sections 1-2 through 1-4 if the containment area or the spoils contain material that would attract hazardous wildlife.

2-6. AGRICULTURAL ACTIVITIES. Because most, if not all, agricultural crops can attract hazardous wildlife during some phase of production, the FAA recommends against the used of airport property for agricultural production, including hay crops, within the separations identified in Sections 1-2 through 1-4. . If the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport, then the airport shall follow the crop distance guidelines listed in the table titled "Minimum Distances between Certain Airport Features and Any On-Airport Agricultural Crops" found in AC 150/5300-13, *Airport Design*, Appendix 17. The cost of wildlife control and potential accidents should be weighed against the income produced by the on-airport crops when deciding whether to allow crops on the airport.

a. Livestock production. Confined livestock operations (i.e., feedlots, dairy operations, hog or chicken production facilities, or egg laying operations) often attract flocking birds, such as starlings, that pose a hazard to aviation. Therefore, The FAA recommends against such facilities within the separations identified in Sections 1-2 through 1-4. Any livestock operation within these separations should have a program developed to reduce the attractiveness of the site to species that are hazardous to aviation safety. Free-ranging livestock must not be grazed on airport property because the animals may wander onto the AOA. Furthermore, livestock feed, water, and manure may attract birds.

b. Aquaculture. Aquaculture activities (i.e. catfish or trout production) conducted outside of fully enclosed buildings are inherently attractive to a wide variety of birds. Existing aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4 must have a program developed to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should also oppose the establishment of new aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4.

c. Alternative uses of agricultural land. Some airports are surrounded by vast areas of farmed land within the distances specified in Sections 1-2 through 1-4. Seasonal uses of agricultural land for activities such as hunting can create a hazardous wildlife situation. In some areas, farmers will rent their land for hunting purposes. Rice farmers, for example, flood their land during waterfowl hunting season and obtain additional revenue by renting out duck blinds. The duck hunters then use decoys and call in hundreds, if not thousands, of birds, creating a tremendous threat to aircraft safety. A wildlife damage management biologist should review, in coordination with local farmers and producers, these types of seasonal land uses and incorporate them into the WHMP.

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS.

a. Golf courses. The large grassy areas and open water found on most golf courses are attractive to hazardous wildlife, particularly Canada geese and some species of gulls. These species can pose a threat to aviation safety. The FAA recommends against construction of new golf courses within the separations identified in Sections 1-2 through 1-4. Existing golf courses located within these separations must develop a program to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should ensure these golf courses are monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

b. Landscaping and landscape maintenance. Depending on its geographic location, landscaping can attract hazardous wildlife. The FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. A wildlife damage management biologist should review all landscaping plans. Airport operators should also monitor all landscaped areas on a continuing basis for the presence of hazardous wildlife. If

hazardous wildlife is detected, corrective actions should be immediately implemented.

Turf grass areas can be highly attractive to a variety of hazardous wildlife species. Research conducted by the USDA Wildlife Services' National Wildlife Research Center has shown that no one grass management regime will deter all species of hazardous wildlife in all situations. In cooperation with wildlife damage management biologist, airport operators should develop airport turf grass management plans on a prescription basis, depending on the airport's geographic locations and the type of hazardous wildlife likely to frequent the airport

Airport operators should ensure that plant varieties attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass. For airport property already planted with seed mixtures containing millet, rye grass, or other large-seed producing grasses, the FAA recommends disking, plowing, or another suitable agricultural practice to prevent plant maturation and seed head production. Plantings should follow the specific recommendations for grass management and seed and plant selection made by the State University Cooperative Extension Service, the local office of Wildlife Services, or a qualified wildlife damage management biologist. Airport operators should also consider developing and implementing a preferred/prohibited plant species list, reviewed by a wildlife damage management biologist, which has been designed for the geographic location to reduce the attractiveness to hazardous wildlife for landscaping airport property.

c. Airports surrounded by wildlife habitat. The FAA recommends that operators of airports surrounded by woodlands, water, or wetlands refer to Section 2.4 of this AC. Operators of such airports should provide for a Wildlife Hazard Assessment (WHA) conducted by a wildlife damage management biologist. This WHA is the first step in preparing a WHMP, where required.

d. Other hazardous wildlife attractants. Other specific land uses or activities (e.g., sport or commercial fishing, shellfish harvesting, etc.), perhaps unique to certain regions of the country, have the potential to attract hazardous wildlife. Regardless of the source of the attraction, when hazardous wildlife is noted on a public-use airport, airport operators must take prompt remedial action(s) to protect aviation safety.

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES. There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations;

therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community when developing the WHMP.

SECTION 3.

PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS.

3.1. INTRODUCTION. In recognition of the increased risk of serious aircraft damage or the loss of human life that can result from a wildlife strike, the FAA may require the development of a Wildlife Hazard Management Plan (WHMP) when specific triggering events occur on or near the airport. Part 139.337 discusses the specific events that trigger a Wildlife Hazard Assessment (WHA) and the specific issues that a WHMP must address for FAA approval and inclusion in an Airport Certification Manual.

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS. The FAA will use the Wildlife Hazard Assessment (WHA) conducted in accordance with Part 139 to determine if the airport needs a WHMP. Therefore, persons having the education, training, and expertise necessary to assess wildlife hazards must conduct the WHA. The airport operator may look to Wildlife Services or to qualified private consultants to conduct the WHA. When the services of a wildlife damage management biologist are required, the FAA recommends that land-use developers or airport operators contact a consultant specializing in wildlife damage management or the appropriate state director of Wildlife Services.

NOTE: Telephone numbers for the respective USDA Wildlife Services state offices can be obtained by contacting USDA Wildlife Services Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157 *(http://www.aphis.usda.gov/ws/)*.

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL. This manual, prepared by FAA and USDA Wildlife Services staff, contains a compilation of information to assist airport personnel in the development, implementation, and evaluation of WHMPs at airports. The manual includes specific information on the nature of wildlife strikes, legal authority, regulations, wildlife management techniques, WHAs, WHMPs, and sources of help and information. The manual is available in three languages: English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov/. This manual only provides a starting point for addressing wildlife hazard issues at airports. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, qualified wildlife damage management biologists must direct the development of a WHMP and the implementation of management actions by airport personnel.

There are many other resources complementary to this manual for use in developing and implementing WHMPs. Several are listed in the manual's bibliography.

3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139. Part 139.337(b) requires airport operators to conduct a Wildlife Hazard Assessment (WHA) when certain events occur on or near the airport.

Part 139.337 (c) provides specific guidance as to what facts must be addressed in a WHA.

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP). The FAA will consider the results of the WHA, along with the aeronautical activity at the airport and the views of the airport operator and airport users, in determining whether a formal WHMP is needed, in accordance with Part 139.337. If the FAA determines that a WHMP is needed, the airport operator must formulate and implement a WHMP, using the WHA as the basis for the plan.

The goal of an airport's Wildlife Hazard Management Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport.

The WHMP must identify hazardous wildlife attractants on or near the airport and the appropriate wildlife damage management techniques to minimize the wildlife hazard. It must also prioritize the management measures.

3-6. LOCAL COORDINATION. The establishment of a Wildlife Hazards Working Group (WHWG) will facilitate the communication, cooperation, and coordination of the airport and its surrounding community necessary to ensure the effectiveness of the WHMP. The cooperation of the airport community is also necessary when new projects are considered. Whether on or off the airport, the input from all involved parties must be considered when a potentially hazardous wildlife attractant is being proposed. Airport operators should also incorporate public education activities with the local coordination efforts because some activities in the vicinity of your airport, while harmless under normal leisure conditions, can attract wildlife and present a danger to aircraft. For example, if public trails are planned near wetlands or in parks adjoining airport property, the public should know that feeding birds and other wildlife in the area may pose a risk to aircraft.

Airport operators should work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in Sections 1-2 through 1-4. Pay particular attention to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, airport operators must ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5 miles of the airport, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife.

3-7 COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS. If an existing land-use practice creates a wildlife hazard and the land-use practice or wildlife hazard cannot be immediately eliminated, airport operators must issue a Notice to Airmen (NOTAM) and encourage the land–owner or manager to take steps to control the wildlife hazard and minimize further attraction.

SECTION 4.

FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS

4-1. FAA REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS.

a. The FAA discourages the development of waste disposal and other facilities, discussed in Section 2, located within the 5,000/10,000-foot criteria specified in Sections 1-2 through 1-4.

b. For projects that are located outside the 5,000/10,000-foot criteria but within 5 statute miles of the airport's AOA, the FAA may review development plans, proposed land-use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. The FAA considers sensitive airport areas as those that lie under or next to approach or departure airspace. This brief examination should indicate if further investigation is warranted.

c. Where a wildlife damage management biologist has conducted a further study to evaluate a site's compatibility with airport operations, the FAA may use the study results to make a determination.

4-2. WASTE MANAGEMENT FACILITIES.

a. Notification of new/expanded project proposal. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) limits the construction or establishment of new MSWLF within 6 statute miles of certain public-use airports, when both the airport and the landfill meet very specific conditions. See Section 2-2 of this AC and AC 150/5200-34 for a more detailed discussion of these restrictions.

The Environmental Protection Agency (EPA) requires any MSWLF operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, Section 258.10, *Airport Safety*). The EPA also requires owners or operators of new MSWLF units, or lateral expansions of existing MSWLF units, that are located within 10,000 feet of any airport runway end used by turbojet aircraft, or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft. (See 4-2.b below.)

When new or expanded MSWLF are being proposed near airports, MSWLF operators must notify the airport operator and the FAA of the proposal as early as possible pursuant to 40 CFR 258.

b. Waste handling facilities within separations identified in Sections 1-2 through 1-4. To claim successfully that a waste-handling facility sited within the separations identified in Sections 1-2 through 1-4 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 2-2.d. The FAA strongly recommends against any facility other than that as outlined in 2-2.d (enclosed transfer stations). The FAA will use this information to determine if the facility will be a hazard to aviation.

c. Putrescible-Waste Facilities. In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, no such facility has been able to demonstrate an ability to reduce and sustain hazardous wildlife to levels that existed before the putrescible-waste landfill began operating. For this reason, demonstrations of experimental wildlife control measures may not be conducted within the separation identified in Sections 1-2 through 1-4.

4-3. OTHER LAND-USE PRACTICE CHANGES. As a matter of policy, the FAA encourages operators of public-use airports who become aware of proposed land use practice changes that may attract hazardous wildlife within 5 statute miles of their airports to promptly notify the FAA. The FAA also encourages proponents of such land use changes to notify the FAA as early in the planning process as possible. Advanced notice affords the FAA an opportunity (1) to evaluate the effect of a particular land-use change on aviation safety and (2) to support efforts by the airport sponsor to restrict the use of land next to or near the airport to uses that are compatible with the airport.

The airport operator, project proponent, or land-use operator may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents similar to FAA Form 7460-1 to notify the appropriate FAA Regional Airports Division Office. Project proponents can contact the appropriate FAA Regional Airports Division Office for assistance with the notification process.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land-use operator or project proponent should also forward specific details of the proposed land-use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

a. Airports that have received Federal grant-in-aid assistance. Airports that have received Federal grant-in-aid assistance are required by their grant assurances to take appropriate actions to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations. The FAA recommends that airport operators to the extent practicable oppose off-airport land-use changes or practices within the separations identified in Sections 1-2 through 1-4 that may attract hazardous wildlife. Failure to do so may lead to noncompliance with applicable grant assurances. The FAA will not approve the placement of airport

development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants without appropriate mitigating measures. Increasing the intensity of wildlife control efforts is not a substitute for eliminating or reducing a proposed wildlife hazard. Airport operators should identify hazardous wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

This page intentionally left blank.

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. **GENERAL.** This appendix provides definitions of terms used throughout this AC.

    1. **Air operations area.** Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

    2. **Airport operator.** The operator (private or public) or sponsor of a public-use airport.

    3. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

    4. **Bird balls.** High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

    5. **Certificate holder.** The holder of an Airport Operating Certificate issued under Title 14, Code of Federal Regulations, Part 139.

    6. **Construct a new MSWLF.** To begin to excavate, grade land, or raise structures to prepare a municipal solid waste landfill as permitted by the appropriate regulatory or permitting agency.

    7. **Detention ponds.** Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

    8. **Establish a new MSWLF.** When the first load of putrescible waste is received on-site for placement in a prepared municipal solid waste landfill.

    9. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

    10. **General aviation aircraft.** Any civil aviation aircraft not operating under 14 CFR Part 119, Certification: Air Carriers and Commercial Operators.

    11. **Hazardous wildlife.** Species of wildlife (birds, mammals, reptiles), including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard

    12. **Municipal Solid Waste Landfill (MSWLF).** A publicly or privately owned discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR § 257.2. An MSWLF may receive

other types wastes, such as commercial solid waste, non-hazardous sludge, small-quantity generator waste, and industrial solid waste, as defined under 40 CFR § 258.2. An MSWLF can consist of either a stand alone unit or several cells that receive household waste.

13. **New MSWLF.** A municipal solid waste landfill that was established or constructed after April 5, 2001.

14. **Piston-powered aircraft.** Fixed-wing aircraft powered by piston engines.

15. **Piston-use airport.** Any airport that does not sell Jet-A fuel for fixed-wing turbine-powered aircraft, and primarily serves fixed-wing, piston-powered aircraft. Incidental use of the airport by turbine-powered, fixed-wing aircraft would not affect this designation. However, such aircraft should not be based at the airport.

16. **Public agency.** A State or political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo (49 U.S.C. § 47102(19)).

17. **Public airport.** An airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft is publicly owned (49 U.S.C. § 47102(20)).

18. **Public-use airport.** An airport used or intended to be used for public purposes, and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft may be under the control of a public agency or privately owned and used for public purposes (49 U.S.C. § 47102(21)).

19. **Putrescible waste.** Solid waste that contains organic matter capable of being decomposed by micro-organisms and of such a character and proportion as to be capable of attracting or providing food for birds (40 CFR §257.3-8).

20. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

21. **Retention ponds.** Storm water management ponds that hold water for several months.

22. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the airport design, aircraft, type of operation, and visibility minimum.

23. **Scheduled air carrier operation.** Any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial

operator for which the air carrier, commercial operator, or their representative offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 119 or as a public charter operation under 14 CFR Part 380 (14 CFR § 119.3).

24. **Sewage sludge.** Any solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (40 CFR 257.2)

25. **Sludge.** Any solid, semi-solid, or liquid waste generated form a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. (40 CFR 257.2)

26. **Solid waste.** Any garbage, refuse, sludge, from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including, solid liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by product material as defined by the Atomic Energy Act of 1954, as amended, (68 Stat. 923). (40 CFR 257.2)

27. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

28. **Turbine-use airport.** Any airport that sells Jet-A fuel for fixed-wing turbine-powered aircraft.

29. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 CFR Section 403.3 (q), (r), & (s)).

30. Wildlife. Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, wildlife includes feral animals and domestic animals out of the control of their owners (14 CFR Part 139, Certification of Airports).

31. Wildlife attractants. Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

32. Wildlife hazard. A potential for a damaging aircraft collision with wildlife on or near an airport.

33. Wildlife strike. A wildlife strike is deemed to have occurred when:

a. A pilot reports striking 1 or more birds or other wildlife;

b. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;

c. Personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;

d. Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified;

e. The animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Transport Canada, Airports Group, *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

2. RESERVED.

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS	**Date:**	**AC No:** 150/5200-33C
	Initiated by: AAS-300	**Change:**

1. PURPOSE. This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICABILITY. Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D, may use the standards, practices and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. All airports that have received Federal assistance and/or that have authority to impose and/or use a Passenger Facility Charge must use the standards in section 1 of this AC. Non-certificated airports (hereinafter referred to as "Subject Airports") that receive Federal assistance and/or authority to impose and/or use a Passenger Facility Charge must also use the standards in sections 3-4 and 3-5 of this AC. The FAA also recommends the guidance in this AC for land-use planners and developers of projects, facilities, and activities on or near airports.

Pursuant to the Federal register published on_____, the FAA has clarified Airport Improvement Program (AIP) Grant Assurance No. 19, "Operation and Maintenance," to require any Subject Airport, after receipt of a new grant for an airport development project, to monitor, evaluate and mitigate risks associated with wildlife hazards on and near federally obligated airports. In particular, such airports are required to conduct Wildlife Hazard Assessments (WHA) or Wildlife Hazard Site Visits (WHSV). Airports certified under Part 139 are required to conduct WHAs in accordance with criteria in 14 C.F.R. §139.337.

3. CANCELLATION. This AC cancels AC 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports*, dated August 28, 2007.

4. PRINCIPAL CHANGES. Changes in this AC include clarification by the FAA that Grant Assurance No. 19 requires Subject Airports to have a qualified airport wildlife biologist conduct a WHA or WHSV; consolidation and reorganization of discussion on land uses of concern; and updated procedures for evaluation and mitigation. Discussion

DRAFT

addresses off-airport hazardous wildlife attractants, followed by discussion of on-airport attractants. It also clarifies language regarding the applicability of AC requirements.

5. BACKGROUND. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1 ranks the most hazardous bird and mammal species or groups as to relative hazard to aircraft in airport environments (i.e., ≤500 ft. [152 m] above ground level), based on a composite ranking of strikes with civil aircraft in the USA 1990-2009.

These hazard rankings can help focus hazardous wildlife management efforts on those species or groups that represent the greatest threats to safe air operations in the airport environment. Used in conjunction with a site-specific WHA that will determine the relative abundance and use patterns of wildlife species, these rankings can help airport operators better understand the general threat level (and consequences) of certain wildlife species and can assist with the creation of a “zero-tolerance” list of hazardous species that warrant immediate attention.

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area (AOA). Constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports. Applicable timeframes for designated categories at airports are in Section 3-4 of this AC.

On March 4, 2008 a catastrophic wildlife strike involving a Cessna 500 Citation and migratory white pelican resulted in five fatalities. Following the National Transportation Safety Board (NTSB) investigation, the NTSB recommended the FAA “*Verify that all federally obligated general aviation airports that are located near woodlands, water, wetlands, or other wildlife attractants are complying with the requirements to perform wildlife hazard assessments as specified in Federal Aviation Administration Advisory*

Circular 150/5200-33B, Hazardous Wildlife Attractants On or Near Airports." In response, the FAA has modified this AC and provided clarification of Grant Assurance No. 19 for airports that are not otherwise required to do so by CFR Part 139, referred to as "Subject Airports." Subject Airports are now required, prospectively, after receipt of a new grant for an airport development project or other federal assistance, and public agencies that receive authority to impose and/or use a Passenger Facility Charge to have a qualified airport wildlife biologist conduct a WHA or WHSV.

6. MEMORANDUM OF AGREEMENT BETWEEN FEDERAL RESOURCE AGENCIES. The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) in July 2003 to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation's valuable environmental resources.

Michael J. O'Donnell
Director, Office of Airport Safety
and Standards

DRAFT

Table 1. Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft. [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009[1].

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Mule deer (*Odocoileus hemionus*)	47	96	38	83	1	1	1	1	100
White-tailed deer (*Odocoileus virginianus*)	814	87	36	68	2	2	3	2	88
Domestic dog	21	53	26	75	4	4	2	3	71
Other geese	20	68	32	32	3	3	8	4	61
Canada goose (*Branta canadensis)*	776	51	16	34	7	9	7	5	46
Turkey vulture (*Cathartes aura*)	159	46	16	34	10	7	6	5	44
Other ducks	77	49	24	30	8	5	11	7	48
Great horned owl (*Bubo virginianus*)	29	52	16	27	6	8	17	8	44
Double-crested cormorant (*Phalacrocorax auritis*)	24	52	13	29	5	13	13	8	43
Brown pelican (*Pelecanus occidentalis*)	31	35	13	38	14	14	5	10	40
Wild turkey (*Meleagris gallopavo*)	38	37	6	43	13	28	4	11	40
Sandhill crane (*Grus canadensis*)	66	43	10	28	11	19	15	11	37
Glaucous-winged gull (*Larus glaucescens*)	27	48	9	28	9	21	16	13	39
Bald eagle (*Haliaeetus leucocephalus*)	74	40	7	30	12	25	10	14	36
Great black-backed gull (*Larus marinus*)	20	26	21	22	18	6	23	14	32
Osprey (*Pandion haliaetus*)	77	32	12	26	16	15	19	16	32
Great blue heron (*Ardea herodius*)	132	32	8	28	15	23	14	17	31
Ring-necked pheasant (*Phasianus colchicus*)	45	26	14	22	20	10	26	18	29
Herring gull (*Larus argentatus*)	291	25	13	24	23	12	21	18	29
Snowy owl (*Bubo scandiacus*)	28	23	12	26	24	17	20	20	28
Mallard (*Anas platyrhynchos*)	221	31	11	21	17	18	28	21	29
Great egret (*Ardea alba*)	24	26	4	29	21	32	12	22	28
Red-tailed hawk (*Buteo jamaicensis*)	534	26	8	21	19	24	27	23	25
California gull (*Larus californicus*)	23	14	14	20	33	11	30	24	22
Cattle egret (*Bubulcus ibis*)	112	17	6	27	32	27	18	25	23
Ring-billed gull (*Larus delawarensis*)	362	21	8	20	26	22	33	26	23
Franklin's gull (*Larus pipixcan*)	26	9	9	23	41	20	22	27	19
Raccoon (*Procyon lotor*)	23	18	12	14	28	16	40	28	20

DRAFT

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Coyote (*Canis latrans*)	231	14	3	31	36	41	9	29	22
Rock dove (*Columba livia*)	1,035	18	6	19	29	26	34	30	20
Swainson's hawk (*Buteo swainsoni*)	24	17	4	20	31	33	31	31	19
Other hawks	34	14	4	22	34	37	25	32	18
Laughing gull (*Larus atricilla*)	106	14	4	21	35	34	29	33	18
Mew gull (*Larus canus*)	21	25	0	16	22	52	37	34	19
Peregrine falcon (*Falco peregrinus*)	44	18	5	7	30	29	53	35	14
Laysan albatross (*Phoebastria immutabilis*)	29	22	0	17	25	53	35	36	18
Rabbits (Leporidae)	78	11	3	15	37	39	39	37	13
Upland sandpiper (*Bartramia longicauda*)	32	8	4	16	43	36	36	37	13
Short-eared owl (*Asio flammeus*)	58	10	4	11	39	35	43	39	12
Black-bellied plover (*Pluvialis squatarola*)	20	18	0	16	27	54	38	40	15
Red fox (*Vulpes vulpes*)	31	8	0	22	42	55	24	41	14
American crow (*Corvus brachyrhynchos*)	141	10	3	13	40	40	41	41	12
Spotted dove (*Streptopelia chinensis*)	46	7	4	10	48	31	45	43	10
Barn owl (*Tyto alba*)	174	11	3	9	38	38	49	44	11
Mourning dove (*Zenaida macroura*)	1,313	7	3	13	45	42	42	45	10
Blackbirds	976	7	2	10	44	46	44	46	9
European starling (*Sturnus vulgaris*)	1,408	7	2	10	47	43	46	47	9
Bats (Chiroptera)	44	5	5	8	55	30	51	47	8
Killdeer (*Charadrius vociferus*)	553	6	1	7	51	48	52	49	7
American kestrel (*Falco sparverius*)	536	4	1	7	57	47	55	50	6
Zebra dove (*Geopelia striata*)	54	4	2	6	56	44	59	50	5
Snow bunting (*Plectrophenax nivalis*)	84	1	0	20	66	66	32	52	10
Common myna (*Acridotheres tristis*)	21	6	0	6	50	58	56	52	6
Bank swallow (*Riparia riparia*)	49	5	0	9	54	61	50	54	6
Meadowlarks	361	3	2	6	61	45	60	55	5
Woodchuck (*Marmota monax)*	41	7	0	3	46	56	68	56	5
Horned lark (*Eremophila alpestris*)	372	3	1	6	60	49	61	56	4
Sparrows	1,799	3	0	6	62	51	58	58	4
Northern harrier (*Circus cyaneus*)	24	5	0	5	52	59	62	59	5
American robin (*Turdus migratorius*)	159	2	0	10	64	65	47	60	5
Burrowing owl (*Athene cunicularia*)	20	6	0	0	49	57	73	61	3
Barn swallow (*Hirundo rustica*)	486	2	0	3	65	50	69	62	2
Wrens	28	4	0	4	58	62	66	63	3

DRAFT

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Terns	45	5	0	0	53	60	74	64	2
Finches	55	0	0	10	71	71	48	65	4
Chimney swift (*Chaetura pelagica*)	34	0	0	6	70	70	57	66	3
Common nighthawk (*Chordeiles minor*)	38	3	0	0	59	63	75	66	1
Pacific golden-plover (*Pluvialis apricaria*)	204	1	0	4	67	67	64	68	2
Purple martin (*Progne subis*)	57	2	0	2	63	64	72	69	2
Western sandpiper (*Calidris mauri*)	31	0	0	7	76	76	54	70	3
Cliff swallow (*Petrochelidon pyrrhonota*)	164	1	0	2	68	68	71	71	1
Skunks (Mephitidae)	30	0	0	4	74	74	63	72	2
Nutmeg mannikin (*Lonchura punctulata*)	26	0	0	4	72	72	67	72	2
Chestnut manikin (*Lonchura malacca*)	28	0	0	0	69	69	76	74	0
Wood warblers	30	0	0	4	77	77	65	75	2
Tree swallow (*Tachycineta bicolor*)	109	0	0	2	75	75	70	76	1
Opossum (*Didelphis virginiana*)	25	0	0	0	73	73	77	77	0

[1] Excerpted from the Wildlife Society Bulletin 35(4):394–402; 2011*; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management."* Refer to this publication for additional explanation of criteria and method of ranking and Wildlife Society Bulletin 28:372–378 "*Ranking the Hazard Level of Wildlife Species to Aviation"* for detailed definitions of damage and EOF.

[2] Other geese = snow goose (*Chen caerulescens*), brant (*Branta bernicla*), greater white-fronted goose (*Anser albifrons*); other ducks = 23 species in the family Anatidae; other hawks = Cooper's hawk (*Accipter cooperii*), sharp-shinned hawk (*A. striatus*), rough-legged hawk (*Buteo lagopus*), red-shouldered hawk (*B. lineatus*), broad-winged hawk (*B. platypterus*), ferruginous hawk (*B. regalis*); blackbirds = red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*); meadowlarks = eastern meadowlark (*Sturnella magna*), western meadowlark (*S. neglecta*); sparrows = 19 species in the family Emberizidae; wrens = house wren (*Troglodytes aedon*), Carolina wren (*Thryothorus ludovicianus*), marsh wren (*Cistothorus palustris*); terns = common tern (*Sterna hirundo*), arctic tern (*S. vittata*), Caspian tern (*S. caspia*), least tern (*S. antillarum*), fairy tern (*S. nereis*); finches = house finch (*Carpodacus mexicanus*), American goldfinch (*Carduelis tristis*); wood warblers = 13 species in the family Parulidae.

DRAFT

This page intentionally left blank.

DRAFT

Table of Contents

SECTION 1. GENERAL SEPARATION CRITERIA AND ASSESSMENT OF HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. 1

1-1. INTRODUCTION 1

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT 1

1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT 1

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE 2

SECTION 2. LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE 5

2-1. GENERAL 5

2-2. WASTE DISPOSAL OPERATIONS 5

2-3. WATER MANAGEMENT FACILITIES 8

2-4. WETLANDS 10

2-5. DREDGE SPOIL CONTAINMENT AREAS 12

2-6. AGRICULTURAL ACTIVITIES 12

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS 13

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES 14

SECTION 3. PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS 15

3.1. INTRODUCTION 15

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED AIRPORT WILDLIFE BIOLOGISTS 15

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL 15

3-4. WILDLIFE HAZARD SITE VISITS AND WILDLIFE HAZARD ASSESSMENTS 16

3-5 WILDLIFE HAZARD MANAGEMENT PLAN (WHMP) 16

3-6. LOCAL COORDINATION 16

3-7. COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS 16

3-8. FEDERAL AND STATE DEPREDATION PERMITS 16

SECTION 4. RECOMMENDED PROCEDURES FOR AIRPORTS REGARDING OFF-AIRPORT ATTRACTANTS 19

4-1. FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS 19

4-2. WASTE MANAGEMENT FACILITIES 19

4-3. OTHER LAND-USE PRACTICE CHANGES 20

4-4. COORDINATION TO PREVENT CREATION OF NEW OFF-AIRPORT HAZARDOUS WILDLIFE ATTRACTANTS. 21

4-5. COORDINATION ON EXISTING OFF-AIRPORT HAZARDOUS WILDLIFE ATTRACTANTS. 21

4-6. PROMPT REMEDIAL ACTION. 22

4-7. FAA ASSISTANCE 22

4-8. AIRPORT DOCUMENTATION PROCEDURES 22

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR 30

DRAFT

This page intentionally left blank.

DRAFT

SECTION 1.

GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. INTRODUCTION. When considering proposed land uses, airport operators, local planners, and developers must take into account whether the proposed land uses, including new development projects, will increase wildlife hazards. Land-use practices that attract or sustain hazardous wildlife populations on or near airports, specifically those listed in Section 2, can significantly increase the potential for wildlife strikes.

The FAA urges regulatory agencies and planning and zoning agencies to prevent the creation of any new instances of these land uses within the separation criteria, and to require evaluation of proposed new land uses within the evaluation distance criteria. The FAA urges regulatory agencies and planning and zoning agencies to require coordination with the affected airport(s) for all existing regulated instances of these land uses within the separation and evaluation distances.

The FAA recommends the minimum separation criteria outlined below for land-use practices that attract hazardous wildlife to the vicinity of airports. Please note that FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA). (See the discussion of the synergistic effects of surrounding land uses in Section 2-8 of this AC.)

The basis for the separation criteria contained in this section can be found in former FAA Order 5280.5A. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet and 90 percent occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT. Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants discussed in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance measured from the nearest AOA.

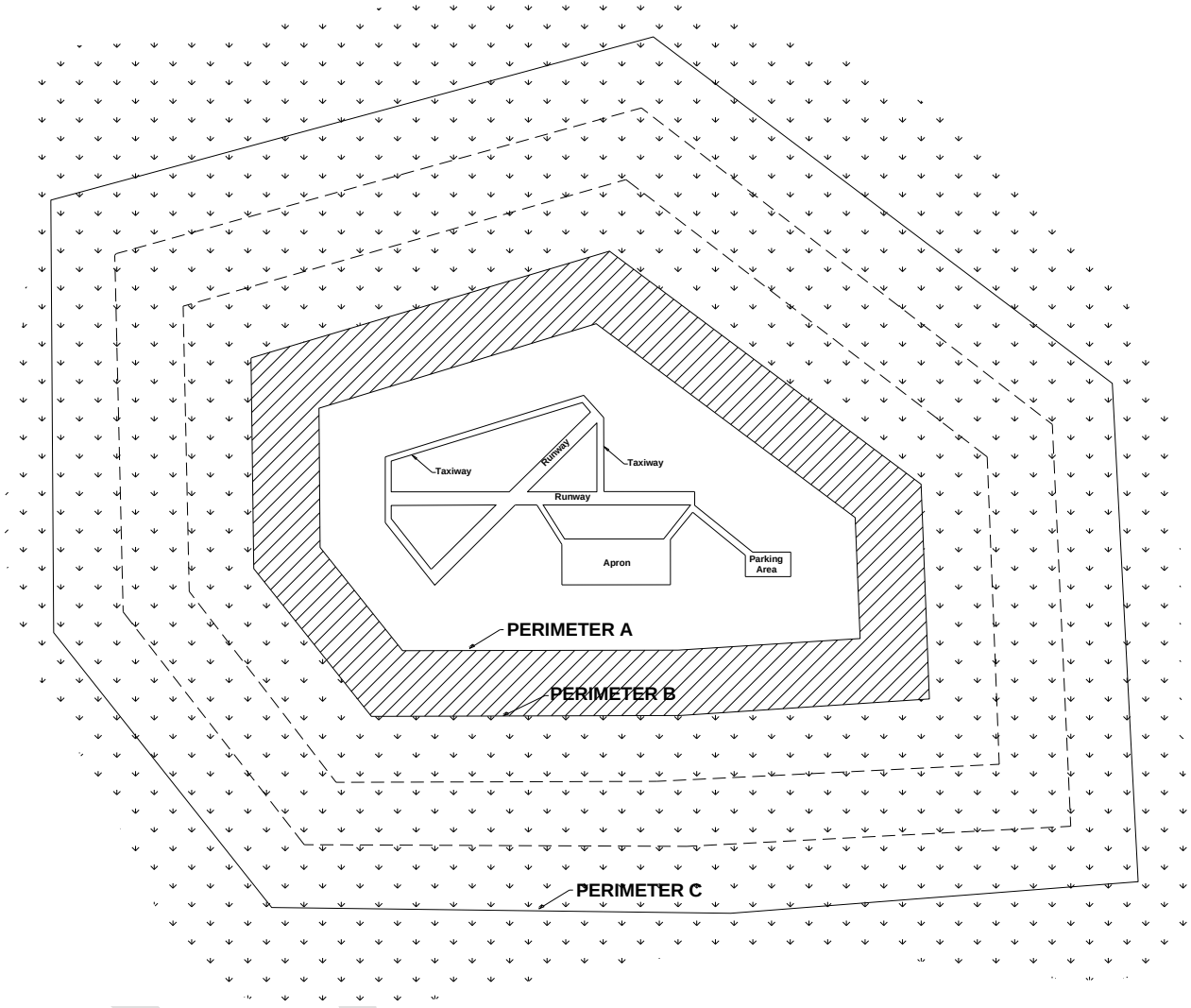
1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT. Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants discussed in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the

hazardous wildlife attractant. Figure 1 depicts this separation distance from the nearest aircraft movement areas.

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE. For all airports, the FAA recommends a distance of 5 statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace. Figure 1 depicts this separation distance measured from the nearest AOA.

DRAFT

Figure 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



PERIMETER A: For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B: For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C: 5-mile range to protect approach, departure and circling airspace.

SECTION 2.

LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE.

2-1. GENERAL. Hazardous wildlife use the natural or artificial habitats on or near an airport for food, water or cover. The wildlife species and the size of the populations attracted to the airport environment vary considerably, depending on several factors, including land-use practices on or near the airport. In addition to the specific considerations outlined below, airport operators should refer to *Wildlife Hazard Management at Airports,* prepared by FAA and U.S. Department of Agriculture (USDA) staff. (This manual is available in English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife.FAA.gov.) Also, *Prevention and Control of Wildlife Damage,* compiled by the University of Nebraska Cooperative Extension Division is available online at the Internet Center for Wildlife Damage Management (ICWDM) web site: in a periodically updated version at: http://icwdm.org/handbook/index.asp.

This section discusses land-use practices having the potential to attract hazardous wildlife and threaten aviation safety. The FAA has determined that the land uses listed below are generally not compatible with safe airport operations when they are located within the separation distances provided in Section 1-2 and 1-3. Certain Waste Disposal Operations require greater separations provided in Section 1-4 and are discussed in Section 2-2.

2-2. WASTE DISPOSAL OPERATIONS. Municipal solid waste landfills (MSWLF) are known to attract large numbers of hazardous wildlife, particularly birds. Because of this, these operations, when located within the separations identified in the siting criteria in Sections 1-2 through 1-4, are considered incompatible with safe airport operations.

a. Siting for new municipal solid waste landfills subject to AIR 21. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) (AIR 21), codified at 49 U.S.C. 44718(d), prohibits the construction or establishment of a new MSWLF within 6 statute miles of certain public-use airports. Before these prohibitions apply, both the airport and the landfill must meet the very specific conditions described below. These restrictions do not apply to airports or landfills located within the state of Alaska.

The airport must (1) have received a Federal grant(s) under 49 U.S.C. § 47101, et. seq.; (2) be under control of a public agency; (3) serve some scheduled air carrier operations conducted in aircraft with less than 60 seats; and (4) have total annual enplanements consisting of at least 51 percent of scheduled air carrier enplanements conducted in aircraft with less than 60 passenger seats.

The proposed MSWLF must (1) be within 6 miles of the airport, as measured from airport property line to MSWLF property line, and (2) have started construction or establishment on or after April 5, 2001. Section 44718(d) only limits the construction

or establishment of some new MSWLF. It does not limit the expansion, either vertical or horizontal, of existing landfills.

Regarding existing MSWLF and lateral expansions of MSWLF: In accordance with 40 CFR § 258.10, owners or operators of MSWLF units that are located within the separation distances provided in Section 1-2 and 1-3 must demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft. To accomplish this, follow the instructions provided in Sections 3-2 and 3-3 of this AC, document the wildlife monitoring and mitigation procedures that are cooperatively developed, and place this documentation in the operating record of the facility.

See Advisory Circular 150/5200-34A, *Municipal Solid Waste Landfills near Public Airports*, for more information on these restrictions, criteria for applicability of AIR 21, standards for compliance with 40 CFR § 258.10, and FAA notification procedures.

b. Siting for new MSWLF not subject to AIR 21. If an airport and MSWLF do not meet the criteria of section 44718(d), the FAA recommends against locating MSWLF within the separation distances identified in Sections 1-2 through 1-4. The separation distances should be measured from the closest point of the airport's AOA to the closest planned MSWLF cell.

c. Considerations for existing waste disposal facilities within the limits of separation criteria. The FAA recommends against airport development projects that would increase the number of aircraft operations or accommodate larger or faster aircraft near MSWLF operations located within the separations identified in Sections 1-2 through 1-4. In addition, in accordance with 40 CFR § 258.10, owners or operators of existing MSWLF units that are located within the separations listed in Sections 1-2 through 1-4 must demonstrate that the unit is designed and operated so it does not pose a bird hazard to aircraft. (See Section 4-2(b) of this AC for a discussion of this demonstration requirement).

d. Enclosed trash transfer stations. Enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ). These facilities should not handle or store putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA's definition of fully enclosed trash transfer stations. The FAA considers fully enclosed waste-handling facilities constructed or operated incorrectly incompatible with safe airport operations if they are located closer than the separation distances specified in Sections 1-2 through 1-4.

e. Composting operations on or near airport property. Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any AOA or the distance called for by airport design requirements (see AC 150/5300-13, *Airport Design*). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic. On-airport disposal of compost by-products should not be conducted for the reasons stated in 2-3f.

f. Underwater waste discharges. The FAA recommends against the underwater discharge of any food waste (e.g., fish processing offal) within the separations identified in Sections 1-2 through 1-4 because it could attract scavenging hazardous wildlife.

g. Recycling centers. Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, or aluminum, are, in most cases, not attractive to hazardous wildlife and are acceptable.

h. Construction and demolition (C&D) debris facilities. C&D landfills do not generally attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, C&D landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, C&D landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities. Therefore, a C&D landfill co-located with another waste disposal operation should be located outside of the separations identified in Sections 1-2 through 1-4.

i. Fly ash disposal. The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they are maintained in an orderly manner, admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria

outlined in Sections 1-2 through 1-4.

2-3. WATER MANAGEMENT FACILITIES. Drinking water intake and treatment facilities, storm water and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. To prevent wildlife hazards, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of storm water management facilities on or near all public-use airports to ensure a safe airport environment.

a. Existing storm water management facilities. On-airport storm water management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect storm water, protect water quality, and control runoff. Because they slowly release water after storms, they create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a Wildlife Hazard Management Plan (WHMP), the FAA requires immediate correction of any wildlife hazards arising from existing storm water facilities located on or near airports, using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a Qualified Airport Wildlife Biologist.

Where possible, airport operators should modify storm water detention ponds to allow a maximum 48-hour detention period for the design storm. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat.

When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wires grids, pillows, or netting, to deter birds and other hazardous wildlife. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

The FAA recommends that airport operators encourage off-airport storm water treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into storm water treatment facility operating practices when their facility is located within the separation criteria specified in Sections 1-2 through 1-4.

b. New storm water management facilities. The FAA strongly recommends that off-airport storm water management systems located within the separations identified in

Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

c. Existing wastewater treatment facilities. The FAA strongly recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should encourage wastewater treatment facility operators to incorporate measures, developed in consultation with a Qualified Airport Wildlife Biologist, to minimize hazardous wildlife attractants. Airport operators should also encourage those wastewater treatment facility operators to incorporate these mitigation techniques into their standard operating practices. In addition, airport operators should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

d. New wastewater treatment facilities. The FAA strongly recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in Sections 1-2 through 1-4. Appendix 1 defines wastewater treatment facility as "any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes." The definition includes any pretreatment involving the reduction of the amount of pollutants or the elimination of pollutants prior to introducing such pollutants into a publicly owned treatment works (wastewater treatment facility). During the site-location analysis for wastewater treatment facilities, developers should consider the potential to attract hazardous wildlife if an airport is in the vicinity of the proposed site, and airport operators should voice their opposition to such facilities if they are in proximity to the airport.

e. Artificial marshes. In warmer climates, wastewater treatment facilities sometimes employ artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking

birds, such as blackbirds and waterfowl, for breeding or roosting activities. The FAA strongly recommends against establishing artificial marshes within the separations identified in Sections 1-2 through 1-4.

f. Wastewater discharge and sludge disposal. The FAA recommends against the discharge of wastewater or sludge on airport property because it may improve soil moisture and quality on unpaved areas and lead to improved turf growth that can be an attractive food source for many species of animals. Also, the turf requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw, both of which can attract hazardous wildlife. In addition, the improved turf may attract grazing wildlife, such as deer and geese. Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

2-4. WETLANDS. Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species (Table 1).

NOTE: If questions exist as to whether an area qualifies as a wetland, contact the local division of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or a wetland consultant qualified to delineate wetlands.

a. Existing wetlands on or near airport property. If wetlands are located on or near airport property, airport operators should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations. At public-use airports, the FAA recommends immediately correcting, in cooperation with local, state, and Federal regulatory agencies, any wildlife hazards arising from existing wetlands located on or near airports. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a Qualified Airport Wildlife Biologist.

b. New airport development. Whenever possible, the FAA recommends locating new airports using the separations from wetlands identified in Sections 1-2 through 1-4. Where alternative sites are not practicable, or when airport operators are expanding an existing airport into or near wetlands, a Qualified Airport Wildlife Biologist, in consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the state wildlife management agency should evaluate the wildlife hazards and prepare a WHMP that indicates methods of minimizing the hazards.

c. Mitigation for wetland impacts from airport projects. Wetland mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects or projects required to correct wildlife hazards from wetlands. Wetland mitigation must be designed so it does not create a wildlife hazard. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife

be sited outside of the separations identified in Sections 1-2 through 1-4.

(1) Onsite mitigation of wetland functions. The FAA may consider exceptions to locating mitigation activities outside the separations identified in Sections 1-2 through 1-4 if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge, which cannot be replicated when moved to a different location. Using existing airport property is sometimes the only feasible way to achieve the mitigation ratios mandated in regulatory orders and/or settlement agreements with the resource agencies. Conservation easements are an additional means of providing mitigation for project impacts. Typically the airport operator continues to own the property, and an easement is created stipulating that the property will be maintained as habitat for state or Federally listed species.

Mitigation must not inhibit the airport operator's ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided. The FAA will review any onsite mitigation proposals to determine compatibility with safe airport operations. A Qualified Airport Wildlife Biologist should evaluate any wetland mitigation projects that are needed to protect unique wetland functions and that must be located in the separation criteria in Sections 1-2 through 1-4 before the mitigation is implemented. A WHMP should be developed to reduce the wildlife hazards.

(2) Offsite mitigation of wetland functions. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4 unless they provide unique functions that must remain onsite (see 2-4c(1)). Agencies that regulate impacts to or around wetlands recognize that it may be necessary to split wetland functions in mitigation schemes. Therefore, regulatory agencies may, under certain circumstances, allow portions of mitigation to take place in different locations.

The FAA encourages landowners or communities supporting the restoration or enhancement of wetlands to do so *only* after critically analyzing how those activities would affect aviation safety. To do so, landowners or communities should contact: the affected airport sponsor; FAA; and/ or the United States Department of Agriculture/ Animal and Plant Health Inspection Service/ Wildlife Services (USDA/ APHIS/ WS) or a Qualified Airport Wildlife Biologist.[1]

Those parties should work cooperatively to develop restoration or enhancement plans that would not worsen existing wildlife hazards or create such hazards.

---

[1] See Advisory Circular 150/ 5200-36 *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports.*

If those parties develop a mutually acceptable restoration or enhancement plan, the landowner or community proposing the restoration or enhancement must monitor the restored or enhanced site. This monitoring must verify their efforts have not worsened or created hazardous wildlife attraction or activity. If such attraction or activity occurs, the landowner or community should work with the airport sponsor, USDA/ APHIS/ WS or another Qualified Airport Wildlife Biologist to reduce the hazard to aviation.

(3) Mitigation banking. Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning. This last benefit is most helpful for airport projects, as wetland impacts mitigated outside of the separations identified in Sections 1-2 through 1-4 can still be located within the same watershed. Wetland mitigation banks meeting the separation criteria offer an ecologically sound approach to mitigation in these situations. Airport operators should work with local watershed management agencies or organizations to develop mitigation banking for wetland impacts on airport property.

2-5. DREDGE SPOIL CONTAINMENT AREAS. The FAA recommends against locating dredge spoil containment areas (also known as Confined Disposal Facilities) within the separations identified in Sections 1-2 through 1-4 if the containment area or the spoils contain material that would attract hazardous wildlife.

2-6. AGRICULTURAL ACTIVITIES. Because most, if not all, agricultural crops can attract hazardous wildlife during some phase of production, the FAA recommends against the used of airport property for agricultural production, including hay crops, within the separations identified in Sections 1-2 through 1-4. If the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport, then the airport shall follow the crop distance guidelines listed in the table titled "Crop Buffers" (Table 3-10) found in AC 150/5300-13, *Airport Design*. The cost of wildlife control and potential accidents should be weighed against the income produced by the on-airport crops when deciding whether to allow crops on the airport.

a. Livestock production. Confined livestock operations (i.e., feedlots, dairy operations, hog or chicken production facilities, or egg laying operations) often attract flocking birds, such as starlings, that pose a hazard to aviation. Therefore, The FAA recommends against such facilities within the separations identified in Sections 1-2 through 1-4. Any livestock operation within these separations should have a program developed to reduce the attractiveness of the site to species that are hazardous to aviation safety. Free-ranging livestock must not be grazed on airport property because the animals may wander onto the AOA. Furthermore, livestock feed, water, and manure may attract birds.

b. Aquaculture. Aquaculture activities (i.e. catfish or trout production) conducted outside of fully enclosed buildings are inherently attractive to a wide variety of birds. Existing aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4 must have a program developed to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should also oppose the establishment of new aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4.

c. Alternative uses of agricultural land. Some airports are surrounded by vast areas of farmed land within the distances specified in Sections 1-2 through 1-4. Seasonal uses of agricultural land for activities such as hunting can create a hazardous wildlife situation. In some areas, farmers will rent their land for hunting purposes. Rice farmers, for example, flood their land during waterfowl hunting season and obtain additional revenue by renting out duck blinds. The duck hunters then use decoys and call in hundreds, if not thousands, of birds, creating a tremendous threat to aircraft safety. A Qualified Airport Wildlife Biologist should review, in coordination with local farmers and producers, these types of seasonal land uses and incorporate them into the WHMP.

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS.

a. Golf courses. The large grassy areas and open water found on most golf courses are attractive to hazardous wildlife, particularly Canada geese and some species of gulls. These species can pose a threat to aviation safety. The FAA recommends against construction of new golf courses within the separations identified in Sections 1-2 through 1-4. Existing golf courses located within these separations must develop a program to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should ensure these golf courses are monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

b. Landscaping and landscape maintenance. Depending on its geographic location, landscaping can attract hazardous wildlife. The FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. A Qualified Airport Wildlife Biologist should review all landscaping plans. Airport operators should also monitor all landscaped areas on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

Turf grass areas can be highly attractive to a variety of hazardous wildlife species. Research conducted by the USDA Wildlife Services' National Wildlife Research Center has shown that no one grass management regime will deter all species of hazardous wildlife in all situations. In cooperation with Qualified Airport Wildlife Biologist, airport operators should develop airport turf grass management plans on a prescription basis, depending on the airport's geographic locations and the type of hazardous wildlife likely to frequent the airport

Airport operators should ensure that plant varieties attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass. For airport property already planted with seed mixtures containing millet, rye grass, or other large-seed producing grasses, the FAA recommends disking, plowing, or another suitable agricultural practice to prevent plant maturation and seed head production. Plantings should follow the specific recommendations for grass management and seed and plant selection made by the State University Cooperative Extension Service, the local office of Wildlife Services, or a Qualified Airport Wildlife Biologist. Airport operators should also consider developing and implementing a preferred/prohibited plant species list, reviewed by a Qualified Airport Wildlife Biologist, which has been designed for the geographic location to reduce the attractiveness to hazardous wildlife for landscaping airport property.

c. Other hazardous wildlife attractants. Other specific land uses or activities (e.g., sport or commercial fishing, shellfish harvesting, etc.), perhaps unique to certain regions of the country, have the potential to attract hazardous wildlife. Regardless of the source of the attraction, when hazardous wildlife is noted on a public-use airport, airport operators must take prompt remedial action(s) to protect aviation safety.

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES. There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations; therefore, airport operators and the Qualified Airport Wildlife Biologist must consider the entire surrounding landscape and community when developing the WHMP.

DRAFT

SECTION 3.

PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS AND REQUIREMENTS FOR SUBJECT AIRPORTS TO CONDUCT WILDLIFE HAZARD ASSESSMENTS.

3.1. INTRODUCTION. In recognition of the increased risk of serious aircraft damage or the loss of human life that can result from a wildlife strike, the FAA requires airports conduct a Wildlife Hazard Site Visit (WHSV) or Wildlife Hazard Assessment (WHA) The results of the WHSV or WHA must be submitted to the FAA for review and approval. The FAA will review the submitted WHSV or WHA and determine the need for a WHA (in the case of a WHSV) or a WHMP (in the case of a WHA).

Part 139 Class I-III certificated airports are required under Part 139, section 139.337, to conduct a WHA when specific triggering events occur. Section 139.337 also discusses the specific issues that a WHMP must address for FAA approval and inclusion in an Airport Certification Manual for airports certificated under Part 139. Additional factors are discussed in Section 3-4.

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED AIRPORT WILDLIFE BIOLOGISTS. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, only airport wildlife biologists meeting the qualification requirements in Advisory Circular 150/5200-36 can conduct WHSVs, WHA, and WHMPs. Airports must maintain documentation that the qualified airport wildlife biologist meets the qualification requirements in Advisory Circular 150/5200-36.

The FAA will use the WHA to determine if the airport needs a WHMP. The airport operator may look to the USDA's Wildlife Services state offices or to qualified private consultants to conduct the WHA. When the services of a qualified airport wildlife biologist are required, the FAA recommends that land-use developers or airport operators contact a consultant specializing in wildlife damage management or the appropriate state director of Wildlife Services.

NOTE: Telephone numbers for the respective USDA Wildlife Services state offices can be obtained by contacting USDA Wildlife Services Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157 *(http://www.aphis.usda.gov/ws/)*.

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL. This manual, prepared by FAA and USDA Wildlife Services staff, contains a compilation of information to assist airport personnel in the development, implementation, and evaluation of WHMPs at airports. The manual includes specific information on the nature of wildlife strikes, legal authority, regulations, wildlife management techniques, WHAs, WHMPs, and sources of help and information. The manual is available in three languages: English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web

site: http://wildlife-mitigation.tc.FAA.gov/. This manual only provides a starting point for addressing wildlife hazard issues at airports. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, Qualified Airport Wildlife Biologists must direct the development of a WHMP and the implementation of management actions by airport personnel.

There are many other resources complementary to this manual for use in developing and implementing WHMPs. Several are listed in the manual's bibliography.

3-4. WILDLIFE HAZARD SITE VISITS AND WILDLIFE HAZARD ASSESSMENTS. Title 14 of the CFR, section 139.337(b), requires operators of certificated airports (Class I-III) to conduct a WHA when certain triggering events occur on or near the airport. Section 139.337(c) provides specific guidance as to what facts must be addressed in a WHA. It is good practice for airport operators to understand the wildlife hazard issues on or near the airport. Operators of certificated airports are encouraged to conduct a WHA regardless of whether the airport has experienced one of the triggering events. Doing so would allow the airport to take proactive action and mitigate the wildlife risk before experiencing an incident. Certificated airports may use the standards, practices and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139.

All other airports (Subject Airports) must provide for a WHA or WHSV conducted by a qualified airport wildlife biologist (as defined in FAA Advisory Circular 150/5200-36, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*) based upon the FAA's interpretation of Grant Assurance No. 19. Part 139 certificated airports are currently required to ensure that a WHA is conducted consistent with 14 C.F.R. § 139.337.

Assurance No. 19, "Operation and Maintenance," requires a sponsor to operate "the airport and all facilities which are necessary to serve the aeronautical users of the airport […] , in a safe and serviceable condition and in accordance with the minimum standards as may be required or prescribed by applicable Federal, state and local agencies for maintenance and operation." Under Assurance 19, sponsors are also required to "have in effect arrangements for […] promptly notifying airmen of any condition affecting aeronautical use of the airport."

The FAA is now interpreting safe 'airport operations' in Assurance 19 to expressly include periodically conducting WHAs or WHSVs, depending upon the size and nature of airport operations. Upon completion, the WHA or WHSV must be submitted to the FAA Administrator for approval and determination of the need for further mitigation measures: a Wildlife Hazard Management Plan (WHMP) when a WHA is submitted, and a WHA when a WHSV is submitted. The completed WHA or WHSV would assist the sponsor in meeting its obligation under the assurance to provide notice to airmen of any condition affecting the aeronautical use of the airport.

Wildlife Hazard Site Visits provide an airport a cursory analysis and actionable

information concerning wildlife hazards. They are often conducted to investigate a triggering event and whether an existing WHA and WHMP adequately address the incident, or to determine, if necessary, the necessity of a WHA. The intent of a WHSV is to provide an abbreviated analysis of an airport's wildlife hazards and to provide timely information that allows the airport to expedite the mitigation of these hazards.

Subsequent to the effective date of the final Federal Register Notice relating to the FAA's modification of its interpretation of Grant Assurance No. 19 and after receiving a new airport development grant, all Subject Airports must provide for a WHA or WHSV by the timeline set forth below for each of the four "Subject Airport" classifications based upon the FAA's interpretation of Grant Assurance No. 19. The WHA or WHSV must be conducted by a qualified airport wildlife biologist (as established in FAA Advisory Circular 150/5200-36A, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*). Part 139 certificated airports are currently required to ensure that a WHA is conducted consistent with 14 C.F.R. § 139.337.

a. **Subject Airports with 100 or more based turbine-powered aircraft or 75,000 or more total annual operations.** The WHA must be initiated within three years of receiving a development grant after the final Federal Register notice. The airport sponsor must update its WHA at least once every 10 years thereafter.

b. **Subject Airports with between 20-99 based turbine-powered aircraft or 30,000-74,999 total annual operations.** The WHSV must be initiated within three years of receiving a development grant after the final Federal Register notice. The airport sponsor must update its WHSV at least once every five years thereafter.

c. **Subject Airports with between 0-19 based turbine-powered aircraft or between 10,000-29,999 total annual operations.** The WHSV must be initiated within five years of receiving a development grant after the final Federal Register notice. The airport sponsor must update its WHSV at least once every five years thereafter.

d. **Subject Airports with no based turbine-powered aircraft and fewer than 10,000 total annual operations.** The WHSV must be initiated within eight years of receiving a development grant after the final Federal Register notice. The airport sponsor must update its WHSV at least once every five years thereafter.

e. Recommendation for earlier WHA or WHSV. The FAA also recommends that Subject Airports provide for a WHA or WHSV as soon as practicable in order to identify any immediate wildlife hazards and/or mitigation measures.

f. Additional factors. In addition, the FAA strongly recommends that Subject Airports provide for a WHA or WHSV earlier than the timetable above whenever any of the following occur:

(1) An aircraft experiences multiple wildlife strikes;

(2) An aircraft experiences substantial damage due to a wildlife strike. As used in this paragraph, "substantial damage" means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;

(3) An aircraft experiences an engine ingestion of wildlife; or

(4) Wildlife of sufficient size or quantity to cause an event described in paragraphs 3-4(f)(1), 3-4(f)(2) or 3-5(f)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP). The FAA will consider the results of the WHA, along with the aeronautical activity at the airport and the views of the airport operator and airport users, in determining whether a WHMP is needed. If the FAA determines that a WHMP is needed, the airport operator must formulate and implement a WHMP, using the WHA as the basis for the plan.

The goal of an airport's Wildlife Hazard Management Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport. For WHMPs to effectively reduce wildlife hazards on and near airports, accurate and consistent wildlife strike reporting is essential. Airports should consult AC No. 150/5200-32, *Reporting Wildlife Aircraft Strikes*, for further information on responsibilities and recommendations concerning wildlife strikes.

The WHMP must identify hazardous wildlife attractants on or near the airport and the appropriate wildlife damage management techniques to minimize the wildlife hazard. It must also prioritize the management measures.

3-6. LOCAL COORDINATION. The establishment of a Wildlife Hazards Working Group (WHWG) will facilitate the communication, cooperation, and coordination of the airport and its surrounding community necessary to ensure the effectiveness of the WHMP. The cooperation of the airport community is also necessary when new projects are considered. Whether on or off the airport, input from all involved parties must be considered when a potentially hazardous wildlife attractant is being proposed. Airport operators should also incorporate public education activities with the local coordination efforts because some activities in the vicinity of your airport, while harmless under

normal leisure conditions, can attract wildlife and present a danger to aircraft (see Sections 4-4 to 4-7). For example, if public trails are planned near wetlands or in parks adjoining airport property, the public should know that feeding birds and other wildlife in the area may pose a risk to aircraft.

3-7 COORDINATION/ NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS. If an existing land-use practice creates a wildlife hazard and the land-use practice or wildlife hazard cannot be immediately eliminated, airport operators must issue a Notice to Airmen (NOTAM) and encourage the land owner or manager to take steps to control the wildlife hazard and minimize further attraction.

3-8 FEDERAL AND STATE DEPREDATION PERMITS. Airports should maintain federal and state depredation permits to allow mitigation and/ or removal of hazardous species. All protected species require special permits for lethal mitigation or capture and relocation procedures. Endangered or threatened species mitigation also requires special permits. Consultation and permitting is required with the U.S. Fish and Wildlife Service (USFWS) and is highly recommended with a Qualified Airport Wildlife Biologist. Section 6 of this AC provides further guidance regarding endangered or threatened species on or near airports.

a. Title 50 CFR § 21.49 CONTROL ORDER FOR RESIDENT CANADA GEESE AT AIRPORTS AND MILITARY AIRFIELDS. The airport control order authorizes managers at commercial, public, and private airports (airports) (and their employees or their agents) and military air operation facilities (military airfields) (and their employees or their agents) to establish and implement a control and management program when necessary to resolve or prevent threats to public safety from resident Canada geese. Control and management activities include indirect and/or direct control strategies such as trapping and relocation, nest and egg destruction, gosling and adult trapping and culling programs, or other lethal and non-lethal control strategies.

To be designated as an airport that is authorized to participate in this program, an airport must be part of the National Plan of Integrated Airport Systems and have received Federal grant-in-aid assistance, or a military airfield, meaning an airfield or air station that is under the jurisdiction, custody, or control of the Secretary of a military department. Only airports and military airfields in the lower 48 States and the District of Columbia are eligible to conduct and implement the various resident Canada goose control and management program components.

Airports and military airfields may conduct management and control activities, involving the take of resident Canada geese, under this section between April 1 and September 15. The destruction of resident Canada goose nests and eggs may take place between March 1 and June 30.

Resident Canada geese may be taken only within the airport, or the military base on which a military airfield is located, or within a 3-mile radius of the outer boundary of such a facility. Airports and military airfields or their agents must first obtain all

necessary authorizations from landowners for all management activities conducted outside the airport or military airfield's boundaries and be in compliance with all State and local laws and regulations.

b. Title 50 CFR § 21.50 Depredation order for resident Canada geese nests and eggs. The nest and egg depredation order for resident Canada geese authorizes private landowners and managers of public lands (landowners); homeowners' associations; and village, town, municipality, and county governments (local governments); and the employees or agents of any of these persons or entities to destroy resident Canada goose nests and eggs on property under their jurisdiction when necessary to resolve or prevent injury to people, property, agricultural crops, or other interests.

Only landowners, homeowners' associations, and local governments (and their employees or their agents) in the lower 48 States and the District of Columbia are eligible to implement the resident Canada goose nest and egg depredation order.

DRAFT

SECTION 4.

RECOMMENDED PROCEDURES FOR AIRPORTS REGARDING OFF-AIRPORT ATTRACTANTS.

4-1. FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS

The FAA discourages the development of waste disposal and other facilities, discussed in Section 2, located within the 5,000/ 10,000-foot criteria specified in Sections 1-2 through 1-4.

a. For projects that are located outside the 5,000/ 10,000-foot criteria but within 5 statute miles of the airport's AOA, the FAA may review development plans, proposed land-use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. The FAA considers sensitive airport areas as those that lie under or next to approach or departure airspace. This brief examination should indicate if further investigation is warranted.

b. Where a Qualified Airport Wildlife Biologist has conducted a further study to evaluate a site's compatibility with airport operations, the FAA may use the study results to make a determination.

4-2. WASTE MANAGEMENT FACILITIES.

a. Notification of new/expanded project proposal. Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181), codified at 49 U.S.C. section 44718(d), prohibits the construction or establishment of new MSWLF within 6 statute miles of certain public-use airports, when both the airport and the landfill meet very specific conditions. See Section 2-2 of this AC and AC 150/5200-34A, *Construction or Establishment of Landfills near Public Airports,* for a more detailed discussion of these restrictions.

The Environmental Protection Agency (EPA) requires any MSWLF operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR § 258, *Criteria for Municipal Solid Waste Landfills*, Section 258.10, *Airport Safety*). The EPA also requires owners or operators of new MSWLF units, or lateral expansions of existing MSWLF units, that are located within 10,000 feet of any airport runway end used by turbine-powered aircraft, or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft. (See 4-2(b) below.)

When new or expanded MSWLF are being proposed near airports, MSWLF operators must notify the airport operator and the FAA of the proposal as early as possible pursuant to 40 CFR § 258.

b. Waste handling facilities within separations identified in Sections 1-2 through 1-4. To claim successfully that a waste-handling facility sited within the separations identified in Sections 1-2 through 1-4 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 2-2.d. The FAA strongly recommends against any facility other than that as outlined in 2-2.d (enclosed transfer stations). The FAA will use this information to determine if the facility will be a hazard to aviation.

c. Putrescible-Waste Facilities. In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, no such facility has been able to demonstrate an ability to reduce and sustain hazardous wildlife to levels that existed before the putrescible-waste landfill began operating. For this reason, demonstrations of experimental wildlife control measures may not be conducted within the separation identified in Sections 1-2 through 1-4.

4-3. OTHER LAND-USE PRACTICE CHANGES. As a matter of policy, the FAA encourages operators of public-use airports who become aware of proposed land use practice changes that may attract hazardous wildlife within 5 statute miles of their airports to promptly notify the FAA. The FAA also encourages proponents of such land use changes to notify the FAA as early in the planning process as possible. Advanced notice affords the FAA an opportunity (1) to evaluate the effect of a particular land-use change on aviation safety and (2) to support efforts by the airport sponsor to restrict the use of land next to or near the airport to uses that are compatible with the airport.

The airport operator, project proponent, or land-use operator may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents similar to FAA Form 7460-1 to notify the appropriate FAA Regional Airports Division Office. Project proponents can contact the appropriate FAA Regional Airports Division Office for assistance with the notification process.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land-use operator or project proponent should also forward specific details of the proposed land-use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

a. Airports that have received Federal assistance. Airports that have received Federal assistance are required by their grant assurances to take appropriate actions to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations. The FAA requires that airport operators oppose off-airport land-use changes or practices, to the extent practicable, within the separations identified in Sections 1-2 through 1-4, which may attract hazardous wildlife. Failure to do so may lead to noncompliance with applicable grant assurances. The FAA will not approve the placement of airport development

projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants without appropriate mitigating measures. Increasing the intensity of wildlife control efforts is not a substitute for preventing, eliminating or reducing a proposed wildlife hazard. Airport operators should identify hazardous wildlife attractants and any associated wildlife hazards during any planning process for airport development projects.

4-4. COORDINATION TO PREVENT CREATION OF NEW OFF-AIRPORT HAZARDOUS WILDLIFE ATTRACTANTS. Airport operators should work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in Sections 1-2 through 1-4. Pay particular attention to proposed land uses involving creation or expansion of wastewater treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, airport operators should ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5 miles of the airport, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife. This may be accomplished through one or more of the following:

a. Site-specific criteria. The airport should establish site-specific criteria for what land uses and locations would be of concern based on wildlife strikes and on wildlife abundance and activity at the airport and in the local area. These criteria may be more restrictive, but should not be less restrictive than the guidance provided elsewhere in this AC.

b. Outreach. Airports should actively seek to provide educational information and/ or provide input regarding local development, natural resource modification or wildlife-related concerns that affect wildlife hazards and safe air travel.

(1) External Outreach. Airports should consider outreach to local planning and zoning organizations on land uses of concern or to local organizations involved with natural resource management (including wildlife management, wetlands management, and parks). Airports should also consider developing and distributing position letters and/ or educational materials on airport-specific concerns regarding wildlife hazards, wildlife activity and/ or attraction, etc. Finally, airports should provide formal comments on local procedures, laws, ordinances, plans, and/ or regulatory actions such as permits related to land uses of concern.

(2) Internal Outreach. Airports should consider developing and distributing position letters and/ or educational materials on airport-specific concerns regarding species identification and mitigation procedures, wildlife hazards, wildlife activity and/ or attraction, etc. to employees and personnel with access to the AOA.

4-5. COORDINATION ON EXISTING OFF-AIRPORT HAZARDOUS WILDLIFE ATTRACTANTS. Airports should work with landowners and managers to cooperatively develop procedures to monitor and manage hazardous wildlife attraction. These

procedures may include:

a. Conduct a Wildlife Hazard Site Visit by a wildlife biologist meeting the qualification requirements of Advisory Circular 150/5200-36, *Qualifications for Wildlife Biologists Conduct Wildlife Hazard Assessments and Wildlife Hazard Management Training at Airports*

b. Conduct regular, standardized, wildlife monitoring surveys

c. Establish threshold numbers of wildlife which would trigger certain actions and/or communications

d. Establishment of procedures to deter or remove hazardous wildlife

4-6. PROMPT REMEDIAL ACTION. Regardless of the type or source of attraction, Part 139 certificated airports must take immediate action to alleviate wildlife hazards whenever they are detected, while Subject Airports should take immediate action to alleviate wildlife hazards whenever they are detected. In addition, airports should take prompt action to identify the source of attraction and cooperatively develop procedures to mitigate and monitor the attractant. **For Part 139 Certificated airports, procedures for immediate actions are required in accordance with 139.337 (a).**

4-7. FAA ASSISTANCE. If there is disagreement on the implementation of any of the guidance in this Section, contact the FAA Regional Airports Division for assistance.

4-8. AIRPORT DOCUMENTATION PROCEDURES.

a. LOG OF WILDLIFE ATTRACTANTS. Airports should develop a log to track all contacts from landowners or managers, permitting agencies, or other entities concerning land uses near the airport, as well as on-airport features and developments that could attract hazardous wildlife. In this log maintain documentation sufficient to conduct the reviews below and to make follow-up contact if necessary.

b. ANNUAL REVIEW OF LOG. The airport should review this log annually to:

(1) Review status of individual offsite attractants and any needed changes

(2) Identify synergistic effects of hazardous wildlife attractants

(3) Identify any existing or potential flyways across or through aircraft travel corridors between hazardous wildlife attractants

(4) Identify cooperative measures and on-airport wildlife management procedures that would alleviate either or both of the above two conditions

(5) Document the participants in the review, items discussed, and changes identified

For Part 139 Certificated airports, this review must be a part of the annual Wildlife Hazard Management Plan review in accordance with 139.337 (f) (6). In addition, Part

139 Certificated Airports must also log triggering events and other wildlife strikes in accordance with 139.337 (f) (6). FAA encourages all airports, regardless of certification, to record any known wildlife strikes in the National Wildlife Strike Database.

DRAFT

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. GENERAL. This appendix provides definitions of terms used throughout this AC.

1. **Air operations area.** Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

2. **Airport operator.** The operator (private or public) or sponsor of a public-use airport.

3. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

4. **Bird balls.** High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

5. **Certificate holder.** The holder of an Airport Operating Certificate issued under Title 14, Code of Federal Regulations, Part 139.

6. **Construct a new MSWLF.** To begin to excavate, grade land, or raise structures to prepare a municipal solid waste landfill as permitted by the appropriate regulatory or permitting agency.

7. **Detention ponds.** Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

8. **Establish a new MSWLF.** When the first load of putrescible waste is received on-site for placement in a prepared municipal solid waste landfill.

9. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

10. **General aviation aircraft.** Any civil aviation aircraft operating under 14 CFR Part 91.

11. **Hazardous wildlife.** Species of wildlife (birds, mammals, reptiles), including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard

12. **Municipal Solid Waste Landfill (MSWLF).** A publicly or privately owned discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR § 257.2. An MSWLF may receive other types wastes, such as commercial solid waste, non-hazardous sludge,

small-quantity generator waste, and industrial solid waste, as defined under 40 CFR § 258.2. An MSWLF can consist of either a stand-alone unit or several cells that receive household waste.

13. **New MSWLF.** A municipal solid waste landfill that was established or constructed after April 5, 2001.

14. **Piston-powered aircraft.** Fixed-wing aircraft powered by piston engines.

15. **Piston-use airport.** Any airport that does not sell Jet-A fuel for fixed-wing turbine-powered aircraft, and primarily serves fixed-wing, piston-powered aircraft. Incidental use of the airport by turbine-powered, fixed-wing aircraft would not affect this designation. However, such aircraft should not be based at the airport.

16. **Public agency.** A State or political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo (49 U.S.C. § 47102(19)).

17. **Public airport.** An airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft is publicly owned (49 U.S.C. § 47102(20)).

18. **Public-use airport.** An airport used or intended to be used for public purposes, and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft may be under the control of a public agency or privately owned and used for public purposes (49 U.S.C. § 47102(21)).

19. **Putrescible waste.** Solid waste that contains organic matter capable of being decomposed by micro-organisms and of such a character and proportion as to be capable of attracting or providing food for birds (40 CFR §257.3-8).

20. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

21. **Retention ponds.** Storm water management ponds that hold water for several months.

22. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the airport design, aircraft, type of operation, and visibility minimum.

23. **Scheduled air carrier operation.** Any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial operator for which the air carrier, commercial operator, or their representative

offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 119 or as a public charter operation under 14 CFR Part 380 (14 CFR § 119.3).

24. **Sewage sludge.** Any solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (40 CFR § 257.2)

25. **Sludge.** Any solid, semi-solid, or liquid waste generated form a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. (40 CFR § 257.2)

26. **Solid waste.** Any garbage, refuse, sludge, from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including, solid liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by product material as defined by the Atomic Energy Act of 1954, as amended, (68 Stat. 923). (40 CFR § 257.2)

27. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

28. **Turbine-use airport.** Any airport that sells -A fuel for fixed-wing turbine-powered aircraft.

29. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-217) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 CFR § 403.3 (q), (r), & (s)).

30. Wildlife. Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR § 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, wildlife includes feral animals and domestic animals out of the control of their owners (14 CFR Part 139, Certification of Airports).

31. Wildlife attractants. Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

32. Wildlife hazard. A potential for a damaging aircraft collision with wildlife on or near an airport.

33. Wildlife strike. A wildlife strike is deemed to have occurred when:

a. A strike between wildlife and aircraft has been witnessed;

b. Evidence or damage from a strike has been identified on an aircraft;

c. Bird or other wildlife remains, whether in whole or in part, are found:

i. Within 250 feet of a runway centerline or within 1,000 feet of a runway end unless another reason for the animal's death is identified or suspected,, unless another reason for the animal's death is identified or;

ii. On a taxiway or anywhere else on or off airport that you have reason to believe was the result of a strike with an aircraft. Examples might be:

1. Bird was found in pieces from a prop strike on a taxiway
2. Carcass was retrieved within 1 mile from airport on final approach path after someone reported the bird falling out of the sky.

d. The presence of birds or other wildlife on or off the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal).

2. RESERVED.

DRAFT

U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: PROTOCOL FOR THE CONDUCT AND REVIEW OF WILDLIFE HAZARD SITE VISITS, WILDLIFE HAZARD ASSESSMENTS, AND WILDLIFE HAZARD MANAGEMENT PLANS	**Date:** DRAFT **Initiated by:** AAS-300	**AC No:** 150/5200-XX **Change:**

1. Purpose.

This Advisory Circular (AC) defines the minimum acceptable standards for the conduct and preparation of Wildlife Hazard Site Visits (Site Visit), Wildlife Hazard Assessments (Assessments) and Wildlife Hazard Management Plans (Plans). This AC provides guidelines that define when a Site Visit should be conducted and when an Assessment must be conducted. It also defines minimum standards for conducting Site Visits and Assessments, as well as developing Plans. The AC further defines and explains continual monitoring programs. This AC also provides checklists to help people evaluate Site Visits, Assessments and Plans.

2. Applicability.

Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D, must use the standards, practices and recommendations contained in this AC to comply with the wildlife hazard management requirements in 14 C.F.R. §139.337. All other airports that have received Federal assistance and/or that have authority to impose and/or use a Passenger Facility Charge must use the standards practices and recommendations contained in this AC during the conduct and preparation of Site Visits, Assessments and Plans. The FAA also recommends the guidance in this AC for Qualified Airport Wildlife Biologists (Biologist), land-use planners and developers of projects, facilities, and activities on or near airports.

3. Background.

Title 14 Code of Federal Regulations, part 139.337, *Wildlife Hazard Management,* prescribes the specific reasons why an Assessment must be conducted and what subject matter is minimally required. Minimal standards have been unclear or absent for preferred methodologies that assess wildlife populations and wildlife hazard attractants. These disparities have resulted in non-standardized, wide ranging methodologies to obtain wildlife and habitat data.

DRAFT

An Assessment, defined as an ecological study in part 139.337 (a), conducted by a Biologist, provides the scientific basis for the development, implementation, and refinement of a Plan. Though parts of the Assessment may be incorporated directly in the Plan, they are two separate documents. Part of the Plan can be prepared by the Biologist who conducts the Assessment. However, some parts can be prepared only by the airport. For example, airport management assigns airport personnel responsibilities, commits airport funds, and purchases equipment and supplies. Site Visits also must be conducted by a Qualified Airport Wildlife Biologist. The intent of a Site Visit is to provide an abbreviated analysis of an airport's wildlife hazards, determine if an Assessment is warranted, and if necessary, provide actionable information that allows the airport to expedite the mitigation of these hazards.

Information about the risks posed to aircraft by certain wildlife species has increased in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1 ranks the most hazardous bird and mammal species or groups as to relative hazard to aircraft in airport environments (i.e., ≤500 ft [152 m] above ground level), based on a composite ranking of strikes with civil aircraft in the USA 1990-2009.

These hazard rankings can help focus hazardous wildlife management efforts on those species or groups that represent the greatest threats to safe air operations in the airport environment. Used in conjunction with a site-specific Assessment that will determine the relative abundance and use patterns of wildlife species, these rankings can help airport operators better understand the general threat level (and consequences) of certain wildlife species and can assist with the creation of a "zero-tolerance" list of hazardous species that warrant immediate attention.

DRAFT

Table 1. Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009[1].

***Species*[2]**	***Total strikes reported***	***% with damage***	***% with substantial damage***	***% with EOF***	***Damage rank***	***Substantial damage rank***	***EOF rank***	***Composite rank***	***Relative hazard score***
Mule deer (*Odocoileus hemionus*)	47	96	38	83	1	1	1	1	100
White-tailed deer (*Odocoileus virginianus*)	814	87	36	68	2	2	3	2	88
Domestic dog	21	53	26	75	4	4	2	3	71
Other geese	20	68	32	32	3	3	8	4	61
Canada goose (*Branta canadensis)*	776	51	16	34	7	9	7	5	46
Turkey vulture (*Cathartes aura*)	159	46	16	34	10	7	6	5	44
Other ducks	77	49	24	30	8	5	11	7	48
Great horned owl (*Bubo virginianus*)	29	52	16	27	6	8	17	8	44
Double-crested cormorant (*Phalacrocorax auritis*)	24	52	13	29	5	13	13	8	43
Brown pelican (*Pelecanus occidentalis*)	31	35	13	38	14	14	5	10	40
Wild turkey (*Meleagris gallopavo*)	38	37	6	43	13	28	4	11	40
Sandhill crane (*Grus canadensis*)	66	43	10	28	11	19	15	11	37
Glaucous-winged gull (*Larus glaucescens*)	27	48	9	28	9	21	16	13	39
Bald eagle (*Haliaeetus leucocephalus*)	74	40	7	30	12	25	10	14	36
Great black-backed gull (*Larus marinus*)	20	26	21	22	18	6	23	14	32
Osprey (*Pandion haliaetus*)	77	32	12	26	16	15	19	16	32
Great blue heron (*Ardea herodius*)	132	32	8	28	15	23	14	17	31
Ring-necked pheasant (*Phasianus colchicus*)	45	26	14	22	20	10	26	18	29
Herring gull (*Larus argentatus*)	291	25	13	24	23	12	21	18	29
Snowy owl (*Bubo scandiacus*)	28	23	12	26	24	17	20	20	28
Mallard (*Anas platyrhynchos*)	221	31	11	21	17	18	28	21	29
Great egret (*Ardea alba*)	24	26	4	29	21	32	12	22	28
Red-tailed hawk (*Buteo jamaicensis*)	534	26	8	21	19	24	27	23	25
California gull (*Larus californicus*)	23	14	14	20	33	11	30	24	22
Cattle egret (*Bubulcus ibis*)	112	17	6	27	32	27	18	25	23
Ring-billed gull (*Larus delawarensis*)	362	21	8	20	26	22	33	26	23
Franklin's gull (*Larus pipixcan*)	26	9	9	23	41	20	22	27	19
Raccoon (*Procyon lotor*)	23	18	12	14	28	16	40	28	20
Species[2]	**Total strikes reported**	**% with damage**	**% with substantial damage**	**% with EOF**	**Damage rank**	**Substantial damage rank**	**EOF rank**	**Composite rank**	**Relative hazard score**

DRAFT

Species[2]	Total strikes reported	% with damage	% with substantial damage	% with EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Coyote (*Canis latrans*)	231	14	3	31	36	41	9	29	22
Rock dove (*Columba livia*)	1,035	18	6	19	29	26	34	30	20
Swainson's hawk (*Buteo swainsoni*)	24	17	4	20	31	33	31	31	19
Other hawks	34	14	4	22	34	37	25	32	18
Laughing gull (*Larus atricilla*)	106	14	4	21	35	34	29	33	18
Mew gull (*Larus canus*)	21	25	0	16	22	52	37	34	19
Peregrine falcon (*Falco peregrinus*)	44	18	5	7	30	29	53	35	14
Laysan albatross (*Phoebastria immutabilis*)	29	22	0	17	25	53	35	36	18
Rabbits (Leporidae)	78	11	3	15	37	39	39	37	13
Upland sandpiper (*Bartramia longicauda*)	32	8	4	16	43	36	36	37	13
Short-eared owl (*Asio flammeus*)	58	10	4	11	39	35	43	39	12
Black-bellied plover (*Pluvialis squatarola*)	20	18	0	16	27	54	38	40	15
Red fox (*Vulpes vulpes*)	31	8	0	22	42	55	24	41	14
American crow (*Corvus brachyrhynchos*)	141	10	3	13	40	40	41	41	12
Spotted dove (*Streptopelia chinensis*)	46	7	4	10	48	31	45	43	10
Barn owl (*Tyto alba*)	174	11	3	9	38	38	49	44	11
Mourning dove (*Zenaida macroura*)	1,313	7	3	13	45	42	42	45	10
Blackbirds	976	7	2	10	44	46	44	46	9
European starling (*Sturnus vulgaris*)	1,408	7	2	10	47	43	46	47	9
Bats (Chiroptera)	44	5	5	8	55	30	51	47	8
Killdeer (*Charadrius vociferus*)	553	6	1	7	51	48	52	49	7
American kestrel (*Falco sparverius*)	536	4	1	7	57	47	55	50	6
Zebra dove (*Geopelia striata*)	54	4	2	6	56	44	59	50	5
Snow bunting (*Plectrophenax nivalis*)	84	1	0	20	66	66	32	52	10
Common myna (*Acridotheres tristis*)	21	6	0	6	50	58	56	52	6
Bank swallow (*Riparia riparia*)	49	5	0	9	54	61	50	54	6
Meadowlarks	361	3	2	6	61	45	60	55	5
Woodchuck (*Marmota monax)*	41	7	0	3	46	56	68	56	5
Horned lark (*Eremophila alpestris*)	372	3	1	6	60	49	61	56	4
Sparrows	1,799	3	0	6	62	51	58	58	4
Northern harrier (*Circus cyaneus*)	24	5	0	5	52	59	62	59	5
American robin (*Turdus migratorius*)	159	2	0	10	64	65	47	60	5
Burrowing owl (*Athene cunicularia*)	20	6	0	0	49	57	73	61	3
Barn swallow (*Hirundo rustica*)	486	2	0	3	65	50	69	62	2
Wrens	28	4	0	4	58	62	66	63	3
Terns	45	5	0	0	53	60	74	64	2
Finches	55	0	0	10	71	71	48	65	4

DRAFT

Chimney swift (*Chaetura pelagica*)	34	0	0	6	70	70	57	66	3
Common nighthawk (*Chordeiles minor*)	38	3	0	0	59	63	75	66	1
Pacific golden-plover (*Pluvialis apricaria*)	204	1	0	4	67	67	64	68	2
Purple martin (*Progne subis*)	57	2	0	2	63	64	72	69	2
Western sandpiper (*Calidris mauri*)	31	0	0	7	76	76	54	70	3
Cliff swallow (*Petrochelidon pyrrhonota*)	164	1	0	2	68	68	71	71	1
Skunks (Mephitidae)	30	0	0	4	74	74	63	72	2
Nutmeg mannikin (*Lonchura punctulata*)	26	0	0	4	72	72	67	72	2
Chestnut manikin (*Lonchura malacca*)	28	0	0	0	69	69	76	74	0
Wood warblers	30	0	0	4	77	77	65	75	2
Tree swallow (*Tachycineta bicolor*)	109	0	0	2	75	75	70	76	1
Opossum (*Didelphis virginiana*)	25	0	0	0	73	73	77	77	0

[1] Excerpted from the Wildlife Society Bulletin 35(4):394–402; 2011*; "Interspecific Variation in Wildlife Hazards to Aircraft: Implications for Airport Wildlife Management."* Refer to this publication for additional explanation of criteria and method of ranking and Wildlife Society Bulletin 28:372–378 "*Ranking the Hazard Level of Wildlife Species to Aviation"* for detailed definitions of damage and EOF.

[2] Other geese = snow goose (*Chen caerulescens*), brant (*Branta bernicla*), greater white-fronted goose (*Anser albifrons*); other ducks = 23 species in the family Anatidae; other hawks = Cooper's hawk (*Accipter cooperii*), sharp-shinned hawk (*A. striatus*), rough-legged hawk (*Buteo lagopus*), red-shouldered hawk (*B. lineatus*), broad-winged hawk (*B. platypterus*), ferruginous hawk (*B. regalis*); blackbirds = red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*); meadowlarks = eastern meadowlark (*Sturnella magna*), western meadowlark (*S. neglecta*); sparrows = 19 species in the family Emberizidae; wrens = house wren (*Troglodytes aedon*), Carolina wren (*Thryothorus ludovicianus*), marsh wren (*Cistothorus palustris*); terns = common tern (*Sterna hirundo*), arctic tern (*S. vittata*), Caspian tern (*S. caspia*), least tern (*S. antillarum*), fairy tern (*S. nereis*); finches = house finch (*Carpodacus mexicanus*), American goldfinch (*Carduelis tristis*); wood warblers = 13 species in the family Parulidae.

DRAFT

This page intentionally left blank.

DRAFT

Table of Contents

SECTION 1. PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD SITE VISIT (SITE VISIT)..... 9

1-1. INTRODUCTION 9

1-2. APPLICABLE AIRPORT INFORMATION 9

1-3. OBSERVATIONS 10

1-4. SITE VISIT REPORT 11

SECTION 2. PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD ASSESSMENT (ASSESSMENT)..... . 12

2-1. INTRODUCTION 12

2-2. REQUIREMENTS FOR WILDLIFE HAZARD ASSESSMENTS 12

2-3. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT... 14

2-4. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT REPORT 15

2-5. MINIMUM NUMBER OF WILDLIFE SURVEYS REQUIRED AND DURATION OF WILDLIFE HAZARD ASSESSMENT 15

2-6. BASIC WILDLIFE SURVEY TECHNIQUES FOR WILDLIFE HAZARD ASSESSMENTS 16

2-7. BASIC HABITAT SURVEYS FOR WILDLIFE HAZARD ASSESSMENTS ..... .21

2-8. BASIC ASSESSMENT OF AIRPORT AND AIRCRAFT OPERATIONS . .24

SECTION 3. PROTOCOL FOR THE PREPARATION OF A WILDLIFE HAZARD MANAGEMENT PLAN (PLAN)..... ..26

3.1 INTRODUCTION 26

3.2 WILDLIFE HAZARD MANAGEMENT PLAN REGULATORY REQUIREMENTS AND METHODOLOGY. 26

3.3. FEDERAL AND STATE-LISTED THREATENED AND ENDANGERED SPECIES, AND SPECIES OF SPECIAL CONCERN 32

3-4. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW..... 34

SECTION 4. PROTOCOL FOR CONTINUAL MONITORING 36

4-1. INTRODUCTION 36

4-2. CONTINUAL MONITORING PROTOCOL 36

4-3. CONTINUAL MONITORING ANNUAL REPORT 37

APPENDIX A. AIRPORT WILDLIFE HAZARD SITE VISIT CHECKLIST..... 38

DRAFT

APPENDIX B. AIRPORT WILDLIFE HAZARD ASSESSMENT AND REPORT CHECKLIST…….. 41
APPENDIX C. AIRPORT WILDLIFE HAZARD MANAGEMENT PLAN CHECKLIST... 47
APPENDIX D. AIRPORT WILDLIFE HAZARD CONTINUAL MONITORING AND REPORT CHECKLIST 52
APPENDIX E. PROCUREMENT OF AIRPORT WILDLIFE BIOLOGISTS..... 56
APPENDIX F. BIRD SURVEY DATA SHEET EXAMPLE 57

DRAFT

SECTION 1.

PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD SITE VISIT (SITE VISIT)

1.1. INTRODUCTION. A Site Visit has three parts: Gathering airport information, field observations, and a final report with recommendations. Airports use a Site Visit to quickly evaluate and mitigate potential hazards on airports. An airport can also use a Site Visit to determine whether an Assessment is necessary. If an airport already has a Plan, airport management can use a Site Visit to investigate wildlife strikes to aircraft or to see if the Plan needs to be updated.

During the Site Visit, the Biologist collects and compiles information on the airport's wildlife hazard history, documented and suspected wildlife hazards, habitat attractants, control activities, airport operations procedures, communications of hazards through ATC and pilots, aircraft operations and scheduling. A Site Visit is typically conducted over a period of one to three days during which a Biologist evaluates the habitat on and surrounding the airport and records direct or indirect wildlife observations; and reviews the current Plan, current wildlife management activities and airport wildlife strike data.

A Qualified Airport Wildlife Biologist must conduct Site Visits. Standards for becoming a Qualified Airport Wildlife Biologist are found in AC 150/5200-36A, *Qualifications for Wildlife Qualified Airport Wildlife Biologists Conducting Wildlife Hazard Assessments and Training Curriculum for Airport Personnel Involved in Controlling Wildlife Hazards on Airports.*

1.2. APPLICABLE AIRPORT INFORMATION. The airport operator shall provide the Biologist the following information, if available:

a. Personnel and departments responsible for airport operations

b. Number of aircraft movements per year

c. Type of movements (i.e., % private, civil, and military)

d. Recent airport improvements or upgrades

e. Past and present land management practices

f. Records of strikes and damage, flight delays, injuries, and fatalities due to strikes. Wildlife strike data may help determine hazardous species on an airport. Data on reported wildlife strikes are available through the FAA National Wildlife Strike Database (available at http://faa.gov/go/wildlife). Airports may maintain their own local database which can be compared with the National Database. A Site Visit should include an analysis of wildlife strike records. If possible, include summaries of strike data by species, time of day, on and off-site airport locations, and weather conditions. A minimum wildlife strike analysis should include, if available:

(1) Bird and mammal species involved

(2) Frequency distribution by month and year

(3) Number per 10,000 aircraft movements

(4) Location on the airfield

g. Previous wildlife hazard management efforts – Records of past management may be helpful during this initial consultation. Attempts to exclude, deter, or remove wildlife from the airport should be noted. If not already in place, a wildlife log should be created and maintained by airport operations to document all wildlife activity observed on the airport.

h. Description of current wildlife hazard threats or concerns

i. Any current Federal and State depredation/ wildlife control permits and annual permit reports

j. Current U.S. Geological Survey (USGS) topographic maps, airport maps, and/ or aerial photographs

k. Other pertinent information present in airport records

Airport records may be incomplete or may not exist. Interviews with airport personnel often yield useful information that is missing from written records. The history of wildlife hazard problems at the airport should be discussed with the airport manager and staff. The control tower supervisor and chief of operations may also provide useful background information on the severity and frequency of the problem.

1.3. OBSERVATIONS. Qualified Airport Wildlife Biologists should make observations from a variety of locations to ensure complete visual coverage of the airport. Minimum coverage shall include observations of the airport's Airport Operations Area (AOA). These observations should be brief and are not as rigorous as a full Assessment. At a minimum, the observations should include:

a. *Birds* – Record bird species present and note abundance, activity, location, type of habitat used, time and date of observations. Note evidence of bird activity such as fecal material and regurgitated pellets (boluses) under structures used for perching.

b. *Mammals* – Document mammals observed and evidence of mammal activity such as scats, tracks, runs, and burrows and include time and date of observations, activity, location, and type of habitat used. Estimate relative abundance, activity, and habitat use.

c. *Habitat Attractants* – Assess habitats and man-made attractants on and around airport property. Note potential wildlife attractants. Review maps and aerial photographs, noting waste management facilities, wildlife refuges, water bodies, agriculture, stock yards, picnic areas, restaurants, and other features or habitats that may attract wildlife within a five mile radius around the airport.

d. *Wildlife/Habitat Relationship* – Observe and record how the wildlife observed is using the habitat on the airport.

e. *Wildlife Interactions with Aircraft Operations* – Assess the potential for wildlife interactions with aircraft operations in the AOA, traffic patterns, approach and departure airspace, and surrounding areas. Evaluate aircraft movements to see if these operations increase the risk of wildlife strikes. Review airport hazard advisories to see if they are specific to the hazards at the airport.

1.4. SITE VISIT REPORT. The Qualified Airport Wildlife Biologist must provide the airport manager with a letter report summarizing field data and any management recommendations following the Site Visit. The FAA Regional office should receive a copy of this report from the Airport Manager. The FAA will review the site visit report and determine if a full Wildlife Hazard Assessment is required. Copies of the report should be filed and made a part of the historical record for the airport. The Site Visit report should contain:

a. List of wildlife species (or wildlife sign- e.g., deer tracks) observed during the visit, with a statement that the list is not a complete record of species using the airport

b. Federal and State status of the species observed

c. Habitat features that may encourage wildlife to use the airport

d. Natural and man-made wildlife attractants on or near the airport

e. Strike data analysis

f. Recommendations to:

(1) Reduce wildlife hazards identified (if data is available to substantiate your conclusions)[1]

(2) Conduct an Assessment, if warranted

(3) Modify an existing Plan, if warranted

(4) Improve communications and hazard advisories between Air Traffic Control, pilots, airlines, airport operations, and other airport users

(5) Provide for potential alteration of aircraft operations including locations and scheduling of flights to avoid identified hazardous wildlife concentrations

(6) No action required, if applicable

[1] Reduce wildlife hazards through the use of habitat management, exclusion/repulsion techniques, active harassment, population control, and operational considerations.

SECTION 2.

PROTOCOL FOR THE CONDUCT OF A WILDLIFE HAZARD ASSESSMENT (ASSESSMENT)

2.1. INTRODUCTION. The first step in preparing an airport Plan is to conduct an Assessment. The Assessment, conducted by a Qualified Airport Wildlife Biologist, provides the scientific basis for the development, implementation, and refinement of a Plan. Though parts of the Assessment may be incorporated directly into the Plan, they are two separate documents.

The objective of an Assessment is to provide a baseline of data and understanding of wildlife species considered hazardous on or near an airport and of attractants that provide food, water, and shelter. The Assessment also identifies wildlife trends at the airport (location of wildlife hazards and seasonality of wildlife) and how these fluctuations in behavior and abundance may affect aviation safety, with particular emphasis to wildlife strikes to aircraft. It promotes the use of an integrated approach for wildlife mitigation to effectively modify the environment (e.g., mowing and drainage clearance), exclude wildlife (e.g., install fences and perch excluders), implement harassment procedures (e.g., pyrotechnics and propane cannons), remove wildlife (e.g., lethal and capture/relocate methodologies), communicate wildlife hazard advisories (e.g., through Air Traffic Control voice communications, ATIS, PIREPS, NOTAMS), direct pilot responses to identified hazards, report strikes or hazardous situations, and potentially alter flight routes, traffic patterns, or schedules to avoid locations and times of identified wildlife hazards.

The Assessment provides baseline data for an airport to evaluate the efficacy of its wildlife hazard management program (e.g., determine redundancy of species-specific wildlife hazards, monitor reduction of onsite damaging strikes, monitor wildlife program communication and response efficiency, and improve the overall wildlife program through annual review). Better information regarding wildlife hazards and their attractants should result in better use of resources.

2.2. REQUIREMENTS FOR WILDLIFE HAZARD ASSESSMENTS. Title 14 CFR 139.337(b)(1–4) requires that, in a manner authorized by the Administrator, each certificate holder must ensure that an Assessment is conducted when any of the following events occurs on or near the airport:

a. An air carrier aircraft experiences multiple wildlife strikes

b. An air carrier aircraft experiences substantial damage from striking wildlife

c. An air carrier aircraft experiences an engine ingestion of wildlife

d. Wildlife of a size, or in numbers, capable of causing an event described in paragraph (b)(1), (2), or (3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

The following provides a point-by-point comment on the regulations concerning the events that trigger a Wildlife Hazard Assessment.

14 CFR 139.337	Clarifications
(b) In a manner authorized by the Administrator, each certificate holder shall ensure that a Wildlife Hazard Assessment is conducted when any of the following events occurs on or near the airport.	A wildlife hazard assessment, conducted by a Qualified Airport Wildlife Biologist, must be conducted if—
(b) (1) An air carrier aircraft experiences a multiple wildlife strike	Aircraft strikes more than one animal (geese, starlings, bats, deer, coyotes, etc.).
(b) (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component	The definition of substantial damage is taken directly from the International Civil Aviation Organization (ICAO) *Manual on the International Civil Aeronautics Organization Bird Strike Information System.*
(b) (3) An air carrier aircraft experiences an engine ingestion of wildlife; or	Wildlife is ingested into a turboprop, turbofan, or turbojet engine. Engine damage does not have to result from the ingestion.
(b) (4) Wildlife of a size, or in numbers, capable of causing an event described in paragraph (b)(1), (2), or (3) of this section is observed to have access to any airport flight pattern or aircraft movement area.	Airports with a standing Notice to Airmen (NOTAM), announcements on their Automatic Terminal Information Service (ATIS), or comments in Airport/Facility Directory (A/FD) warning pilots of wildlife hazards on or near the airport meet this condition. Permanent or blanket generic advisories should not be issued without actionable mitigation measures provided.

DRAFT

2.3. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT. Title 14 CFR 139.337 (c)(1–5) provides specific guidance as to what facts must be addressed in a Wildlife Hazard Assessment. The following is a point-by-point comment on each section of the regulations concerning the factors to be addressed in a Wildlife Hazard Assessment.

14 CFR 139.337	Clarifications
(c) The Wildlife Hazard Assessment … shall be conducted by Qualified Airport Wildlife Biologist… having training or experience in wildlife hazard management at airports … or working under the direct supervision …	The Assessment is to be conducted by someone having met the requirements defined in the most recent version of AC 150/ 5200-36 *"Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports"*
(c) cont. … the Wildlife Hazard Assessment shall contain:	
(c) (1) Analysis of the event or circumstances that prompted the assessment.	Who, what, when, where, why of the situation prompting the Assessment.
(c) (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.	What wildlife species have access to the airport? What are their legal status, movement patterns, and seasonal patterns?
(c) (3) Identification and location of features on and near the airport that attract wildlife.	Wildlife are attracted to an airport because something exists on or near the airport that they desire. Wood lots near the AOA and large open areas provide relatively safe loafing, nesting and feeding locations. Food and water sources can be highly variable (dependent on hazardous species), seasonal or ephemeral. These attractants and others, such as easily accessible travel corridors, should be analyzed.
(c) (4) A description of wildlife hazards to air carrier operations.	This is a judgment call best made by the Qualified Airport Wildlife Biologist trained in dealing with airport issues. Hitting 3-4 swallows is much less hazardous than hitting one 12-pound Canada goose.
(c) (5) Recommended actions for reducing identified wildlife hazards to air carrier operations.	The Qualified Airport Wildlife Biologist preparing the Assessment must provide prioritized recommendations for mitigating the hazardous wildlife and their attractants as well as recommendations for Operations (e.g., ATC, air carriers, pilots, etc.)

DRAFT

2.4. NECESSARY ELEMENTS OF A WILDLIFE HAZARD ASSESSMENT REPORT. Elements within 14 CFR 139.337 (c) (1-5) must be discussed in the final Assessment report. If there was no event or circumstance that prompted the Assessment then 14 CFR 139.337 (c) (1) may be omitted. Although there are many acceptable formats to present the findings of an Assessment, there are certain key components that must be provided. The required components include sections summarizing methodologies, results and recommendations (if there are any).

Assessment techniques such as point counts, trapping indices, vehicle routes, and avian radar should be conducted and locations described that allows future duplication for consistent, continued monitoring or comparison to previous findings. Maps, imagery and/or detailed descriptions should be incorporated whenever location information is necessary (e.g., Assessment techniques, wildlife hazard attractants, airport layout).

Wildlife strike data should be evaluated regardless of an event or circumstance that may have prompted the Assessment. The National Wildlife Strike Database (http://faa.gov/go/wildlife) is available to the public and is the primary repository for wildlife strikes to civil aircraft in the U.S., although strike records may be available from other sources such as the airport, airlines and engine manufacturers. When available, key strike data such as species, number struck, phase of flight, altitude, time of day, time of year, and damage (if any) should be summarized in the Assessment.

Recommended actions for reducing identified wildlife hazards may include detailed, task specific objectives or general measures. Attention should be given both to proactive mitigation such as habitat modification and exclusion techniques and reactive measures that involve harassment, dispersal and removal procedures. When applicable, airports should be strongly encouraged to maintain Federal and State depredation permits.

2.5. MINIMUM NUMBER OF WILDLIFE SURVEYS REQUIRED AND DURATION OF WILDLIFE HAZARD ASSESSMENT. In conducting a Wildlife Hazard Assessment 14 CFR Part 139.337 (c)(2) requires the *"identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences."* In most cases, this requirement dictates that a 12-month Assessment be conducted so the seasonal patterns of birds and other wildlife using the airport and surrounding area during an annual cycle can be properly documented. Most regions of the USA have dramatic seasonal differences in numbers and species of migratory birds. Even for non-migratory wildlife, such as deer and resident Canada geese, behavior and movement patterns can change significantly throughout the seasons. Observations of wildlife at an airport and surrounding areas limited to a few days in a single season generally cannot adequately assess hazardous wildlife issues and associated habitat attractants.

In order to adequately identify wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences, the Biologist may choose from several objective procedures that will adequately assess avian and mammalian species. These standardized survey procedures will insure that quality, representative data can

be consistently collected for hazardous wildlife species in the airport environment and that these procedures can be repeated in future years for comparative purposes.

Various wildlife species are active throughout all hours of the day and night. Inventory and monitoring techniques should account for these movement dynamics. Birds should be surveyed diurnally in the morning, midday, and evening hours while appropriate nocturnal surveys and/or tracking indices are incorporated to sample mammals.

a. Avian Surveys

(1) Minimum of twelve months data collection

(2) Minimum of two randomly selected sampling trips/month

(3) Minimum of two survey samples/month for each of the survey points during the diurnal periods of morning, midday and evening[2]

b. Mammalian Surveys

(1) Minimum of twelve months data collection

(2) Minimum of one randomly selected sampling trip/month

c. Data from Other Sources

(1) Published data

(2) University studies

(3) Federal and State studies

(4) NEPA documents

(5) Radar studies

(6) ATC and airport "event logs" or wildlife management, patrol, monitoring logs

(7) Other acceptable data sources

2.6. BASIC WILDLIFE SURVEY TECHNIQUES FOR WILDLIFE HAZARD ASSESSMENTS. Not all species are equally detectable but an Assessment should strive to assess the presence/absence of known or suspected hazardous species on or near the airport, especially those documented within the facility's strike database. Hazardous avian species on or near airports are typically medium to large birds that exhibit either solitary or flocking behavior or small birds that congregate in large flocks.

[2] It may be beneficial to increase avian surveys during spring and fall migrations.

a. North American Breeding Bird Survey. One objective procedure for assessing bird populations, based on North American Breeding Bird Survey (BBS) methodology, is the establishment of standardized survey points about ½ mile apart throughout the airport. Assigning each bird or bird flock observed during a point count to a grid location can be useful in further refining spatial distributions of birds on the airport. Additional survey points should be established in nearby off-airport areas (e.g., wetlands, open water impoundments, taxicab lot, golf course, City Park, etc.) suspected of attracting hazardous birds that move across the AOA.

Use of this design provides a baseline estimate of bird species and numbers on the airport that can be compared with other airports and the same airport in the future. Data on species and numbers are collected from established observation points along a survey route. A survey is defined as one visit to all observation points along a survey route. A survey day consists of one or more independent (i.e., replicated) surveys conducted during one day.

In many cases, observation points in forested areas on airport property are less critical for identifying hazardous avian species yet important for the systematic or ancillary identification of mammals. Although forested areas can provide attractive perching/roosting locations for some hazardous avian species (e.g., raptors, blackbirds), woodland interior birds are usually of limited concern unless they frequent open habitats which will be surveyed. Data relating to forested areas may also be collected by general observations.

The number of observation points required to obtain adequate coverage of the sample area will depend on the size, complexity, and physical features of the airport. The combined area covered by observation points (about 50 ha/point) should exceed 10% of the airport land area.

To conduct a survey, an observer starts at one end of the survey route and stops the vehicle at each observation point. After turning off the motor and exiting the vehicle, the observer records the numbers and species of all birds heard at any distance and all birds detected visually (with or without binoculars) within a 0.4 km (1/4-mi.) radius (i.e., 50 ha), for a 3-minute period. During the survey, significant birds (e.g., a flock of geese; an endangered species) observed outside the 0.4 km (l/4-mi.) radii around observation points or outside the 3-minute periods (e.g., while driving between stops) should be noted on a separate data form and reported under general observations.

It also may be useful to develop a coding procedure on the data sheet (or a separate data sheet) to record birds observed actually on or over a runway during the 3-minute observation periods. By knowing the percent of total airport runway area covered by the 0.4 km (1/4 mi.) radius observation points, an estimate of the number of birds on or crossing the runways per hour could be estimated. For example, if 10 observation points on an airport survey route covered 25% of the runway area and you recorded an average of 1.5 birds per 3-minute observation on or over a runway, then you would estimate that the airport averaged 120 birds on or crossing runways per hour.

For the area within a 0.4 km (1/4 mi.) radius of each avian observation point, a visual estimate should be made of the proportion of each major habitat type [e.g., pavement, short < 20 cm) grass, tall grass (>20 cm), water, shrub]. It may be useful to analyze data for certain species by observation point to associate that species with a certain habitat type or location on the airport. For example, if waterfowl are consistently observed at one observation point that has aquatic habitat, this should be stated in the analysis and presentation of results.

b. General Observations. In addition to the standardized survey, it is important to make general wildlife observations in areas outside the survey points. These observations can provide important information on significant bird hazards and/or zero tolerance species (e.g., Canada geese) and issues (e.g., endangered species) not fully covered by a standardized survey. Observations of wildlife use and movements around and within structures and other unique areas of the airport environment that are not covered in the standardized bird survey should still be recorded. In addition, observation points also should be established at selected areas of high wildlife use within 8 km (5 mi.) of the airport such as reservoirs, roosting sites, feedlots, landfills, and other potentially attractive sites. The FAA has established an 8 km (5 mi.) radius around the airport as the major area of concern.

Additional analysis may also be performed. Each airport is different, and may require special analysis to document bird activity. For example, if a certain flocking species is present in large numbers, some analysis of mean flock size might be presented. If a large number of birds migrate through the airport area over a two-week period, a graphic presentation showing numbers at two week intervals instead of monthly or seasonal intervals might be appropriate. In addition, the general bird observations made outside of the standardized survey need to be incorporated. For example, tables might list the number of goose flocks recorded on the airport by month, the mean number of gulls seen per observation by month at a trash transfer facility approximately 3.2 km (2 mi.) from the airport, or the mean number of pigeons seen in a hangar per observation by season. Descriptive summaries might be included of general observations about flight patterns of a certain species over the airport or the habitat use by another species on the airport.

c. Data Recording. An example of the form used for data recording and is similar to the BBS is located in Appendix F and may be used to record survey data. This data form has standardized codes for weather and time. Encoding data will facilitate data analysis and entry into a database. The use of bird species codes is recommended. The American Ornithologists' Union (AOU) has established a standard four letter alphabetic code for most bird species (http://www.birdpop.org/alphacodes.htm). You may have to develop bird codes for special situations. For example, in some situations you may not always be able to identify gulls to species and need a code for unknown gull ("UNGU").

d. Data Analysis and Descriptive Statistics. Appropriate data analysis and interpretation will provide much of the information necessary to accurately assess

hazards and make management recommendations. Data will also serve as a baseline from which the effectiveness of management actions can be measured.

For each survey, the total birds observed per species and the number of observation points recording the species (frequency of sightings on the airport) should be calculated. The number of birds observed provides a measure of species density on the airport. The frequency of sightings at each location indicates the distribution of the species on the airport. Surveys can then be grouped to calculate mean number and frequency of birds (by species) seen per survey by time of day, month, and season.

If desired, statistical tests used to identify significant differences among months or seasons can be conducted using analysis of variance (ANOVA) and chi-square calculations.

e. Seasonal Patterns. Seasonal patterns or trends for species can be represented by graphing the mean number of birds and mean frequency of sightings per month or season as calculated above. The graph will provide a visual representation of obvious seasonal trends or patterns for each bird species observed in all habitat types (i.e., the entire airport). In many cases it will be useful to simplify presentations by combining species into groups/guilds (e.g., birds of prey, gulls, waterfowl) in these summary graphs, presenting the detailed data for individual species in a table or appendix.

f. Mammal Surveys. The collection of data pertaining to mammal populations is often time consuming and labor intensive. However, these data often are a necessary part of an Assessment and wildlife hazard analysis. Whether to collect data for all or for selected mammal species found on an airport depends on past and present wildlife hazards and the judgment of the Biologist. The Biologist should collect data related to identified and suspected hazardous mammal species, including ungulates, canids, and if necessary, rodents.

A number of survey designs developed for mammal species rely upon trapping and marking animals (e.g., mark-recapture studies). Mark-recapture studies are usually time consuming, labor intensive, and costly. Typically, the Biologist should consider a combination of data collection procedures that best identify a specific airport's hazardous species. Systematic vehicle surveys, tracking indices, catch-per-unit-effort survey, and spot mapping are commonly used techniques. Vehicle surveys should provide adequate data on large mammals such as ungulates, canids, and lagomorphs. Various tracking indices can be used to assess relative abundance or to aid in the identification of mammals beyond the scope of vehicle surveys which have varying degrees of success dependent on method (e.g.,., spotlight, night vision or Forward-Looking Infra-Red [FLIR]). Relative abundance data for small mammals are collected by catch-per-unit-effort sampling (snap traps). Data related to miscellaneous mammals (canids, ungulates, raccoons) can also be collected by spot mapping.

(1) Vehicle Surveys. Vehicle surveys at night using a spotlight, night vision equipment, or FLIR unit are performed along predetermined routes. The survey can be one continuous route around the airport or several routes covering different areas. Survey routes should include areas near runways and habitat types where ungulates, predators, or other target species are suspected or known to occur. Routes should sample a minimum of 10% of the total area. Aerial photographs, topographic maps, and maps that contain airport roadway systems can help in establishing survey routes. Preliminary examinations will be helpful to establish appropriate night time survey routes without excessive obstructions that limit viewing. Survey routes should be established carefully and remain constant throughout the study. Coordination with Air Traffic Control is essential during spotlight surveys to ensure no aircraft are in the AOA or traffic pattern in the line of spotlight beams. Additionally, spotlight surveys should ideally be scheduled at times when aircraft operations are limited or not present. **Spotlights must not be pointed at aircraft, other vehicles or the airport tower**. At a minimum, the survey must be conducted at least one time per month for the duration of the study.

Observations may be performed starting one half hour after sunset and ending after two to three hours or delayed, dependent on times of limited scheduled aircraft operations. In general, the survey route(s) are run only once per night although multiple runs can be made if time permits. All mammals and birds observed should be recorded by species and location. The start and end time of each survey and total distance driven should be recorded so that numbers seen per hour and distance can be calculated. Wildlife surveys should be conducted in most types of weather according to schedule, but it may sometimes be necessary to postpone survey periods during severe weather. Surveys should not be conducted in excessive wind or heavy rain as mammal activity may be significantly affected by weather.

(2) Catch-Per-Unit-Effort (small mammals). Small mammal populations may be measured if birds of prey or mammalian predators occur in the strike record. As a general guideline, transects with 50 traps each should be placed in at least four habitats or locations on the airport. Each transect should have 50 traps placed at 10-m intervals in one line or 25 traps each in two parallel lines 30 m apart. Traps are set in daylight hours and checked 24 hours later. Transects should be run for two to four consecutive nights in spring and again in autumn.

When checking traps, the following data should be collected for each trap: status of trap (sprung or unsprung) and species, if any, captured. Trapping results are recorded, by species, as the number of animals caught per 100 adjusted trap nights.

(3) Spot Mapping. Spot mapping consists of plotting on a grid map the location, date, and time of mammal observations and provides a general overview of mammal activity on the airport. Often, airport operations officers, who are required to perform runway sweeps, can assist in collection of this data as can pilots or other airport personnel. Additionally, mammal observations made while performing designated bird and mammal surveys can be mapped and used to augment spot observations.

2.7. BASIC HABITAT SURVEYS FOR WILDLIFE HAZARD ASSESSMENTS. Habitat evaluation is an essential part of an Assessment, and is required by 14 CFR Part 139.337 (c) (3). Many natural and artificial habitats are attractive to wildlife, and evaluation of these should provide the Biologist with information about the quantity, quality, and seasonal nature of their use. Wildlife exploit these habitats for food, water or cover, which may vary seasonally and/or throughout an animal's life cycle. Although they may be considered either a direct or indirect attractant[3], it remains essential for safe air traffic operations to fully understand their influence.

Land-use practices that attract or sustain hazardous wildlife populations on or near airports, specifically those listed in AC No: 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* Section 2 can significantly increase the potential for wildlife strikes. FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA).

The FAA recommends the minimum separation criteria outlined in AC No: 150/5200-33B Section 1 for land-use practices that attract hazardous wildlife to the vicinity of airports. This separation criterion provides predetermined boundaries of concern around airports to be considered while conducting comprehensive, detailed studies and evaluations of wildlife populations and attractants.

a. Pre-existing Habitat Data. Pre-existing habitat inventory and geospatial information can prove useful regarding soils, vegetative species, topography, geography, habitat type, location and size. This data may be found in various locations or with various agencies such as:

(1) Airport Layout Plan

(2) Airport Master Plan

(3) Airport Environmental Assessment

(4) Airport Environmental Impact Statement

(5) U.S. Fish and Wildlife Service

(6) U.S. Geological Survey

(7) U.S. Army Corps of Engineers

(8) USDA – Natural Resources Conservation Service

(9) Department of Natural Resources (state)

(10) Department of Transportation (state)

[3] Direct attractants (i.e., favorable vegetation for foraging) or indirect attractants (e.g., brushy vegetation may result in increased rodent populations which attracts hazardous raptors) can create equally hazardous environment for safe air operations.

b. Descriptive Habitat Data. A general description of the study area needs to be included within the Assessment. This should describe natural and artificial attractants both on-site and off-site within the separation criteria defined in AC No: 150/5200-33B Section 1.

(1) Natural[4] Habitat Data. This may include characteristics such as geographic location, topography, soils, climate, vegetation, agriculture, and wetlands/water features (drainages, ponds, lakes, rivers, and water impoundments).

(2) Artificial[5] Environment Data. This may include items such as airport buildings, jet bridges, towers, antennas, runways, taxiways, ramp, hangars, waste disposal operations and waste containers)..

c. Food. Naturally occurring wildlife foods such as insect and other invertebrate populations should be noted with descriptions, time of year, weather conditions, and environmental factors such as soil type, vegetative cover, and drainage conditions. In addition, management practices that enhance the production of these natural foods should be documented. An evaluation of small mammal populations as a food source for predators can be addressed in the sampling strategy discussed previously.

Plant seeds, fruits, and berries are other food attractants on airports for birds and mammals. Seasonal wildlife hazards may develop when seeds or fruits are abundant. Documentation of these food sources is an important component of the habitat analysis.

Review environments within 3,048 m (10,000 ft.) radius of the airport, and record food sources that attract wildlife. Agricultural fields, grain elevators, food product industries, fast food restaurants, livestock operations, wildlife refuges and sanctuaries, and waste handling facilities may attract significant numbers of birds and/or mammals, increasing the hazard to human safety and aircraft. A Wildlife Hazard Assessment should contain information relative to these sites such as the names and locations, and a description of the attractant and the potential hazard.

d. Vegetation. Vegetation and cover requirements vary by species and time of year. Relationships between wildlife species and cover types provide information necessary to develop appropriate wildlife management strategies. In reviewing

---

[4] Natural habitat is defined for this purpose as biotic habitats including vegetation (e.g., grass, forest, shrub scrub, wetland, agriculture, desert, etc.) and water features (e.g., ponds, rivers, lakes, marine, retention/detention ponds, drainages, etc.).

[5] Artificial environment is defined for this purpose as man-made features (e.g., buildings, structures, towers, paved/hard surfaces, waste disposal operations, waste containers, etc.).

vegetative areas on an airport, it is important to record observations of species, management practices, seasonal growth, density, percent cover, and any noted wildlife associations. Use of specific areas by animals in the airport environment may assist the observer in identifying vegetative attractants.

e. Water. Water sources are wildlife attractants, especially fresh water sources in coastal areas. Reservoirs, streams, ponds, drainage basins, seep areas, and ephemeral water sources should be identified and mapped. Gulls, waterfowl, shorebirds, and marsh birds may be attracted to the airport because of abundant food or drinking and resting sites available in existing water resources.

f. Structures. Buildings, areas adjacent to buildings, and equipment on airports are readily used by some wildlife species, such as European starlings, pigeons, gulls, sparrows, crows, raptors, mice, rats, skunks, and woodchucks. Wildlife use of structures can present threats to human safety and aircraft, and may cause unsanitary working conditions or damage to structures.

The reasons for use of most structural features by wildlife are usually easily determined, while others are less obvious. For example, feral pigeons may loaf on just one ledge of a particular building because it provides shelter from the wind or protection from predators. The Qualified Airport Wildlife Biologist should determine what features are attractive to problem species, and why. A strategy can then be developed to reduce or eliminate the problem.

g. Soil. The type(s) and fertility of soils present on an airport is a general indicator of biological productivity. Habitat quality is directly related to soil fertility and other soil conditions. The nutritive value, quantity, and attractiveness of plant and animal food organisms varies widely with soil types and conditions. For example, sandy, well-drained soils that dry quickly after rainfall generally produce less biomass and are less likely to harbor an abundant population of earthworms and other invertebrates.

Identification and documentation of soil types and conditions on the airport and vicinity should be an integral part of an overall assessment or study. In most states, information on soil types and conditions can be acquired from soil survey publications available from the USDA Natural Resource Conservation Service (NRCS) or the Cooperative Extension Service. These publications contain soil maps and descriptions, formations, morphology and soil classifications. However, on airports where large scale soil disturbance, such as grading, leveling, and filling, have been conducted, soil maps may be of limited value.

h. Spot Mapping. Because attractants may vary seasonally and following precipitation, spot mapping the location and date of features such as fruit and seed bearing vegetation, ephemeral pools and temporary ponding of water or puddles throughout the AOA will help identify food sources, drainage problems and grade deficiencies.

2.8. Basic Assessment of Airport and Aircraft Operations. Assessment of airport and aircraft operational procedures is an essential part of an Assessment. Hazardous wildlife only presents a risk to aviation if aircraft and wildlife occupy the airspace or movement areas at the same time and location. Persons conducting Assessments must also gather general observation data and other information related to airport and aircraft operations regarding wildlife hazards. Biologists should monitor NOTAMs, ATIS advisories, and published Airport/Facilities Directory information to ensure specific information and not a blanket advisory is issued. Assessment of ATC's involvement in identifying potential hazards as observed or relayed by pilots or airport operations personnel should include determination that wildlife dispersal is coordinated with ATC such that hazards are not inadvertently increased by dispersing wildlife into the path of aircraft movements. ATC must provide wildlife control teams access to movement areas of the airfield, but also communicate with them during the implementation of mitigation measures to ensure dispersal paths are observed and de-conflicted with aircraft movements.

Biologists should also query users of the airport for their inputs on wildlife observed on and around the airport. For example, pilots should be interviewed about their experience in the local area as they have a perspective not available to ground-based personnel. Congregations of towering raptors or gulls over off-airport facilities such as landfills and food-processing plants are often detected this way as are major roost sites of blackbirds, starlings, vultures, or crows. Time should be dedicated to visit the pilots' lounge or to visit the local airline representative/facility agent for informal interviews. Fixed-base operators (FBO's) should also be visited and personnel interviewed for their experience with hazardous wildlife in the local area. Pilots, especially those operating non-commercial or private aircraft, must be aware that they have the discretion to delay takeoffs or departures, ask for wildlife dispersal action, or requires alternate runways, departure .or approach paths to avoid identified hazards.

Airline and private maintenance personnel should similarly be interviewed for their perspective on local hazardous wildlife and their reporting procedures when strikes are detected on post-or pre-flight inspections of aircraft.

Other airport users must also be interviewed and included in the Assessment process. Aircraft Rescue and Fire Fighting (ARFF) and Airport Security Personnel are always present on airports during operations and have a unique view of the airfield. They must also be notified should major dispersal operations be conducted, such as with pyrotechnics, where the slight chance for grass fires or security concerns are present.

SECTION 3.

PROTOCOL FOR THE PREPARATION OF A WILDLIFE HAZARD MANAGEMENT PLAN (PLAN)

3.1. INTRODUCTION. When complete, the Assessment is submitted by the airport to the FAA for review and approval. The FAA will also use it to determine if the airport must do a Wildlife Hazard Management Plan. In reaching this decision, the FAA will consider the Assessment, the aeronautical activity at the airport, the views of the certificate holder and airport users, and any other pertinent information (14 CFR 139.337 (d)(1–6)).

The goal of an airport's Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport. The Plan accomplishes this through the identification of hazardous wildlife and their attractants, suitable proactive and reactive management techniques, necessary resources and supplies to successfully implement a wildlife hazard management program and personnel responsibilities and training requirements. Appropriate federal, state and possible local wildlife control permits should be identified as well as a schedule and methodology to evaluate and update the Plan.

3.2 WILDLIFE HAZARD MANAGEMENT PLAN REGULATORY REQUIREMENTS AND METHODOLOGY. 14 CFR 139.337 (f)(1–7) provides specific guidance as to what facts must be addressed in a Plan.

a. ***14 CFR 139.337 (f)(1). "A list of the individuals having authority and responsibility for implementing each aspect of the plan."*** This list shall assign or delegate specific responsibilities for various sections of the Plan to various airport departments and other interested federal, state or local agencies, such as:

(1) Airport Director

(2) Operations Dept.

(3) Maintenance Dept.

(4) Security Dept.

(5) Planning Dept.

(6) Finance Dept.

(7) Wildlife Coordinator

(8) Wildlife Hazards Working Group

(9) Air Traffic Control

(10) Airlines

(11) Pilots

(12) Fixed-base Operators

(13) Air-side tenants

(14) Land-side tenants

(15) State Wildlife Agency

(16) Local law enforcement authorities

(17) U.S. Fish and Wildlife Service

b. ***14 CFR 139.337 (f)(2). "A list prioritizing the following actions identified in the ASSESSMENT and target dates for their initiation and completion."*** The Plan should provide a prioritized list of problem wildlife populations and wildlife attractants (food, cover, and water) identified in the Assessment, proposed mitigation actions, and target starting and completion dates. A list of completed wildlife population management projects and habitat modification projects designed to reduce the wildlife strike potential can be included to provide a history of work already accomplished. It is helpful to group attractants by areas and ownership.

AIRPORT PROPERTY	**NON-AIRPORT PROPERTY**
Air Operations Area (AOA)	Within 2 miles of AOA
Within 2 miles of AOA	Within 5 miles of AOA
Airport structures	

Wildlife mitigation techniques at commercial airports involve integrated and systematic methodologies that typically progress (based on necessity) from proactive measures to reactive measures. The reduction of wildlife threats at an airport is often the unintended or secondary consequence of ongoing habitat management such as mowing, tree removal, drainage reparations, out-of-grade surface restoration and the establishment or maintenance of perimeter fencing.

(1) ***14 CFR 139.337 (f)(2)(i). Wildlife population management.*** Address species-specific population management plans (e.g., deer, gulls, geese, and coyotes). The progression of techniques employed to mitigate hazardous species include habitat modification and resource protection, exclusion devices, repellent / harassment measures, and removal.

(a) Habitat Management
(b) Exclusion (fencing, netting, anti-perch/ nesting devices)
(c) Repellents (chemical, audio, visual)
(d) Harassment (pyrotechnics, falconry, dogs, radio-controlled models, etc.)
(e) Capture (chemical, live traps, lethal traps)
(f) Toxicants (oral and contact); Fumigants
(g) Shooting

When applicable, airports should identify resident or seasonal "zero-tolerance[6]" hazardous species based on historical strike records or recognized threat posed by such species at the facility. The ranking of hazard level for birds and terrestrial mammals in Table 1 should also be considered when an airport determines zero-tolerance species and subsequent management protocols. Ungulates (i.e., deer, elk), canids (i.e., coyotes, domestic dogs) and certain avian species (i.e., Canada geese, snow geese) are universal candidates for zero-tolerance management protocols but other hazardous species may require conditional zero-tolerance management. Flocking birds such as European starlings and gulls pose a significant and increasing hazard to aircraft as flock size increases. Therefore, an airport may choose to require zero-tolerance management protocol for these (or similar) species only when an unacceptable flock size has been reached. Determination of action based on flock size is often difficult and requires experienced consideration of variables such as hazard relative to species, airport operation type, and current aircraft activity.

(2) ***14 CFR 139.337 (f)(2)(ii). Habitat modification.*** Address natural and artificial habitats that may provide a food, water or cover source to hazardous species to reduce their attractiveness. Advisory Circular 150/ 5200-33B (AC-33B) *Hazardous Wildlife Attractants On or Near the Airport* provides in-depth discussion on acceptable/unacceptable habitats and land-use practices on and near airports. Management of the vegetative/prey food items for hazardous species is often season or weather related and may include rodent control, garbage storage, landscaping, and management of standing water.

(a) Vegetative/prey food items for hazardous species
- **(i)** Prey items (rodents, earthworms, insects)
- **(ii)** Vegetative food items (grain/seeds, fruit, desirable grasses)
- **(iii)** Garbage (handling, storage)
- **(iv)** Handouts (feeding wildlife)

(b) Vegetation management may include:
- **(i)** AOA vegetation
- **(ii)** Drainage ditch vegetation
- **(iii)** Landscaping
- **(iv)** Agriculture

(c) Water management may include:
- **(i)** Permanent Water
- **(ii)** Wetlands

[6] Zero-tolerance designation in the airport environment denotes wildlife species that represent an unacceptable high risk to safe aircraft operations. Their presence in the airport environment cannot be tolerated and warrants immediate management action to remove them from the AOA using appropriate techniques (i.e., harassment, lethal take, capture/ relocate, etc.).

(iii) Canals / ditches / streams
(iv) Holding ponds
(v) Sewage (glycol) treatment ponds
(vi) Ephemeral water
(vii) Runways, taxiways, aprons
(viii) Other wet areas

(d) Airport buildings may include:

(i) Airfield structures
(ii) Abandoned structures
(iii) Terminal
(iv) Airport construction
(v) Leased facilities

(3) ***14 CFR 139.337 (f)(2)(iii). Land use changes.*** Eliminate agricultural activities and standing water on the airport. When feasible, off-site attractants within the defined separation criteria such as agricultural activities, waste handling facilities that are not fully enclosed, surface mining, urban development, wildlife refuges and storm water management systems should be eliminated as well. See Advisory Circular 150/ 5200-33B for an in-depth discussion on acceptable/ unacceptable land-use practices on and near airports.

c. ***14 CFR 139.337 (f) (3). "Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits."*** Certain species of wildlife are protected at all levels of government—local, state, and federal. Address the specific species involved and their legal status in this section. Describe the wildlife management permitting requirements and procedures for all levels of government having jurisdiction.

(1) Federal (50 CFR, Parts 1 to 199)

(2) State (Fish and Game Code - or equivalent)

(3) City and County ordinances

(4) If pesticides are to be used, the following are also needed:

(a) Pesticide-use regulations and licensing requirements
(b) Federal regulations and licensing: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
(c) State regulations and licensing (varies by state)

For the purpose of the Plan, summaries are generally adequate. It is not necessary to quote chapter and verse of federal, state, and local laws and regulations.

d. ***14 CFR 139.337 (f) (4). "Identification of resources that the certificate holder will provide to implement the plan."*** Provide information identifying what resources the airport will supply in terms of personnel, time, equipment (e.g., radios, vehicles, guns, traps, propane cannons, etc.), supplies (e.g., pyrotechnics), pesticides (restricted/non-restricted use) and application equipment and supply sources for equipment and supplies.

e. ***14 CFR 139.337 (f) (5) "Procedures to be followed during air carrier operations that at a minimum includes—"***

(1) ***14 CFR 139.337 (f) (5) (i) "Designation of personnel responsible for implementing the procedures."*** This section corresponds with the aforementioned 14 CFR 139.337 (f)(1) and describes who is required for successful mitigation of wildlife hazards in the airport environment.

- **(a)** Wildlife Control Personnel
- **(b)** Wildlife Coordinator
- **(c)** Operations Dept.
- **(d)** Maintenance Dept.
- **(e)** Security Dept.
- **(f)** Air Traffic Control
- **(g)** Pilots
- **(h)** Airlines
- **(i)** Fixed-base Operators
- **(j)** Airside/landside tenants

(2) ***14 CFR 139.337 (f) (5) (ii) "Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin."*** This section provides a description of known or anticipated locations that should be monitored for successful mitigation of wildlife hazards in the airport environment.

- **(a)** Runway, taxiway
- **(b)** AOA
- **(c)** Perimeter fence
- **(d)** Other areas attractive to wildlife

(3) ***14 CFR 139.337 (f) (5) (iii) "Wildlife hazard control measures."*** This section corresponds to the aforementioned 14 CFR 139.337 (f)(2)(i) and details current or anticipated techniques that may be implemented for successful mitigation of wildlife hazards in the airport environment. Techniques discussed in this section typically represent an integrated approach and include exclusion, repellent, harassment, capture, lethal control or even relocation measures in specific instances. In addition, operational control measures such as scheduling of flights, air traffic control advisories, Pilot Reports (PIREPS), UNICOM advisories, avoidance procedures, delayed takeoffs and approaches, use of alternate runways or traffic direction, must be considered.

(4) ***14 CFR 139.337 (f) (5) (iv) "Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower."*** This section provides a description of regulated and site-specific protocols for the communication and/ or notification of wildlife control activities, identified and current wildlife hazards on or near the airport environment or imminent wildlife threats to aircraft operations on or near the airport. Protocols may include training in airport communication and the development of notification procedures for airport personnel and Air Traffic Control when wildlife control

procedures are implemented or in response to immediate wildlife threats to safe air operations to ensure dispersal activities do not inadvertently increase wildlife hazards. Communication and/ or notification procedures within the Plan should recognize pilot reports and ATC advisories and establish responsibilities for reporting wildlife strikes. This section may also provide equipment requirements that include radios, cellular phones, and lights and an official call list with numbers.

f. 14 CFR 139.337 (f) (6) "*Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in paragraphs (b)(1), (b)(2), and (b)(3) of this section," including:* At a minimum, the Plan should be reviewed once annually and anytime a triggering event occurs as defined in 139.337(b)(1–3). The review(s) should include representatives from all airport departments involved in wildlife hazard management efforts and the Biologist who did the original Assessment. It is often helpful for the airport manager to appoint a Wildlife Hazards Working Group that periodically reviews the airport's Plan and the plan's implementation to make recommendations for further refinements or modifications.

(1) ***14 CFR 139.337 (f) (6) (i) "The plans effectiveness in dealing with known wildlife hazards on and in the airport's vicinity and:"*** Input should be provided from all airport departments, Air Traffic Control, and the Biologist as to the effectiveness of the Plan. Good records are necessary to properly evaluate the effectiveness of a program.

(2) ***14 CFR 139.337 (f) (6) (ii) "Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated."*** For example—

- **(a)** Number of times wildlife seen on AOA
- **(b)** Requests for wildlife dispersal from air traffic control, pilots, or others
- **(c)** Increased number of strikes

Regulations 14 CFR 139.337 (f) (6) (i) and (ii) cannot be effectively implemented or evaluated without documentation of wildlife strikes. The effectiveness of a Plan to reduce wildlife hazards both on and near an airport and the reevaluation of all facets of damaging/nondamaging strikes from year to year requires accurate and consistent reporting. Therefore, every Plan should include a commitment to document all wildlife strikes that occur within the separation distances described in sections 1-2 and 1-3 of Advisory Circular 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* to better identify, understand and reduce threats to safe aviation.

g. *14 CFR 139.337 Comments (f) (7) "A training program conducted by a Qualified Airport Wildlife Biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan required by paragraph (d) of this section."* Recurrent training requirements as described in 14 CFR 139.303 should equip personnel actively involved in an airports wildlife hazard management program with sufficient resources needed to

comply with the requirements in their Airport Certification Manual and the requirements of 14 CFR 139.337. Personnel identified in 14 CFR 139.337 (f) (5) (i) should be considered for inclusion within this recurrent training. Pesticide user training and certification requires its own regulated training and certification schedule and should be closely followed.

3.3. FEDERAL AND STATE-LISTED THREATENED AND ENDANGERED SPECIES, AND SPECIES OF SPECIAL CONCERN. The Endangered Species Act (ESA) directs all Federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. This section also describes procedures for responding to requests by state wildlife agencies to facilitate and encourage habitats for state-listed threatened and endangered species or species of special concern that occur on airports and may pose a threat to aviation safety.

The FAA's action in requiring an airport operator to develop, submit for approval, and implement a Plan is considered a Federal action, as defined in the Endangered Species Act, and therefore, subject to section 7 consultation with the U.S. Fish and Wildlife Service (USFWS).

a. Procedures for Federal Threatened and Endangered Species on Airports. Section 7 of the ESA, as amended, applies to Federal agency actions and sets forth requirements for consultation to determine if the proposed action "may affect" an endangered or threatened species. If an agency determines that an action "may affect" a threatened or endangered species, then Section 7(a)(2) requires each agency, generally the lead agency, to consult with the USFWS or the National Marine Fisheries Service (NMFS), as appropriate, to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any Federally listed endangered or threatened species or result in the destruction or adverse modification of critical habitat. (The effects on fish, wildlife, and plants include the destruction or alteration of habitat and the disturbance or elimination of fish, wildlife, or plant populations.) If the Secretary of the Interior has developed a recovery plan for an affected species pursuant to section 4(f) of the ESA, that plan should be reviewed by FAA NEPA practitioners to ensure that assessments of impacts from FAA actions consider the management actions and criteria for measuring recovery identified in the plan. If a species has been proposed for Federal listing as threatened or endangered, or a critical habitat has been proposed, section 7(a) (4) states that each agency shall confer with the Services. Refer to the FWS and NMFS *"Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act,"* March 1998.

Section 9 prohibits a Federal agency from taking, without an incidental take permit, any endangered species. Where a conservation plan has been developed pursuant to a section 10 permit (incidental take permit), the FAA NEPA practitioner should

ensure that the impact analysis contained in the NEPA document for the affected species is consistent with the predicted impacts described in the conservation plan. Under the Magnuson-Stevens Act, Federal agencies must consult with the NMFS with regard to any action authorized, funded, or undertaken that may adversely affect any essential fish habitat identified under the Act. The consultation procedures are generally similar to ESA consultation requirements.

Under Title 14, Code of Federal Regulations, part 139.337(e), the FAA may direct an airport operator to develop a Wildlife Hazard Management Plan or to update an existing plan. In these instances, the airport operator shall contact and request information from the local USFWS Ecological Services Field Office regarding the presence of Federally-listed or proposed species or designated or proposed critical habitat occurring on or near the airport.

(1) No Further Coordination is Required.

If the USFWS indicates there are no Federally-listed or proposed species or designated or proposed critical habitat occurring on or near the airport, no further action is required regarding the section 7 consultation.

(2) Further Coordination is Required.

If the USFWS indicates that Federally-listed or proposed species or designated or proposed critical habitat occur on or near the airport, the following additional actions must be taken.

(a) The airport operator shall take this information into consideration when developing its Wildlife Hazard Management Plan.

(i) The airport operator must prepare a Biological Assessment (50 CFR 402.13) assessing the effects of the Wildlife Hazard Management Plan on the Federally-listed or proposed species or designated or proposed critical habitat. The Biological Assessment must be submitted to FAA along with the draft plan.

(ii) The airport operator may request early consultation if it has reasons to believe some of the actions proposed under the Wildlife Hazard Management Plan may affect federally-listed or proposed species or designated or proposed critical habitat.

(b) When the plan is submitted to the FAA for review and approval, the FAA Regional Coordinator must contact the local USFWS Ecological Services Field Office responsible for section 7 consultations and request consultation on the plan.

(c) The section-7 consultation must be completed before the Wildlife Hazard

Management Plan is given final FAA approval and returned to the airport operator for inclusion in its Airport Certification Manual and implementation.

(d) The signature level for both letters is at the discretion of the FAA Regional Office.

b. Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports. The airport's AOA is an artificial environment that has been created and maintained for aircraft operations. Because an AOA can be markedly different from the surrounding native landscapes, it may attract wildlife species that do not normally occur, or that occur only in low numbers in the area. Some of the grassland species attracted to an airport's AOA are at the edge of their natural ranges, but are attracted to habitat features found in the airport environment. Also, some wildlife species may occur on the airport in higher numbers than occur naturally in the region because the airport offers habitat features the species prefer. Some of these wildlife species are State-listed threatened and endangered species or have been designated by State resource agencies as species of special concern.

Many State wildlife agencies have requested that airport operators facilitate and encourage habitat on airports for state-listed threatened and endangered species or species of special concern. State-Listed threatened and endangered species and species of special interest are not afforded the level of protection of federally-listed species. These species, or the habitat needed to support them should not be allowed on airport property if direct or associated hazards are caused by their promotion in the airfield environment. Managing the on-airport environment to facilitate or encourage the presence of hazardous wildlife species can create conditions that are incompatible with, or pose a threat to, aviation safety.

3.4. NATIONAL ENVIRONMENTAL POLICY ACT REVIEW. The FAA's approval of a draft Plan is covered by the categorical exclusion in FAA Order 1050.1E, paragraph 308e. Before the FAA approves a draft Plan, the FAA must determine whether or not the draft involves extraordinary circumstances (see FAA Order 1050.1E, paragraphs 303c and 304).

a. If a draft does not involve extraordinary circumstances, the FAA may categorically exclude the Plan under FAA Order 1050.1E, paragraph 308e.

b. If a draft involves extraordinary circumstances, the FAA may require the airport sponsor to prepare an Environmental Assessment, or the FAA may prepare an Environmental Impact Statement.

Once a draft Plan is approved, the plan is returned to the airport sponsor for inclusion in the airport's Airport Certification Manual and is enforceable.

DRAFT

SECTION 4.

PROTOCOL FOR CONTINUAL MONITORING

4.1. INTRODUCTION. Upon completion and approval of an Assessment and Plan, certificate holders should consider implementing a continual monitoring program for wildlife hazards. Recurrent wildlife monitoring would be outlined in the certificate holder's Plan and ACM. The goal of systematic, long-term wildlife hazard monitoring in an airport environment is to identify changes to wildlife composition, numbers, attractants, travel corridors and the general airport environment in a timely manner that can affect the presence or behavior of wildlife. Continual monitoring would enhance safety because it allows the airport operator to regularly determine trends in wildlife fluctuations and target mitigation practices to reduce the possibility of strikes. The certificate holder can use this information to quickly and efficiently implement mitigation techniques and evaluate the efficacy of its mitigation program. Ultimately, the frequent hazard identification and adaptable mitigation would reduce the likelihood of wildlife strikes. Additionally, continual monitoring should decrease the time, effort, personnel hours, and money spent on mitigation because hazards would be identified before they pose a high risk.

In contrast to an assessment or inventory of wildlife hazards in an airport environment, a monitoring program over time assesses changes and trends of the resources. Consideration should be given to data points and techniques tested and incorporated into an airport's Assessment for use in its long term monitoring protocol. Ultimately, the techniques used for long term monitoring may change over time dependent on the airports goals/ management objectives, personnel changes, availability of improved methodologies/ equipment or recommendations based on systematic evaluation of the monitoring program.

4.2 CONTINUAL MONITORING PROTOCOL. The monitoring should consist of monthly wildlife surveys and identification of significant changes to natural/ artificial habitats and other attractants. This monitoring would best be conducted by a Qualified Airport Wildlife Biologist.

a. Avian Surveys.

(1) Twelve months data collection

(2) Minimum one survey/ month for each of the survey points during the diurnal periods of morning, midday and evening; unless the Assessment, strike records or monitoring data justifies the elimination of a survey time period (i.e., elimination of midday surveys for example)[7].

b. Mammalian Surveys.

[7] It may be beneficial to increase avian surveys during spring and fall migrations.

(1) Twelve months data collection.

(2) Airports that have documented hazardous terrestrial mammals (i.e., deer, canids) should conduct a minimum of one survey/ month. Airports without recognized terrestrial mammal hazards should conduct a minimum of quarterly surveys throughout the year.

c. Monitoring of Airport Procedures. Monitoring of airport procedures should include:

(1) ATC and airport "event logs" or wildlife management, patrol, monitoring logs

(2) Wildlife/aircraft strike reports

(3) Federal/State Depredation Permit use; Special Permit use (e.g., Eagle Disturbance or Nest Removal Permits)

4.3 CONTINUAL MONITORING ANNUAL REPORT. As part of a continual monitoring program, a certificate holder may choose to prepare an annual report to best evaluate the efficacy of its wildlife mitigation program summarizing:

(1) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences

(2) Identification and location of features on and near the airport that attract wildlife

(3) Description of wildlife hazards to air carrier operations

(4) Description of wildlife strikes during the year

(5) Discussion of any significant modifications on or near the airport property

(6) Summary of ATC and airport "event logs" or wildlife management, patrol, monitoring logs

(7) Summary of Federal/State Depredation Permit use; Special Permit use (e.g., Eagle Disturbance or Nest Removal Permits)

DRAFT

APPENDIX A: Airport Wildlife Hazard Site Visit Checklist

Wildlife Hazard Site Visits must be conducted by a Qualified Airport Wildlife Biologist to provide an airport a quick analysis and actionable information concerning wildlife hazards that allows the airport to expedite the mitigation of these hazards. A Site visit can be used to investigate a triggering event or other significant event and determine whether an existing Plan adequately addresses the incident and if applicable, the necessity of an Assessment.

During the Site visit, the Qualified Airport Wildlife Biologist collects and compiles information on the airport's wildlife hazard history, documented and suspected wildlife hazards, habitat attractants, control activities, airport operations procedures, communications of hazards through ATC and pilots, aircraft operations and scheduling. A Site visit is typically conducted over a period of one to three days during which a Qualified Airport Wildlife Biologist evaluates the habitat on and surrounding the airport and records direct or indirect wildlife observations; and reviews the current Plan, current wildlife management activities and airport wildlife strike data.
The following is a Checklist that can be utilized to insure a complete and detailed site visit. The checklist can also be used to review the site visit protocol and report.

The following is a Checklist that can be utilized to insure a complete and detailed Site visit. The checklist can also be used to review the Site visit protocol and report.

DRAFT

Airport Wildlife Hazard Site Visit Checklist

Airport Name:		
Date of Site Visit:		**Time:**
Airport Representative:		
Qualified Airport Wildlife Biologist:		
	Yes/No	**Comments/Observations**
Information review		
Personnel and departments responsible for airport ops		
Type of airport/annual movements		
Recent improvements		
Strike records (in database or airport records)		
Depredation permits		
Review of habitat management activities		
Mowing		
Clearing ditches of vegetation		
Tree removal		
Other		
Review wildlife management activities		
Pyrotechnics		
Fencing		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Review Plan (if applicable)		
Observe features on airport property that may attract wildlife		
Wetlands		
Ditches		
Stormwater Treatment Areas		
Forested/Shrub Areas		
Abandoned Structures		
Construction Sites/Debris		

DRAFT

Airport Wildlife Hazard Site Visit Checklist (page 2)

Observe features adjacent to airport property that may attract wildlife (5,000 ft 10,000 ft 5 miles)		
Wetlands		
Agriculture		
Forested/Shrub Areas		
Golf Courses		
Other		
Observe and identify wildlife species and/or sign		
List all wildlife observed		Please list on separate data sheet
List all wildlife sign observed		Please list on separate data sheet
State and/or Federally Listed Species		
Site Visit Report		
General airport information		
Strike data analysis		
List of bird/mammal species observed and times of observations		
State and federal status of species		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on or near airport and observations		
Recommended actions* for reducing identified wildlife hazards to air carrier operations		
Recommendation regarding whether a 12-month wildlife hazards assessment is necessary		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed
- Keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

DRAFT

APPENDIX B: Airport Wildlife Hazard Assessment and Report Checklist

A Wildlife Hazard Assessment (Assessment) is a 12-month assessment of wildlife and wildlife attractants on or near an airport. An Assessment provides the baseline data and understanding of wildlife hazards and trends for preparing a Wildlife Hazard Management Plan (Plan).

The following is a Checklist that can be utilized to insure a complete and detailed Assessment. The checklist can also be used to review the Assessment protocol and report.

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist

Airport Name:
Airport Representative:
Qualified Airport Wildlife Biologist:
Assessment Dates (Initiation/Completion):
Assessment Report – Date Completed:
Assessment Report – Date Approved by FAA:

	Yes/No	Comments/Observations
ASSESSMENT CHECKLIST		
Analysis of the event or circumstances that prompted the assessment (14 CFR 139.337 (c)(1))		
General Airport Information Review		
Personnel and departments responsible for airport ops		
Type of airport/annual movements		
Recent improvements		
Strike records (in database or airport records)		
Depredation permits		
Wildlife hazard management plan (if applicable)		

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist (page 2)

Review of Habitat Management Activities	Yes/No	Comments/Observations
Mowing		
Drainage maintenance/clearing		
Tree removal		
Other		
Review of Wildlife Management Activities		
Harassment		
Exclusion		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Identification and location of features on airport that attract wildlife (14 CFR 139.337 (c)(3))		
Wetlands		
Drainages		
Agriculture		
Water impoundments/ponds/streams/marine		
Forested/Shrub Areas		
Structures/towers/antennas		
Construction Sites/Debris		

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist (page 3)

Identification and location of features near airport (within 5 miles) that attract wildlife (14 CFR 139.337 (c)(3))	**Yes/No**	**Comments/Observations**
Wetlands		
Ditches		
Agriculture		
Water impoundments/ponds/streams/marine		
Landfill		
Forested/Shrub Areas		
Golf Courses		
Other		
Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences (14 CFR 139.337 (c)(2))		
Assessment = Minimum of 12 consecutive months		
Locate standardized observation points on airport (observation points off airport are optional) to adequately observe wildlife and their movements on all parts of AOA.		
Point count surveys conducted morning, midday and evening		
Avian surveys conducted a minimum of twice monthly		
Mammal surveys conducted a minimum of once monthly		

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist (page 4)

	Yes/No	Comments/Observations
Record results of point count surveys and all general wildlife observations (including wildlife sign)		
Small mammal trapping (optional)		
Record presence of state and/or federally listed species		
REPORT SECTION-(Assessment Report <u>must</u> have a **Methods**, **Results** and **Recommendations** section to provide required information)		
Executive summary and qualified airport wildlife biologist qualifications (recommended)		
Analysis of the event or circumstances that prompted the study (14 CFR 139.337 (c)(1))		
General airport information (refer to General Airport Information Review section at beginning of appendix)		
Strike data spreadsheet		
Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences (14 CFR 139.337 (c)(2))		
Description of avian and mammal survey methodologies (minimum survey methodologies described above)		
List and description of bird/mammal species observed		
State and federal status of species		

DRAFT

Airport Wildlife Hazard Assessment and Report Checklist (page 5)

Map of airport with location of observation points		
Identification and location of features on and near the airport that attract wildlife (14 CFR 139.337 (c)(3))		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on airport property		
Map of airport with location of wildlife attractants near airport (within 5,000 ft, 10,000 ft, and 5 miles).		
Description of the wildlife hazards to air carrier operations (14 CFR 139.337 (c)(4))		
List the wildlife hazards that have been observed that are unique to this airport		
Recommended actions for reducing identified wildlife hazards to air carrier operations (14 CFR 139.337 (c)(5))		
List of prioritized recommendations* that are unique to this airport (is a Section 7 Consultation required based on these recommendations?)		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed
- Keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

DRAFT

APPENDIX C: Airport Wildlife Hazard Management Plan Checklist

A Wildlife Hazard Management Plan (Plan) is a document that is prepared by the airport if the FAA determines a Plan is necessary based on the results of an Assessment. The goal of the Plan is to minimize risk to aviation safety, airport structures, or equipment, or human health posed by populations of hazardous wildlife on and around the airport. The items that must be included in the plan are listed in 14 CFR 139.337(f). These items are listed and further described in the list below.

The following is a Checklist that can be utilized to insure a complete and detailed Plan. The checklist can also be used to review the Plan contents.

DRAFT

Airport Wildlife Hazard Management Plan Checklist

Airport Name:
Airport Representative:
Plan Preparation Date:
Plan FAA Review Date:
FAA Reviewer:

	Yes/No	Comments/Observations
Brief introduction describing hazards identified in the Assessment and the wildlife attractants on and near the airport		
A list of individuals having authority and responsibility for implementing each aspect of the plan (14 CFR 139.337 (f)(1))		
Decision making roles and responsibilities including: Airport Director, Wildlife Coordinator, Operations Supervisor, Maintenance Supervisor, Security Dept., Planning Dept., Finance Dept., Wildlife Hazard Working Group		
Other		
A list prioritizing the following actions identified in the Assessment and target dates for their initiation and completion (14 CFR 139.337 (f)(2)):		
(i) Wildlife population management (list of problem wildlife populations and mitigation actions/target dates)		
(ii) Habitat modification (list of wildlife attractants and mitigation actions/target dates)		
(iii) Land use changes (list of land use on and near airport that attract wildlife and mitigation actions/target dates)		
Ongoing data collection and analysis		
Recordkeeping		
Other		
Do any proposed activities require NEPA review or Section 7 Consultation with USFWS?		

DRAFT

Airport Wildlife Hazard Management Plan Checklist (page 2)

	Yes/No	Comments/Observations
Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits (14 CFR 139.337 (f)(3)) (Copies of all valid permits must be included in Plan)		
Federal depredation permit		
State game hunting permit		
Incidental take permits		
Pesticide-use license/permits		
Other		
Identification of resources that the certificate holder will provide to implement the plan (14 CFR 139.337 (f)(4))		
Personnel		
Field identification guides		
Pyrotechnics		
Vehicles		
Pesticides and application equipment		
Other (binoculars, traps, guns, radios, etc.)		
Sources of supplies		
Procedures to be followed during air carrier operations that at a minimum includes (14 CFR 139.337 (f)(5)):		
(i) Designation of personnel responsible for implementing the procedures (Wildlife patrol staffing and primary responsibilities, hours of availability, etc.)		
(ii) Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin • Routine inspection procedures, • Documentation of inspections and observations • Runway/taxiway sweeps, perimeter fence inspections		

DRAFT

Airport Wildlife Hazard Management Plan Checklist (page 3)

	Yes/No	Comments/Observations
(iii) Wildlife hazard control measures • Monitoring • Recordkeeping, • Dispersal/harassment procedures • Procedures for wildlife control during different seasons and heavy air traffic times)		
(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower • Training in communication procedures • Procedures for immediate coordination and response to pilot-reported wildlife strikes or observations		
Other		
Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following a triggering event, including 14 CFR 139.337 (f)(6)):		
(i) The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity and (ii) Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated • One or more meetings with Wildlife Hazard Working Group to review Plan • Procedures for documentation of wildlife observations and wildlife control activities • Protocol to meet training requirements		
A training program conducted by a qualified airport wildlife biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan (14 CFR 139.337 (f)(7))		
Certification that training meets requirements in AC 150/5200-36A		
Training participation documentation		

DRAFT

APPENDIX D: Airport Wildlife Hazard Continual Monitoring and Report Checklist

Upon completion and approval of an Assessment and Plan, airports can implement a continual monitoring program that will be outlined in their Plan and ACM. Continual monitoring is an ongoing assessment of wildlife hazards at an airport that results in an annual report. The annual report will include recommendations for wildlife hazard mitigation and data on the effectiveness of mitigation programs at the airport and seasonal trends of species behavior and utilization of the airport.

The following is a Checklist that can be utilized to insure a complete and detailed Continual Monitoring program. The checklist can also be used to review the monitoring protocol and report.

DRAFT

Airport Wildlife Hazard Continual Monitoring and Report Checklist

Airport Name:
Airport Representative:
Qualified Airport Wildlife Biologist:
Initial Assessment Dates (Initiation/Completion):
Continual Monitoring Dates (Initiation/Completion):

	Yes/No	Comments/Observations
Assessment Checklist		
General Airport Information Review		
Recent improvements, ALP or MP changes		
Strike records (database/airport records)		
Depredation permits (current?)		
Review of Plan		
Review of Habitat Management Activities		
Mowing		
Clearing ditches of vegetation		
Tree removal		
Other		
Review of Wildlife Management Activities		
Pyrotechnics		
Fencing		
Wildlife removal (lethal, trapping, etc.)		
Nest removal		
Other		
Identification and location of features on airport that attract wildlife		
Wetlands		
Ditches		
Agriculture		
Stormwater Treatment Areas		
Forested/Shrub Areas		
Abandoned Structures		
Construction Sites/Debris		

DRAFT

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 2)

	Yes/No	Comments/Observations
Identification and location of features near airport (within 5 miles) that attract wildlife		
Wetlands		
Ditches		
Agriculture		
Stormwater Treatment Areas		
Landfill		
Forested/Shrub Areas		
Golf Courses		
Other		
Identification of wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences		
Minimum of 12 months data collection		
Locate standardized observation points on airport (observation points off airport are optional) to adequately observe wildlife and their movements on all parts of AOA. Use points established during initial Assessment is recommended		
Point count surveys conducted morning, midday and evening (unless Assessment, strike data, or monitoring data justifies the elimination of a survey time period)		
Avian surveys conducted a minimum of **once** monthly		
Mammal surveys conducted once a month for airports with documented hazardous terrestrial mammals **OR….**		
Mammal surveys conducted quarterly for airports without recognized terrestrial mammal hazards		
Record results of point count surveys and all general wildlife observations (including wildlife sign)		
Small mammal trapping (optional)		
Record presence of state and/or federally listed species		

DRAFT

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 3)

	Yes/No	Comments/Observations
Report Checklist		
General airport information (refer to General Airport Information Review section at beginning of appendix)		
Identification and location of features on and near the airport that attract wildlife		
Description of habitat features (natural and man-made) that may attract wildlife on and near the airport		
Map of airport with location of wildlife attractants on airport property		
Map of airport with location of wildlife attractants near airport (within 5,000 ft, 10,000 ft, and 5 miles).		
Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences		
Description of avian and mammal survey methodologies (minimum survey methodologies described above)		
List and description of bird/mammal species observed		
State and federal status of species		
Map of airport with location of observation points		
Description of the wildlife hazards to air carrier operations		
List the wildlife hazards that have been observed that are unique to this airport		
Description of wildlife strikes during the year and table depicting strike data		
Summary of ATC and airport records including wildlife observations, patrol, control, and monitoring		
Summary of Federal/State depredation permit use; special permit use (Eagle Disturbance or Nest Removal permits		

DRAFT

Airport Wildlife Hazard Continual Monitoring and Report Checklist (page 4)

Recommended actions for reducing identified wildlife hazards to air carrier operations		
Recommendation regarding whether or not modifications should be made to existing Plan		

*Recommendations can include (but are not limited to) the following:

- Clearing vegetation in ditches to improve drainage and reduce nesting habitat
- Mowing grass to recommended heights
- Tree removal inside the perimeter fence
- Repair breaches in perimeter fence when observed; keep vegetation maintained along fencing
- Install perching deterrents on signs and lights
- Use pyrotechnics to disperse hazardous wildlife
- Trap and remove hazardous mammal species (beavers, feral hogs, etc.)

DRAFT

APPENDIX E: PROCUREMENT OF AIRPORT WILDLIFE BIOLOGISTS

This Appendix contains information about qualified airport wildlife biologists for the conduct of Wildlife Hazard Assessment (and Related Services) procurement.

1. Procurement Method: Airports must use the competitive proposal method as defined in 49 CFR §18.36 (d)(3) when procuring airport wildlife biologists for AIP-funded procurements.

2. Required Federal Contract Provisions. The procurements must follow all other procurement and contracting requirements for AIP projects, including all required federal contract provisions.

3. Proposal Contents. The proposals from the vendors must contain the following information:

   a. Relevant references and evidence of experience in assessing and managing wildlife hazards.

   b. A Statement of Qualifications (SOQ) that includes the documentation verifying the Qualified Airport Wildlife Biologist conducting the WHA meets the requirements of AC 150/5200-36A as described in Section B (above). Sponsors MAY require:

      1. Copies of college transcripts,
      2. Copies of certificates of training/attendance at approved courses and/or Bird Strike Committee meetings,
      3. Letter from FAA approving initial WHA
      4. Letter from qualified mentor

   c. Project Experience, including descriptions of previous airport projects and references.

   d. Firm's Organizational Chart. The organizational chart with the key personnel who will be working on the project along with their resumes and estimated percentage of time each person will have available to spend on the project should be submitted.

   e. Vendors must submit a detailed Statement of Project Approach describing the work to be conducted to the sponsor for review prior to beginning the WHA. The project approach should demonstrate an understanding of the project and should include, in detail, how the Qualified Airport Wildlife Biologist intends to meet the minimum requirements detailed in Section 2.5 of this AC.

DRAFT

APPENDIX F. BIRD SURVEY DATA SHEET EXAMPLE

AIRPORT OBSERVATION SHEET

AIRPORT NAME OBSERVER SURVEY PERIOD DATE

TIME TEMPERATURE WIND DIR / SPEED WEATHER SUNRISE SUNSET

TIME	PT	LOC	SPP	#	ACT	COV	DIR	COMMENTS

SU - sunny
PS - partly sunny
CL - cloudy
RN - rain
SN - snow/sleet
FG - fog
PC - partly cloudy

FD - feeding
LF - loafing
RS- roosting
NS - nesting
VO - vocalizing
FL - flying local
FP - flying passing

RN – running
BD - bedded
P – perched
ST – standing
TW- towering
HW - hawking
SW- swimming

RWY - runway
TWY - taxiway
RMP - ramp
ASP - asphalt
UNP - unpaved road
STR - structure
DTC - ditch

PND - pond
RES - reservoir
RIV - river
WDL – woodland
MAR - marsh/wetland
CRK - creek/stream
TSW - temp standing water
TR - single/sm group of trees

GSH grass, short
GLG - grass, long
SHB - shrubs
GRV - gravel
AGF - ag field
SHR - shoreline

PAGE_____ of _____

DRAFT

U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Consolidated AC includes Change 1

Subject: Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports

Date: 01/31/2012 **AC No:** 150/5200-36A
Initiated by: AAS-300 **Change:**

1. Purpose.

This Advisory Circular (AC) has two purposes. First, this AC describes the qualifications for wildlife biologists who conduct Wildlife Hazard Assessments (WHA) for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139), and at non-certificated airports funded by a Federal Aviation Administration (FAA) Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) Program. We recommend that airports, at a minimum, consult with a qualified airport wildlife biologist when developing a Wildlife Hazard Management Plan (WHMP).

Second, this AC addresses the minimum wildlife hazard management curriculum for the initial and recurrent training of airport personnel who implement an FAA-approved WHMP.

2. Applicability.

The standards and practices in this AC for public-use airports and for those who conduct Wildlife Hazard Assessments and conduct required training are:

a. Mandatory for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139).

b. Highly recommended for airports that have accepted AIP or the Passenger Facility Charge (PFC) Program funds.

c. Highly recommended for all other airports that independently fund Wildlife Hazard Assessments.

3. Cancellation.

This AC cancels AC 150/5200-36, Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports, dated June 28, 2006.

4. Background.

Wildlife biologists conducting Wildlife Hazard Assessments or training airport personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans at

certificated airports must have professional training and experience in wildlife hazard management at airports [§139.337(c) and (f)(7)]. Airport personnel actively involved in overseeing or implementing FAA-approved Wildlife Hazard Management Plans must receive initial training and recurrent training every 12 consecutive months [§139.303(c) and (e) (Personnel)].

5. Related Reading Material.

Please review the most recent versions of the following documents:

a. FAA AC 150/5200-18, Airport Safety Self-Inspection.

b. FAA AC 150/5200-32, Reporting Wildlife Aircraft Strikes.

c. FAA AC 150/5200-33, Hazardous Wildlife Attractions On or Near Airports.

d. FAA AC 150/5200-34, Construction or Establishment of Landfills Near Public Airports.

e. FAA AC 150/5210-20 Ground Vehicle Operations on Airports

f. FAA AC 150/5220-25 Airport Avian Radar Systems

g. FAA AC 150/5300-13 Airport Design

h. FAA AC 150/5340-1K Standards for Airport Markings

i. FAA AC 150/5340-18F Standards for Airport Sign Systems

j. FAA Office of Safety and Standards, Certalert no. 98-05, Grasses Attractive to Hazardous Wildlife.

k. FAA Office of Safety and Standards, Certalert no. 04-09, Relationship Between FAA and WS.

l. FAA Office of Safety and Standards, Certalert no. 04-16, Deer Hazard to Aircraft and Deer Fencing.

m. Cleary, E. C. and Archie Dickey. 2010. Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports. Airport Cooperative Research Program Report #32.

n. Cleary, E. C. and R. A. Dolbeer. 2005. Wildlife Hazard Management at Airports: A Manual for Airport Personnel. 2nd Ed. FAA, Office of Airport Safety and Standards, Washington, DC.

o. Dolbeer, R. A., S. E. Wright, J.R. Weller and M.J. Begier. 2009. Wildlife Strikes to Civil Aircraft in the United States, 1990 – 2008. FAA National Wildlife Aircraft Strike Database Serial Report #15.

p. Dolbeer, R. A. et al. Ranking the Hazard Level of Wildlife Species to Civil Aviation in the United States: Update #1. Special Report for the Federal Aviation Administration, July 2, 2003.

q. Report to Congress: Potential Hazards to Aircraft by Locating Waste Disposal Sites in the Vicinity of Airports, April 1996, DOT/FAA/AS/96-1.

r. Title 14, Code of Federal Regulation, Part 139, Certification of Airports.

s. Title 40, Code of Federal Regulation, Part 258, Criteria for Municipal Solid Waste Landfills.

t. FAA Grant Assurance No. 34, Policies, Standards, and Specifications

u. FAA Passenger Facility Charge (PFC) Assurance No. 9, Standards and Specifications

v. Aeronautical Information Manual (AIM)

Some of these documents and other information on wildlife management, including FAA Certalerts and guidance on siting hazardous wildlife attractants such as landfills, are available on the FAA website at http://www.faa.gov/airports/ and http://wildlife.faa.gov/.

6. Professional Qualifications of Wildlife Biologists Conducting Wildlife Hazard Assessments and Wildlife Hazard Management Training at FAA Certificated Airports.

a. Wildlife biologists conducting airport Wildlife Hazard Assessments must meet certain education, training, and experience standards.

> §139.337(c) reads: Wildlife Hazard Assessment required in paragraph (b) of this section shall be conducted by a wildlife damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual.

b. Airports with a FAA-approved Wildlife Hazard Management Plan must provide employees the training needed to carryout the Plan.

> §139.337(f)(7) reads: A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the Wildlife Hazard Management Plan required by paragraph (d) of this section.

c. To meet the requirements of §139.337(c) and (f)(7), a wildlife damage management biologist (from now on referred to as a "qualified airport wildlife biologist") must:

(1) Have the necessary academic coursework from accredited institutions and work experience to meet the qualifications of a GS-0486 series wildlife biologist as defined by the U.S. Office of Personnel Management classification standards (Appendix A) **or** be designated as a Certified Wildlife Biologist by The Wildlife Society (http://www.wildlife.org) **and,**

(2) Have taken and passed an airport wildlife hazard management training course acceptable to the FAA Administrator (Appendix C), **and**;

(3) While working under the direct supervision of a qualified airport wildlife biologist, have conducted at least one Wildlife Hazard Assessment acceptable to the FAA Administrator (as described in §139.337(c)). **and,**

(4) Have successfully completed at least one of the following within five years of their initial FAA approved airport wildlife hazard management training course, and every five years thereafter:

(i) An airport wildlife hazard management training course that is acceptable to the FAA Administrator (Appendix C) **or**,

(ii) Attendance, as a registered participant, at a joint Bird Strike Committee–USA/Bird Strike Committee–Canada annual meeting **or**,

(iii) Other training acceptable to the FAA Administrator.

d. Individuals who work under the direct supervision of a qualified airport wildlife biologist are allowed to conduct Wildlife Hazard Assessments if the airport sponsor and the qualified airport wildlife biologist agree in writing to determine how the qualified airport wildlife biologist will:

(1) Supervise how the individual(s) will conduct the Wildlife Hazard Assessment; and

(2) Report progress of the Wildlife Hazard Assessment; and

(3) Supervise the Wildlife Hazard Assessment report production.

e. Certificate Holders or Airport Sponsors must obtain documentation verifying the qualifications outlined in c (1) – (3) above of any person(s) conducting wildlife hazard assessments or providing requisite training.

f. Holders of Airport Operating Certificates issued under Part 139 must retain records documenting the airport wildlife biologist(s) qualifications to conduct Wildlife Hazard Assessments and Wildlife Hazard Management Plans. These records must be retained for 10 years. If an airport conducts another WHA before the ten year expiration, the airport must maintain the qualification records for the previous WHA one year after the new WHA is completed.

7. Initial and Recurrent Training for Airport Personnel Actively Involved in Managing Hazardous Wildlife On or Near Airports.

a. Personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans are subject to the requirements of 14 CFR Part 139.303. Section 139.303 requires a specific training regimen for all airport personnel. Section 139.303(c) and (e) require the holder of an Airport Operating Certificate issued under Part 139 to provide initial training and, every 12 months thereafter, recurrent training in wildlife hazard management to airport personnel actively involved in implementing FAA-approved Wildlife Hazard Management Plans. The required training must include "Any additional subject areas required under … §139.337" [§139.303(c)(5)] and, "As appropriate, comply with the following training requirements of this part … §139.337, Wildlife Hazard Management" [§139.303(e)(5)].

b. Appendix D outlines the minimum training requirements for airport personnel who carry out an airport's Wildlife Hazard Management Plan. Depending on local wildlife and environmental issues, additional topics or more in-depth coverage of listed topics might be needed.

c. §139.337(f)(1) requires the Wildlife Hazard Management Plan to include a list of the individuals having authority and responsibility for implementing each aspect of the plan. This list identifies the individuals who must complete the required training.

d. §139.337(f) does not prohibit holders of Airport Operating Certificates from using a "train-the-trainer" approach when providing the requisite training, provided the trainers receive and successfully complete their initial and recurrent training from a qualified airport wildlife biologist. Trainers who are not qualified airport wildlife biologists are limited to providing training to their airport employees.

e. Holders of Airport Operating Certificates issued under Part 139 are required to make and keep records of all training for airport personnel involved in controlling wildlife hazards for at least 24 consecutive calendar months.[§139.301(b)(1) and §139.303(d)].



Michael J. O'Donnell
Director, Office of Airport Safety and Standards

Appendix A.

U.S. Office of Personnel Management Qualification Standards for GS-0486 Series Wildlife Biologists.

To be qualified as a GS-0486 series wildlife biologist, a candidate must have the following:

1. A degree in biological science that includes—

a. At least nine semester hours in such wildlife subjects as mammalogy, ornithology, animal ecology, and wildlife management or research courses in the field of wildlife biology; **and**

b. At least 12 semester hours in zoology in such subjects as general zoology, invertebrate zoology, vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, and entomology or research courses in these subjects (excess courses in wildlife biology may be used to meet the zoology requirements where appropriate); **and**

c. At least nine semester hours in botany or the related plant sciences; **or**

2. A combination of education and experience equivalent to a major in biological science (i.e., at least 30 semester hours), with at least nine semester hours in wildlife subjects, 12 semester hours in zoology, and nine semester hours in botany or related plant science, as shown in Paragraph 1 above, plus appropriate experience or additional education; **or**

3. Be designated as a Certified Wildlife Biologist by The Wildlife Society (http://www.wildlife.org).

Appendix B.

Training Resource Requirements and Instructor Qualifications.

The following training resource requirements and instructor qualifications are for any individual wishing to:

- Provide an airport wildlife hazard management course acceptable to the FAA Administrator, for personnel conducting Wildlife Hazard Assessments; or

- Provide training to airport personnel actively involved in implementing FAA approved Wildlife Hazard Management Plans.

1. Training Resources and Requirements.

a. A list of training program providers acceptable to the FAA Administrator can be found on the FAA's wildlife strike website: http://wildlife.faa.gov/.

b. Links to the most recent versions of FAA regulations, FAA Advisory Circulars, Certalerts, and other documents relevant to wildlife hazard management issues can be found at http://www.faa.gov/airports/ and http://wildlife.faa.gov/.

c. Those proposing to establish a program to train qualified airport wildlife biologists to meet the requirements of 14 CFR §139.337 must submit a complete training syllabus and instructor resume to the FAA. The syllabus must include all lesson plans, student handouts, and graphic presentations that include as a minimum all curriculum provided in Appendix C. Submit the materials to:

FAA National Wildlife Biologist, AAS-300
Office of Airport Safety and Standards
Federal Aviation Administration,
800 Independence Ave SW
Washington DC 20591

d. The goal of the training must be to provide the knowledge, skills, and abilities needed by a GS-0486 wildlife biologist to conduct Wildlife Hazard Assessments [§139.337(c)] and to conduct wildlife hazard training [§139.337(f)(7)]. To be acceptable to the FAA, the course must be at least 24 hours in length and include the curriculum items listed in Appendix C.

2. Instructor Qualifications.

The lead instructor for the training should:

a. Be a qualified airport wildlife biologist.

b. Have academic credits in education or instructor/teaching experience.

c. Have a minimum of 2 years experience in all aspects of managing hazardous wildlife on or near airports.

Appendix C.

Training Curriculum Outline for Any Individual Wishing to Provide an Airport Wildlife Hazard Management Course Acceptable to the FAA Administrator, for Personnel Conducting Wildlife Hazard Assessments.

1. Training Curriculum Outline.

The goal of the training must be to provide the knowledge, skills, and abilities needed by a GS-0486 wildlife biologist to conduct Wildlife Hazard Assessments [§139.337(c)] and to conduct wildlife hazard training [§139.337(f)(7)]. To be acceptable to the FAA, the course must be at least 24 hours in length and include the curriculum items listed below.

- **a.** Training goals and process
- **b.** Airport familiarization
  - (1) Introduction to the National Plan of Integrated Airport Systems
  - (2) Airport design and layout (AC 150/5300-13 Airport Design)
  - (3) Navigation aids and Air Traffic Control (Aeronautical Information Manual [AIM])
  - (4) Airport operations and safety (AIM)
  - (5) Signs, marking, and lighting (AC 150/5340-1K Standards for Airport Markings and AC 150/5340-18F Standards for Airport Sign Systems)
  - (6) Ground vehicle operator communication (AC 150/5210-20 Ground Vehicle Operations on Airports)
- **c.** Aircraft familiarization
  - (1) Physics of a strike
  - (2) Aircraft nomenclature
  - (3) Civil aviation aircraft categories
  - (4) Aircraft engines
    - (a) Reciprocating
    - (b) Turbo
  - (5) Aircraft certification standards
- **d.** Preview of wildlife hazards to aviation
  - (1) History of major strikes
  - (2) Aviation losses
    - (a) Worldwide
    - (b) United States
- **e.** Controlling laws, regulations, and policies
  - (1) Migratory Bird Treaty Act of 1918, as amended

(2) Animal Damage Control Act of 1931, as amended

(3) Bald Eagle Protection Act of 1940, as amended

(4) Federal Insecticide, Fungicide, and Rodenticide Act of 1948, as amended

(5) National Environmental Policy Act of 1969, as amended

(6) Endangered Species Act of 1973, as amended

(7) Title 14, Code of Federal Regulation, Part 139, Certification of Airports

(8) Title 40, Code of Federal Regulations, Part 258, Criteria for Municipal Solid Waste Landfills

(9) Title 50, Code of Federal Regulations, Parts 1–199, Wildlife Management

(10) Wendell H. Ford Aviation Investment and Reform Act for the 21st Century, Pub. L. No. 106–181 (April 5, 2000), "Structures Interfering with Air Commerce," section 503

(11) Applicable FAA ACs in the 150/5200 series about Airport Wildlife Hazard Management

(12) Applicable FAA Airport Certalerts

(13) Applicable state and local laws, regulations, and ordinances

f. Department of Defense requirements and perspective on military/civilian joint-use airports

g. Other Federal and State agency roles and responsibilities

(1) U.S. Department of Interior, Fish and Wildlife Service

(a) Role and responsibilities related to managing problem wildlife

(b) Migratory Bird Depredation Permits

(c) Salvage Permits

(2) U.S. Department of Agriculture, Wildlife Services

(a) Role and responsibilities related to managing problem wildlife

(3) Other agencies

(a) U.S. Environmental Protection Agency

(i) Siting landfills

(ii) Pesticide registration and use

(b) U.S. Army Corps of Engineers

(i) Wetlands mitigation

(4) Multi-Federal Agency Memorandum of Agreement

(5) Applicable State wildlife regulations

h. FAA National Wildlife Aircraft Strike Database

(1) Strike reporting

(2) Species identification and feather identification

(3) Database access

i. Environmental issues—working with Federal and State agencies

(1) National Environmental Policy Act

(2) U.S. Army Corps of Engineers (wetland loss and mitigation issues)

j. Initial consultations and Wildlife Hazard Assessments (WHAs)

(1) Triggering events for WHAs

(2) Duration and contents of WHAs

(3) Wildlife surveys at airports to assess wildlife hazards

(4) Data analysis and presentation of results

(5) Writing a WHA

k. FAA review of a WHA and determination of need for a Wildlife Hazard Management Plan (WHMP)

l. Drafting and carrying out integrated WHMPs

(1) Contents of WHMPs

(2) FAA review of WHMPs

(3) Endangered Species Act compliance

(4) National Environmental Policy Act review

m. Integrated wildlife hazard management for airports; survey of basic control strategies and tactics

(1) Flight schedule modification

(2) Habitat modification and exclusion

(3) Wildlife dispersal techniques

(4) Wildlife population management

n. Addressing off-airport attractants and community planning and involvement

o. Outline of field trip (to conduct a “mini” WHA)

p. Field trip/site visit

q. Final exam

r. Post exam review

s. Course evaluation

t. Presentation of certificates

2. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of each.

b. Passing grade/evaluation should be recorded and retained as instructor's records.

c. Instructors should retain course attendance records for a period of three years.

Appendix D.

Training Curriculum Outline for Airport Personnel Actively Involved in Implementing FAA-Approved Wildlife Hazard Management Plans.

1. Training Curriculum Outline.

The goal of the training course must be to provide the knowledge, skills, and abilities needed by airport personnel to safely, accurately, and effectively implement relevant portions of an FAA-approved Wildlife Hazard Management Plan. To be acceptable to the FAA, initial and recurrent training must include the following agenda items:

a. General survey of wildlife hazards to aviation based on the most recent annual FAA National Wildlife Strike Database Serial Report

b. Review of wildlife strikes, control actions, and observations at the airport over at least the past 12 months

c. Review of the airport's Wildlife Hazard Assessment is to include—

(1) Existing wildlife hazards and trends in wildlife abundance

(2) Status of any open or unresolved recommended action items for reducing identified wildlife hazards to air carrier operations within the past 12 months

d. Review of the airport's Wildlife Hazard Management Plan, to include the following:

(1) Airport-specific wildlife attractants, including man-made and natural features and habitat management practices of the last 12 months.

(2) Review of the airport's wildlife permits (local, State, and Federal)

(3) Review of other airport-specific items:

(a) Wildlife hazard management strategies, techniques, and tools:

(i) Flight schedule modification

(ii) Habitat modification, exclusion

(iii) Repelling methods

(iv) Wildlife population management

(b) Responsibilities of airport personnel for—

(i) Reporting wildlife strikes, control actions, and wildlife observations

(ii) Communicating with personnel who conduct wildlife control actions or who see wildlife hazards and air traffic control tower personnel and others who may require notification, such as airport operations or maintenance departments

(iii) Documenting and reporting wildlife hazards seen during patrols and inspections and follow-up control efforts

(iv) Documenting and reporting when no hazards are seen during patrols and inspections

e. Basic bird and mammal identification, stressing local hazardous and rare or endangered species of concern

f. For any airport personnel using pyrotechnic launchers or firearms, training on the following topics from a qualified individual[2]:

(1) Safety, parts, and operation of pyrotechnic launchers

(2) Fundamentals of using pyrotechnics to safely and effectively disperse wildlife

(3) Personnel protective equipment

(4) Cleaning, storage, and transport of firearms and pyrotechnic launchers

(5) Applicable local, State, and Federal regulations on firearms, pyrotechnic launchers, and pyrotechnics[3]

(6) Live fire training with pyrotechnic launchers including strategies for dispersing wildlife away from runways and aircraft movement corridors

(7) For any airport personnel using firearms, live fire training. This training is highly recommended from a qualified individual but not a requirement for this training program[2].

g. Any other training required by local, State, or Federal regulations

2. Recommendations.

a. Exams or tests may be oral, written, practical demonstrations, or a combination of all three.

b. The Trainer should retain passing grades/evaluations records.

c. The Trainer should retain course attendance records for a period of three years.

d. Airport personnel responsible for the airport's wildlife hazard management program should retain records of those to whom instruction in airport wildlife hazard management has been given for the period of time during which the employees conduct hazardous wildlife management activity on the airport and for six months after termination of employment.

---

[1] State Certificated Hunter Safety Instructors, police officers, firearms instructors and other personnel who have been professionally trained in firearms safety should be qualified to teach firearm safety and possibly the safe use of pyrotechnic launchers. Pyrotechnics are classified as high explosives by the Bureau of Alcohol Tobacco and Firearms (ATF) and as Division 1.4 explosives by the U.S. Department of Transportation. There are numerous regulations, security considerations, and ATF licensing requirements that apply to pyrotechnics.

[2] Airport personnel actively involved with the use of firearms for the mitigation of wildlife hazards should receive and maintain current firearms training from either a licensed National Rifle Association (NRA) instructor or other qualified individual. This training should include type and caliber of weapon used at the airport.

[3] Bureau of Alcohol, Tobacco and Firearms provides information on Federal explosive requirements for explosive pest control devices at: http://www.atf.gov/explosives/how-to/documents/epcd-flyer.pdf.



The Florida Wetlands Delineation Manual

Katherine M. Gilbert,
John D. Tobe, Richard W. Cantrell,
Maynard E. Sweeley, and James R. Cooper

Table of Contents

Forward ..... **vii**

Acknowledgements ..... **ix**

Introduction **1**

Applied Concepts and Interpretation of Chapter 62-340, F.A.C. **5**

Methodology **7**

INTENT 8
DEFINITIONS 9
DELINEATION PROCEDURES - TOOLS 12
VEGETATIVE INDEX 13
HYDROLOGIC INDICATORS 16
SURFACE WATERS 36
EXEMPTIONS 39
MOSQUITO CONTROL 40

Location of Sites **41**

Reference Site Information **43**

Cecil M. Webb Wildlife Management Area **45**

LOCATION 45
ACCESS 45
COMMUNITY CHARACTERIZATION 46
DELINEATION PROCEDURE 47
SOIL DESCRIPTIONS 49

Green Swamp Wilderness Preserve **53**

LOCATION 53
ACCESS 54
COMMUNITY CHARACTERIZATION 54
DELINEATION PROCEDURE 54
SOIL DESCRIPTIONS 57

Hal Scott Regional Preserve and Park **59**

LOCATION 59
ACCESS 59
COMMUNITY CHARACTERISTICS 60
DELINEATION PROCEDURE 60
SOIL DESCRIPTIONS 62

Hickory Mound Impoundment 65
LOCATION 65
ACCESS 65
COMMUNITY CHARACTERIZATION 66
DELINEATION PROCEDURE 66
SOIL DESCRIPTIONS 68

Jennings Forest Wildlife Management Area 71
LOCATION 71
ACCESS 71
COMMUNITY CHARACTERIZATION 72
DELINEATION PROCEDURE 72
SOIL DESCRIPTIONS 75

Jonathan Dickinson State Park 77
LOCATION 77
ACCESS 78
GENERAL COMMUNITY CHARACTERIZATION OF BOTH SITES 78
GENERAL DELINEATION PROCEDURE 79
SOILS DESCRIPTIONS 85

Little-Big Econ State Forest 95
LOCATION 95
ACCESS 95
COMMUNITY CHARACTERIZATION - DEPRESSION MARSH 96
DELINEATION PROCEDURE - DEPRESSION MARSH 96
COMMUNITY CHARACTERIZATION - RIVERINE SWAMP 99
DELINEATION PROCEDURES - RIVERINE SWAMP 99
SOIL DESCRIPTIONS 100

Naval Live Oaks Area 105
LOCATION 105
ACCESS 106
COMMUNITY CHARACTERIZATION 106
DELINEATION PROCEDURE 107
SOIL DESCRIPTIONS 108

No Name Key 111
LOCATION 111
ACCESS 111
COMMUNITY CHARACTERIZATION 112
DELINEATION PROCEDURE 112
SOILS DESCRIPTION 114

Peck Lake Park 117
LOCATION 117
ACCESS 117

COMMUNITY CHARACTERIZATION - HARDWOOD SWAMP 118
DELINEATION PROCEDURE - HARDWOOD SWAMP 118
COMMUNITY CHARACTERIZATION - MANGROVE SWAMP 120
DELINEATION PROCEDURE - MANGROVE SWAMP 120
SOIL DESCRIPTIONS 121

Purify Bay 125

LOCATION 125
ACCESS 125
COMMUNITY CHARACTERIZATION 126
DELINEATION PROCEDURE 126
SOIL DESCRIPTIONS 129

St. George Island State Park 131

LOCATION 131
ACCESS 131
COMMUNITY CHARACTERIZATION 132
DELINEATION PROCEDURE 132
SOIL DESCRIPTIONS 134

Saint Marks National Wildlife Refuge 137

LOCATION 137
ACCESS 137
COMMUNITY CHARACTERIZATION 138
DELINEATION PROCEDURE 138
SOIL DESCRIPTIONS 141

Little Talbot Island State Park 145

LOCATION 145
ACCESS 146
COMMUNITY CHARACTERIZATION 146
DELINEATION PROCEDURE 147
SOIL DESCRIPTIONS 149

Woods Ferry 153

LOCATION 153
ACCESS 153
COMMUNITY CHARACTERIZATION - SWAMP/CUTOVER FLATWOODS 154
DELINEATION PROCEDURE - SWAMP/CUTOVER FLATWOODS 154
COMMUNITY CHARACTERIZATION - STREAM SEEPAGE SLOPE 156
DELINEATION PROCEDURE - STREAM SEEPAGE SLOPE 156
SOIL DESCRIPTIONS 158

Literature 161

Chapter 62-340, F.A.C. 163

INTENT 163
DEFINITIONS 163

DELINEATION OF WETLANDS 165
SELECTION OF APPROPRIATE VEGETATIVE STRATUM 167
VEGETATIVE INDEX. 168
HYDROLOGIC INDICATORS 168
WETLAND HYDROLOGY 170
SURFACE WATERS 170
EXEMPTIONS FOR TREATMENT OR DISPOSAL SYSTEMS 171
EXEMPTION FOR SURFACE WATERS OR WETLANDS CREATED BY MOSQUITO CONTROL ACTIVITIES 172

The Vegetative Index 175

Agency Addresses 193

Index 195

Forward

This manual was developed to assist in the implementation of Chapter 62-340, Florida Administrative Code, *Delineation of the Landward Extent of Wetlands and Surface Waters.* The Department of Environmental Protection (DEP) and the five Water Management Districts (WMDs) were directed through Chapter 94 - 356, Laws of Florida, to develop a training manual describing the use of Chapter 62-340, F.A.C. through its application to selected, publicly accessible, reference sites located throughout the state. Funding for this project was provided for one year from the Department's Pollution Recovery Trust Fund.

The concept for this manual originated with Dr. Michael Dennis of Breedlove Dennis & Associates, and Chuck Littlejohn of Littlejohn & Associates, representing the Florida Chamber of Commerce, during the discussions which resulted in the ratification by the legislature of the Florida unified wetland delineation methodology (Chapter 62-340, F.A.C.). As representatives of affected regulated interests, they were seeking a solution to the perception that, through time, interpretations of rules have changed, while the wording of the rules have not changed. To prevent what has been perceived by them as the "creeping up hill" of previous wetland delineation rule interpretations, Dr. Dennis suggested establishing a number of control sites where the use of the Florida unified wetland delineation methodology could be demonstrated. These sites would be used to "anchor" the rule interpretation in time, thus reducing future innovative interpretations which may differ from the common understanding as it existed when the legislature ratified the rule. In the view of the Department and the Water Management Districts, this approach also provides the opportunity for staff and private sector training.



Emergent aquatic vegetation *Nelumbo lutea* (American lotus)

Acknowledgements

The time and effort of many individuals went into the development of this manual. Each of these persons gave freely of themselves and worked long demanding hours. The primary team which researched, located and delineated the reference sites used in this manual was composed of Katherine M. Gilbert, Maynard E. Sweeley, and John David Tobe, Ph.D. of the Florida Department of Environmental Protection (DEP), Lisa Grant and Dar-Guam Cheng of the St. Johns River Water Management District (SJRWMD), and Mia Van Horn, Greg Sawka, and Boyd Gunsalus of the South Florida Water Management District (SFWMD). This group was assisted by Debra Goss of the SFWMD, Terry Demott of the Suwannee River Water Management District (SRWMD), and Karen Gruenhagen of the Southwest Florida Water Management District (SWFWMD).

Kim Schiltz and Bill Beers of the DEP and Mike Broker of the SFWMD collected data for GIS analysis of the wetland boundaries at the reference sites.

We extend appreciation to Dr. Robert K. Godfrey for providing assistance with plant identification and to Dr. Dana Griffin for providing information on aquatic bryophytes.

We appreciate the cooperation and support of the Division of Parks and Recreation, DEP for allowing the placement of reference sites within state parks and also for providing park staff to assist in locating the sites. Without the assistance of these dedicated individuals, this manual could not have been completed in a timely manner. The Suwannee River Water Management District, the Southwest Florida Water Management District, and the St. Johns River Water Management District each made property available for reference sites, for which we are most grateful. We also extend our sincere appreciation to the Florida Game and Freshwater Fish Commission for permission to locate a reference site within the Cecil M. Webb Wildlife Management Area and to the United States Department of the Interior for the use of the Naval Live Oak Reserve, Saint Marks National Wildlife Refuge, and the National Key Deer Refuge. In particular we thank Larry Campbell and Dr. Jim Beever at the Cecil M. Webb Wildlife Management Area, Jim Bell and Tom Wilmers at the National Key Deer Refuge, Reilly Hoggart at the Naval Live Oaks Area, and the personnel at the Saint Marks National Wildlife Refuge.

The manual was prepared by the staff of the Wetlands Evaluation and Delineation Section of Florida Department of Environmental Protection, Richard W. Cantrell administrator. Principal authors are Katherine M. Gilbert, John David Tobe, Ph.D., Richard W. Cantrell, Maynard E. Sweeley, and James R. Cooper, Ph.D. Maynard E. Sweeley also provided the computer expertise essential to completing the manual. Vital contributions were provided by David Bickner, Neil Aymond and David Adams. Dr. John David Tobe was the principal photographer for this manual. This manual was produced on a Power Macintosh 7100/66 using Adobe's Pagemaker, Illustrator, and Photoshop. We are grateful to the management and staff of Lithotec Commercial Printing for their help and support.

Greg Sawka and Mia Van Horn of the South Florida Water Management District, Lynette Ciardulli of the DEP Office of General Counsel, Leonard L. Nero and Dana Burch of the DEP Bureau of Submerged Lands and Environmental Resources, Mike Ashey, chief of the DEP Bureau of Submerged Lands and Environmental Resources, and Janet Llewellyn, assistant director of the DEP Division of Environmental Resource Permitting all provided numerous suggestions and corrections to the draft document. Any remaining errors however are ours not theirs.

Front cover photo by David Bickner.

Introduction

This manual should be used as an aid in the use of Chapter 62-340, F.A.C. It will not answer every question that may arise in the use of the rule. It is not a substitute for the rule. Hands-on training will continue to be necessary to achieve and maintain a proficient understanding of wetland delineation.

The sole topic of this manual is the *identification and delineation of wetlands and other surface waters*. The definition of *wetlands* provides a categorization of the areas intended for inclusion in this process. The *regulation* of areas determined to be *wetlands and other surface waters* is **not** the topic of this manual. *Regulation*, including permitting thresholds and criteria, is covered under different rules and statutes and is not part of the wetland delineation methodology.

To aid Floridians in understanding the science and nuances of *wetland delineation*, this manual provides reference site examples of *wetland* identification and delineation as defined and prescribed in Chapter 62-340, F.A.C. Nineteen references sites, at fifteen locations representing common wetlands in Florida, are described. Each site and the wetland delineation are discussed. The sites are located on public lands and are readily accessible to the public. In some cases prior notice will be necessary and a fee may be required to access some sites. Examples of altered sites are not provided because the community characteristics necessary to establish a firm boundary are generally masked or may be in a state of redevelopment.

This manual is structured to provide the reader with necessary information prior to discussing the actual mechanics of Chapter 62-340, F.A.C. Important preliminary discussions are found in this Introduction, in the section titled Applied Concepts and Interpretations of Chapter 62-340, F.A.C., and under Methodology in the subsection titled Delineation Procedures - Tools.

Several fundamental topics need to be understood prior to the use of this manual, and the rule: the wetland definition, reasonable scientific judgement, ecotones, and hydric soils.

Wetland Definition

Chapter 62-340, F.A.C., *Delineation of the Landward Extent of Wetlands and Surface Waters*, provides a single methodology that is applicable statewide. While both *wetlands* and *other surface waters* are addressed by this rule, the primary focus is *wetlands*, the more complex of the topics. The intent of this rule is to identify and delineate as *wetlands* those areas found to be in accordance with the definition of *wetlands* provided in subsection 373.019(17), Florida Statutes.

> ***"Wetlands" means those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support,***

> ***a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto.***

This definition provides the concept for the types of areas intended to be included as *wetland*. A list of *wetland* types found in Florida is provided to assist in the interpretation of the terms and concepts of the definition. The list of wetland types is not all-inclusive of the *wetland* communities throughout the state however, and therefore the definition contains the phrase *other similar areas*. This phrase is intended to include the less common varieties of *wetland* communities, altered *wetlands*, and ecotonal areas which are *wetlands*. The definition also provides an example of community types that are generally not intended to be identified as wetlands, *long leaf and slash pine flatwoods with a dominant understory of saw palmetto*. During rule development this definition was used to shape the vegetative, hydrologic, and soil parameters used for wetland delineation.

Reasonable Scientific Judgement

Reasonable scientific judgement is used several times throughout the rule and applies both to specific sections and to the overall application of the rule. *Reasonable scientific judgement* involves the ability to collect and analyze information using technical knowledge, and personal skills and experience to serve as a basis for decision making. Examples of situations where *reasonable scientific judgement* is very important include: ecotonal, seasonally wet or occasionally wet lands which are not the *wetlands* intended by the statutory definition, wetland communities dominated by non-listed plant species such as *Quercus virginiana* (live oak) and *Magnolia grandiflora* (southern magnolia), i.e. hydric hammock, altered areas which still have relict wetland vegetation and/or hydric soils but may have lost the hydrology necessary to maintain a wetland condition, and *wetland* ecotones, especially throughout south Florida. When employing the provisions of section 62-340.300, F.A.C., an area may be identified or delineated as a *wetland* only to the extent that it is a *reasonable scientific judgement* that the area adheres to the wetland definition. The definition should be read often!

Ecotones

The rule is used both to identify areas as wetlands and to delineate their boundaries. Delineating the boundaries between wetlands and uplands often involves evaluations in areas with a broad transition zone. This type of area is referred to as an *ecotone*. An *ecotone* is an area where two or more communities grade into each other. The *wetland* boundary line is often located within an *ecotone*. Understanding the concept of *ecotone* is necessary to use this rule. It is in the *ecotones,* those areas of shared or gradually changing attributes, that *reasonable scientific judgement* is often put to its greatest use.

Hydric soils

Hydric soils play an integral role in defining *wetland* limits. The terms *hydric soil* and *wetland* are neither equivalent, nor interchangeable under Florida law. *Hydric soils* are present in some flatwoods which are not *wetlands* as statutorily defined. Conversely, there are some site specific exceptions where hydric soil indicators are absent or are very difficult to interpret in *wetlands*. Hydric mapping units delineated in county soil surveys make excellent initial review information, but *in-situ* (in place) confirmation of hydric soil indicators by the regulating agency is required. Hydric mapping units of a county soil survey can not substitute for in-situ observations by experienced soil scientists.

Hydric soils are formed by either inundation or saturation for very long periods of time (USDA - SCS, 1991). The United States Department of Agriculture - Natural Resource Conservation Service (USDA - NRCS), formerly the Soil Conservation Service, has identified four morphologic features which are consistent with a long-term water table at or above the surface (subsection 62-340.550(8), F.A.C.). Using reasonable scientific judgement, the presence of one or more of these four morphologic features, in an *undrained condition,* provides reliable evidence that the site is very wet for an extended period of time and is typically considered a *wetland*. Similarly, in the *undrained condition* (subsection 62340.300(2)(c), F.A.C.), the remaining soil indicators (USDA - NRCS, 1992) provide evidence that the water table rises to within six inches of the soil surface for sandy textured soils and to within twelve inches for loamy and clayey soils for long periods of time. These saturation indicators do not exclude the possibility of inundation for a site. They also do not by themselves define an area as a wetland.

Certain types of hydric soils can be used as the sole basis for a wetland delineation. The very wet mapping units, those designated as frequently flooded or depressional, along with soil *great groups* considered very poorly drained by the USDA - NRCS, are wetlands, provided that careful site verification of the extent and the hydric nature of the soil is conducted. These very poorly drained (very wet) soils, in their *undrained condition* (subsection 62-340.300(2)(c), F.A.C.) are always contained within the definition of wetlands, unlike hydric soils in general which can extend beyond the boundaries of *wetlands* as defined in Chapter 62-340, F.A.C. Because soils can be a very powerful aspect of wetland delineation, identification of hydric soils should be performed by a trained soil scientist. This does not prevent the use of some of the more obvious soil features by other trained professionals; however, there is no substitute for field expertise.

Applied Concepts and Interpretation of Chapter 62-340, F.A.C.

This manual was developed to provide guidance for consistent interpretation of the wetland and surface water delineation rule by providing information and examples instructive of the intent of the various sections of the rule. Anyone familiar with wetland delineation or any other type of land evaluation understands that rarely are two non-contiguous properties exactly alike in their community structure and ecological condition. The primary parameters utilized to determine the boundaries between wetlands and uplands are *vegetation, soil characteristics*, and *hydrologic indicators*. The rule establishes the use of these parameters for consistent application to wetland delineation.

Care should be given to evaluate *all facts and factors* influencing these parameters whenever feasible. Throughout the manual, guidance is provided for the use and interpretation of data considered. This guidance is based on a compilation of extensive statewide experience in wetland delineation among DEP and WMD staff. Implementation of the procedures within this rule does require some degree of knowledge and experience in evaluating plant communities, hydric soils and observations of the effects of surficial hydrology.

As you follow the procedures described herein and implement the rule, please remember that the rule was developed through the cooperative effort of the DEP, the five WMDs, many local governments, representatives of the regulated public and representatives of concerned citizen groups. The regulatory scope of this rule is intended to approximate the combination of *wetland* areas regulated by the DEP and the WMDs immediately prior to July 1, 1994, the effective date of the rule. Changes in the location of the *wetland or surface water* boundary in any particular area, if any, are more than likely because of the influence of procedures already employed in other areas of the state. Remember, this rule is a *statewide, unified* approach to wetland and other surface water delineation within Florida, and *it is the law* (subsection 373.412(2), F.S.).

Water is the driving force of a *wetland*. The influence of water in the concept of *wetlands* is best demonstrated by hydropatterns. *Hydropatterns* include the frequency, distribution and duration of surficial hydrology along with topographic and edaphic features. The hydropatterns of Florida wetlands are quite variable, differing both by type and location. Because of this, there is no single criteria by which the observation of water alone can be rationally and efficiently used to deduce wetland delineation. The influence of water in establishing wetlands is evaluated in the rule using the physical landscape markers provided by the hydropattern as expressed by the parameters of: vegetation, hydric soils and hydrologic indicators. This rule does not use mandatory hydrology criteria with respect to frequency, duration, and depth of inundation or saturation to delineate wetlands. Water as an indicator is never used alone or outside the control of reasonable scientific judgement. (See section 62-340.550, F.A.C., for special circumstances involving wetland hydrology). According to USDA - NRCS, areas with hydric soil, in the *undrained condition*, possess sufficient hydrology to support a hydrophytic community, yet not every area of hydric soil constitutes a *wetland*. To many observers, a community not dominated by wetland indicator plant species (subsections 62340.450(a) and (b), F.A.C.) is

not a wetland. Hydric hammock, as previously noted, often is dominated by non-listed vegetation. *Hydropatterns* provide the integrating link that determines if an area will be a wetland. In some areas of Florida, this has resulted in wetlands occurring beyond the edge depicted by listed vegetation. There is more to a *wetland* than an observation of inundation and species composition.



Cypress swamp

Methodology

The methodology described in Chapter 62-340, F.A.C., is to be applied consistently throughout the state regardless of environmental variation. The criteria of this rule are binding on all political subdivisions of Florida when used in the identification and delineation of wetlands as directed in Section 373.421(1), F.S.:

> "Upon ratification of such methodology, the Legislature preempts the authority of any water management district, state or regional agency, or local government to define wetlands or develop a delineation methodology to implement the definition and determines that the exclusive definition and delineation methodology for wetlands shall be that established pursuant to s. 373.019(17) and this section. Upon such legislative ratification, any existing wetlands definition or wetlands delineation methodology shall be superseded by the wetland definition and delineation methodology established pursuant to this chapter."



Shallow hardwood swamp
(Wakulla County)

The methodology is a best fit combination of the methodologies and practices employed by the water management districts and the DEP prior to the ratification of Chapter 62-340, F.A.C. The wetland boundary may or may not change in your area. It may or may not be in the same exact location as delineated under previous rules and policies. For most areas, the wetland boundary will be very close to where it had been previously delineated by the Water Management Districts.

In the following discussion, Chapter 62-340, F.A.C., will be covered section by section. Supplemental information is provided which should be read in conjunction with the text of Chapter 62-340, F.A.C.

Intent (section 62-340.100, F.A.C.)

The intent of Chapter 62-340, F.A.C. is to provide a wetland delineation methodology which can be consistently applied throughout the state of Florida. The phrase *combined landward extent* means the total extent of area under the wetland regulatory jurisdictions of the WMDs and the DEP. This rule was developed by a working group of representatives from the DEP and the five WMDs with the aid of representatives of the regulated public and environmental organizations. Careful attempts were made to provide a methodology which reflects the wetland and surface water jurisdictional authority of the DEP and the WMDs as it existed immediately prior to the effective date of Chapter 62-340, F.A.C., July 1, 1994.

The focus of the methodology is on the use of vegetation, hydric soil characteristics and hydrologic indicators to delineate those areas which meet the definition of wetlands provided in subsection 62-340.200(19), F.A.C.

The department is vested with the responsibility of maintaining the consistent statewide application of Chapter 62-340, F.A.C., and intends to be actively engaged in this responsibility.



Emergent wetland vegetation associated with a lake (Marion County)

Definitions (section 62-340.200, F.A.C.)

When interpreting or implementing Chapter 62-340, F.A.C., the definitions provided in this section of the rule shall apply. Additional information and guidance is provided below for some of the definitions. **The definitions are listed by the same numbers used in the rule. Not all the definitions are included below.**

(1) ***Aquatic plants*** are free floating or underwater plants. Some of the free floating plants are *Lemna* and *Spirodella* (duckweeds), *Eichhornia crassipes* (water hyacinth), *Pistia stratiodes* (water lettuce), and *Salvinia*. Examples of underwater plants include but are not limited to *Hydrilla* and *Vallisneria americana* (eel-grass). *Nymphaea* spp. (water lilies), *Nelumbo* spp. (lotus), *Nuphar luteum* (spatterdock) and other emergent plants, which send a leafy stem above the surface of the water, are not considered aquatic plants for the purposes of Chapter 62-340, F.A.C. Aquatic plants are not considered when determining the dominance of plant species or in the determination of strata. The presence of aquatic plants may be considered as a hydrological indicator in accordance with subsection 62-340.500(3), F.A.C.

(2) ***Canopy*** is often referred to as the top layer of the forest. The definition in the rule further qualifies the characteristics as woody plants or palms with a main trunk at least 4 inches in diameter (four inches wide) at a point 4.5 feet above the base of the tree (Diameter at Breast Height - DBH). If the tree is on a slope, the diameter is measured from the midpoint of the base of the tree on the slope. Vines are not considered for this or any other vegetative evaluation.

(4) ***Facultative plants (FAC)*** are plants which are so problematic in their distribution as to render them inappropriate for indicating inundation or soil saturation. Specifically included are exotic plants with a weedy distribution. Facultative plants are not used when evaluating the dominance of plants species or when determining the appropriate strata.

(5) ***Facultative wet plants (FACW)*** are plants which under natural conditions typically exhibit their maximum cover in areas subject to surface water inundation and/or soil saturation, but can also be found in an upland.

(6) ***Ground Cover*** includes all plants which are less than 4.5' tall or have a DBH of less than 1". Vines are not considered. Groundcover is the lower most of the three layers of vegetation which are evaluated for the vegetation analysis.

(7) ***Ground truthing*** or on-site evaluations of the wetlands and their parameters are necessary to accurately delineate a *wetland*. The conditions of the *wetlands* and the boundaries observed should be documented during the ground truthing of the site.

(8) ***Hydric soils***. A soil is inundated when the water table is at or above the soil surface. A soil is flooded if the water is moving across the soil surface as in a slough or on a floodplain. A soil is ponded if the water is sitting on top of the soil

with no movement to an outlet as is the case with some depressions. A soil is saturated if the water table is within 6 inches of the soil surface for sandy textured soils or within 12 inches for loamy or clayey textured soils. These water table depths for each textural category will support a capillary rise of water to the soil surface. If the duration of saturation or inundation is long enough, (greater than several weeks during the growing season), the oxygen content of the water in the topsoil will be exhausted. The subsequent anaerobic conditions in the soil result in an accumulation of organic matter and the reduction and movement of iron which produce a soil morphology that is identifiable in the field (*hydric soil indicators*). Hydric soil information is available through the county Natural Resource Conservation Service (formerly the Soil Conservation Service) office.

(9) ***Hydric Soil Indicators*** are those listed in *Florida's Ecological Communities* (1992). It is highly recommended that all who evaluate hydric soil seek professional training provided by qualified soil scientists. Hydric soil indicators must be verified on site, throughout the site.

(10) ***Inundation*** pertains to all surface water at or above the soil surface.

(11) ***Obligate plants*** are those plant species which under natural conditions are only found or achieve their greatest abundance in an area which is subject to surface water inundation and/or soil saturation. Some obligate plant species can be observed in an upland, especially under a controlled environment. Included in this category are the littoral plants and emergent aquatics, such as *Nymphaea* spp. (water lilies), *Nelumbo* spp. (lotus), and *Nuphar luteum* (spatterdock).

(13) ***Riverwash*** includes areas generally considered to be alluvial.

(14) ***Saturation.*** The extent to which shallow water tables can create anaerobic conditions throughout the soil profile is to a great extent a function of the soil texture. Soil texture determines the size and nature of open pores which exist within the soil. Capillary action, the adhesion and cohesion of water molecules in these pores, results in the lifting of water from the water table towards the soil surface. The smaller the pores, the greater the distance which capillary action will lift water. In order for water to reach the soil surface via capillary action, a water table must be closer to the surface in sandy soils than in finer textured soils because the soil pores are larger in the sandy soil.

(15) ***Seasonal High Water*** means the elevation to which the ground and surface water can be expected to rise in a normal wet season. Indicators of seasonal high water may be observed whether the mark is above or below ground. The characteristics may not always be obvious or even present. The presence of hydrologic indicators must be used with reasonable scientific judgement. Seasonal high water is particularly applicable to the delineation of isolated wetland systems.

(16) ***Subcanopy*** is generally thought of as the smaller trees and tall shrubs in the forest. It is typically the middle of the three vegetative layers considered in the

vegetation analysis. A plant must have a main stem more than 4.5 feet tall and greater than 1" in diameter to be in the subcanopy. Most species of palms will not be in the subcanopy category if their diameter is greater than 4.5" when the trunk is at least 4.5 feet tall.

(18) ***USDA - SCS*** is the former United States Department of Agriculture - Soil Conservation Service, now know as the **USDA - Natural Resource Conservation Service (USDA - NRCS)**.

(19) ***Wetlands.*** This definition lists the types of areas that are intended to be considered *wetlands* and areas which are generally not intended to be considered *wetlands. Wetland types* are quite variable within the climatological extent of Florida. *Other similar areas* includes less common *wetland types* and *wetland ecotonal* areas that may have a mixture of characteristics of adjoining communities. Please refer to the *characteristics of wetlands* as provided in the methodology to determine if these areas are wetlands or uplands in accordance with this definition. Please note the word *generally*. *Generally* means *in most cases*. All applications of the methodologies should reflect this definition of *wetlands*.



Wetland vegetation along lake margin, *Taxodium ascendens* (pond cypress), *Nymphaea odorata* (white water lily), and *Typha domingensis* (southern cattail).

Delineation Procedures - Tools (subsection 62-340.300(2), F.A.C.)

The tools used in the delineation of wetlands are very specific:

Vegetative Index - This is a list of most plant species which can be found in Florida wetlands. When the term *spp.* is used, it represents all species in that genus within the geographical range of the boundaries of Florida (some exceptions are stated on the list). Each species or group of species is assigned an indicator status of either obligate (OBL), facultative wet (FACW), or facultative (FAC), that can be used in the technical procedures described below. All plant species which are not specifically assigned an indicator status, except for vines, aquatic plants and plants introduced into the geographic area of Florida subsequent to July 1, 1994, shall be considered to be assigned an indicator status of upland (UPL).

Hydric Soil Indicators - Hydric soil characteristics are those identified in Soil and Water Relationships of Florida's Ecological Communities (Florida Soil Conservation ed. Staff 1992). Additionally, included in subsection 62-340.300(2)(c), F.A.C., are specific types of *very wet* soils.

Hydrologic Indicators - Hydrologic Indicators, and conditions thereof, shall be used in accordance with section 62-340.500, F.A.C., using ***reasonable scientific judgement***.

Reasonable Scientific Judgement - Reasonable scientific judgement takes into account all available information and factors pertinent to the surficial hydrology of the area (see introduction). Some of the important factors to consider when applying reasonable scientific judgement include the following: antecedent moisture conditions, vegetation present, hydrologic alterations, landscape position, local knowledge, and climactic conditions.

Vegetative Index (section 62-340.450, F.A.C.)

The *vegetative index* (section 62-340.450, F.A.C.), is used in the identification and delineation of *wetlands* within Florida. At times, the *landward extent of surface waters* will be determined by factors other than wetlands. In these situations, the vegetative index may not be useful (see section 62340.600, F.A.C.).

The use of plant species in the rule shall be consistent at all times with the indicator status of the species on the *vegetative index*. Plants on the *vegetative index* are specifically listed as *obligate* (OBL), *facultative wet* (FACW), and *facultative* (FAC). Any plant not specifically listed is considered an upland plant except *vines, aquatic plants, and any plant species not introduced into the State of Florida as of the effective date of Chapter 62-340, F.A.C.* (subsection 62-340.200(17), F.A.C.).

Vine refers to any plant species which has a twinning or clasping extended growth form originating at the base of the plant and which is dependent on its own accumulated growth or the growth of other plants for support. Some common vines are: *Vitis* spp. (grape vines), *Smilax* spp. (greenbriers), and *Parthenocissus quinquefolia* (Virginia-creeper). *Lygodium japonicum* (Japanese climbing fern) and *L. macrophyllum* are ferns which grow as a vine. *Rubus* spp. (blackberries) are considered canes, not vines.

Aquatic plants will generally not be observed along the boundary of a wetland unless they have floated up with rising water. Because of the general need for support from surface water, the presence of aquatic plants may be used as an indicator of hydrology, in accordance with subsection 62-340.500(3), F.A.C. This is one of the indicators which may reflect extraordinary events. Always use *reasonable scientific judgement* when using this hydrologic indicator.

Facultative species are not used in the evaluation of the dominant vegetative cover (subsection 62340.300(2)(a) and (b), F.A.C.) or in determining the appropriate strata (subsection 62-340.400, F.A.C.). Facultative species can be observed as dominant vegetation in uplands as often as in wetlands. The ***presence*** of facultative species does not provide information on the exact placement of the boundary of a wetland. In general, facultative species may be thought of as neutral. At times certain facultative species or even upland species may develop morphological adaptations to soil saturation and inundation. These structures are often excellent hydrologic indicators and may be used as such independent of the indicator status of the species, provided such use is in keeping with subsections 62340.300(2)(d) and .500(9), F.A.C.

The *vegetative index* (section 62-340.450, F.A.C.) is not a complete list of all the plants which occur in Florida wetlands. Some Florida wetlands are even dominated by non-listed plants. The indicator status assigned to certain common native plants, which are difficult to categorize ecologically, reflects the intent to maintain the wetland delineation within the scope of the wetland definition. (Please refer to the previous discussions under Introduction, Applied Concepts, and Methodology, section 62340.100, F.A.C.). Among the common plants for which the indicator status of *upland* may not accurately express the complete ecological range of the species are: *Pinus elliottii* (slash pine), *Ilex*

glabra (gallberry), *Quercus virginiana* (live oak), and *Serenoa repens* (saw palmetto). The ecological preference typically exhibited by some species does not reflect the entire range of tolerance to hydrologic conditions which the species may exhibit statewide. For example, the typical ecological preference of saw palmetto throughout most of the state is upland. However, in the Florida Keys, it is found almost exclusively in wetlands (rockland depressions). The wispy, magenta flowered grass, *Muhlenbergia capillaris* (muhly grass) illustrates the reverse situation. It has an obligate status on the *vegetative index* and in south Florida is restricted to inundated and saturated areas, covering extensive wet prairie and similar habitats. Along the north Florida Atlantic coast it is also observed growing on the exposed *upland* coastal sands (these areas would not be delineated as wetlands by the rule). If vegetation were a mandatory criterion under the rule, the inclusion of these and some other species as obligate, upland or wetland indicators would result in the incorrect application of the intent of the wetland definition. The rule provisions regarding choosing appropriate vegetative strata, use of certain soils, commonly referred to as very wet soils, and use of hydrologic indicators in conjunction with hydric soils, are all included in the methodology, at least in part, as a means of addressing the contradictions which can arise because of these plants, which can not be satisfactorily categorized. Remember, it is the methodology as a whole, not any one provision, that is to be used to accurately delineate wetlands as defined by statute.

Please refer to the list of recommended references provided at the back of this manual for assistance in plant identification.

Hydric Soils and Hydric Soil Indicators

A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile that favor the growth and regeneration of hydrophytic vegetation (USDA - SCS, 1991). A soil is inundated when the water table is at or above the soil surface. A soil is flooded if the water is moving across the soil surface as in a slough or on a floodplain. A soil is ponded if the water is sitting on top of the soil with no movement to an outlet, as is the case with some depressions. A soil is saturated if the water table is within 6 inches of the soil surface for sandy textured soils or within 12 inches for loamy or clayey textured soils. These water table depths for each textural category will support a capillary rise of water to the soil surface. If the duration of saturation or inundation is long enough, (greater than several weeks during the growing season) the oxygen content in the in the topsoil water will be exhausted. The subsequent anaerobic conditions in the soil result in an accumulation of organic matter and the reduction and movement of iron which produce a soil morphology that is identifiable in the field (hydric soil indicators).

The USDA - NRCS recognizes four (4) of the hydric soil indicators that are evidence of a water table at or above the soil surface for more than several weeks during the growing season. The hydric soil indicators are muck, mucky texture, gley colors, and sulfidic odor. A complete description of these indicators plus additional criteria needed for each indicator can be found in *Soil and Water Relationships of Florida's Ecological Communities* (Florida Soil Conservation Service, Staff, 1992). The remaining hydric soil indicators are

recognized as evidence of saturation (Table 1.) of the top layer of soil for more than several weeks. These hydric soil indicators are also discussed in detail in the FL - SCS publication previously mentioned.

Table 1. Hydric soil indicators of saturation

1. Dark surface
2. Organic accretions
3. Oxidized rhizospheres
4. Polychromatic matrix (matrix stripping)
5. Stratified layers
6. Iron and Manganese concretions*
7. Distinct or Prominent mottles*
8. Marl*

* For loamy and clayey textured soils only



Hydric soil sample from hardwood swamp
(Wakulla County)

Hydrologic Indicators (section 62-340.500, F.A.C.)

It is important to read the first paragraph of section 62-340.500, F.A.C. as it qualifies the use of the hydrologic indicators with ***reasonable scientific judgement*** (see introduction). *Reasonable scientific judgement* involves consideration of the conditions causing the indicators. The presence of hydrologic indicators may not provide any information on the normalcy of the event or series of events causing the conditions. Every effort should be made to acquire detailed knowledge about the site prior to considering factors which are directly caused by the immediate presence of water. The lack of certain or specific hydrologic indicators at a site should not be viewed as negative evidence when other indicators are present. It is the total weight of the evidence of wetland conditions on site, provided by the indicators present that, once subjected to reasonable scientific judgement, is used or rejected in establishing the wetland boundary. The following thirteen hydrologic indicators are listed in the rule.

(1) Algal mats are the presence or remains of nonvascular plant material which develops during periods of inundation and persists after the surface water has receded. Algal mats are important indicators of inundation when the vegetation and soil has been altered. In addition, seasonally flooded natural areas such as depression marsh, interdunal swale, rocklands in the Florida Keys and extensive areas of marl/swale of the Everglades may have extensive algal mats as the only hydrologic indicator present. In southwest Florida, algae mats are one of the most important wetland indicators because of the lack of organic accumulation in many of the seasonally inundated communities. Algal mats are often associated with aufwuchs and water marks. The degree to which this indicator is expressed on a site is best interpreted when the rainfall history of the area is known.



Algal mat, rockland depression, Big Pine Key
(Monroe County)



Algal mat in depression marsh, Southwest Florida

(2) Aquatic mosses or liverworts on trees or substrates. Mosses and liverworts are in a group of plants collectively called bryophytes. They lack true roots and leaves and are generally found in shaded, moist environments. Look for epiphytic or epipteric mosses and liverworts along rivers, streams, bayous, sloughs and strands as they typically occur in shaded, forested floodplains that experience prolonged, seasonal inundation. After



Fontinalis sp. on tree base in a riverine swamp

water levels have fallen, they will appear as a dark greenish-brown "shaggy" growth, suspended on the bark of trees and the surface of rocks. Typically encountered mosses include: *Brachelyma* spp., *Dichelyma capillaceum*, *Fissidens debilis, Fissidens manateensis*, *Fontinalis* spp., *Hygroamblystegium tenax*, *Leptodictyum riparium, Sciaromnium lescurii*, and *Sphagnum* spp.; liverworts include: *Porella pinnata*. Identification of dried bryophytes is aided by a hand lens and the application of water to the dried plant body. Two taxonomic references of use are: *Mosses of Florida* by Ruth Schornherst Breen, 1963 and *Mosses of the Gulf South* by William Dean Reese, 1984.



Aquatic bryophytes on *Nyssa ogeche*

(3) Aquatic plants. Aquatic plants are defined in section 62-340.200, F.A.C. as "plants which typically float on water or require water for its entire structural support, or which will desiccate outside of water." Aquatic plants naturally grow in



Eichhornia crassipes (water-hyacinth), an aquatic plant.

areas where inundation is permanent or nearly so. The presence of aquatic plants at a site not presently inundated by water is an excellent indicator that the normal condition at the site is much wetter or, in the case of floating plants, that the site experiences periodic flooding by an adjacent surface waterbody. Look for evidence of aquatic plants in seasonally fluctuating water bodies. Typical floating aquatics include such genera as: *Riccia, Ricciocarpus, Azolla, Salvinia, Pistia, Echhinoria, Lemna, Spirodela, Wolffia*, and *Wolffiella* in seasonally flooded, shallow lakes and ponds or surrounding floodplain forests. An aid to the identification of the previously mentioned plants can be found in R. K. Godfrey, *Aquatic and Wetland Plants of Southeastern U. S.*, 1979 and floras published for a particular area of the state. Water lines and aufwuchs are often also associated with a seasonal drawdown of water bodies.

(4) Aufwuchs is the presence or remains of the assemblage of sessile, attached or free-living, nonvascular plants and invertebrate animals (including protozoans and fresh water sponges) which develop a community on inundated surfaces. Look for the presence of aufwuchs on branches, rocks and other objects that have been submerged.



Aufwuchs on emergent wetland vegetation

Aufwuchs are important indicators in seasonally inundated areas. They often appear as a crust-like growth, sometimes bleaching to white in sunlight during the dry seasons.

(5) Drift lines and rafted debris are vegetation, litter, and other natural or manmade material deposited in discrete lines or locations on the ground or against fixed objects, or entangled above the ground within or on fixed objects in a form and manner which indicates that the material was waterborne. This indicator should be used with caution to ensure that the drift lines or rafted debris represent usual and recurring events typical



Drift line in a salt marsh, Choctawhatchee Bay

of inundation or saturation at a frequency and duration sufficient to meet the wetland definition of subsection 62-340.200(19), F.A.C. When debris has been carried by water and deposited in an area, especially an area foreign to the origin of the material, then the conditions contributing to the observations must be considered. For example, extreme events such as hurricanes and tropical storms may induce unusually high drift lines and rafted debris associated with a storm surge that would not be typical for a particular area. Look for drift lines in tidal areas, rivers and streams that regularly flood, or any wetland where high water deposits or arranges leaves and twigs in a distinguishable pattern. In evaluating rafted vegetative debris, be sure to consider only water-induced evidence.



Rafted debris, North Florida stream

(6) Elevated lichen lines. Lichens are a symbiotic association of a fungus and an alga. Typical lichen forms include crustose, foliose and fruticose. Crustose lichens are flattened and appressed like a film on the bark. Foliose lichens are flattened, thin and lobed. Fruticose lichens are highly branched, forming a shrubby, bushy

structure of flattened or cylindrical branches. The crustose and foliose type of lichen are the most commonly encountered on the bark of trees. Lichen are not tolerant of inundation. When water routinely stands around the trunks of trees it abruptly limits the growth of lichens producing a distinct line. These are instructive as part of the



Elevated lichen lines, riverine swamp

information used in determining the ordinary or seasonal high water line for some types of wetlands and other water bodies. Many shallow swamps have a seasonal high water which does not result in prolonged inundation of the tree trunks. These wetlands exhibit inundation as the pooling of water over the swamp floor which is typically at a lower elevation than the base of the trees (see vegetated tussocks and hummocks). Lichen lines would not be anticipated in this type of wetland.

(7) Evidence of aquatic fauna. This indicator considers the presence or indications of the presence of animals which spend all or portions of their life cycle in water. Only those life stages which depend on being in or on water for daily survival are included in this indicator. Remember that some types of aquatic fauna are extremely motile and can move into non-wetland areas because of abnormal conditions such as prolonged flooding. Additionally, some adult aquatic beetles and bugs are capable of flight and readily leave the water during warm humid nights. It is not unusual to encounter these animals in uplands, especially if night lighting is present. Look for evidence in the cast skins of insect larva, especially dragonflies, on emergent vegetation, or remanent molluscan shells (bivalves and snail). Crayfish burrows are excellent hydrologic indicators but must be considered with care as they can occur outside areas defined as wetlands and may only be indicators of a seasonal high water table. When this is the

case however, the burrows are, almost without exception, much more numerous on the wetland side of the boundary.

(8) Hydrologic data consists of reports, measurements, or direct observation of inundation or saturation which support the presence of water to an extent consistent with the provisions of the definition of wetlands and the criteria within the rule, including evidence of a seasonal high water table at or above the surface according to methodologies set forth in *Soil and Water Relationships of Florida's Ecological Communities* (Florida Soil Conservation Staff 1992) (see introduction). These observations should be used in conjunction with observations offered by local residents, published reports or data and other hydrologic indicators observed in the field. Provided that a site has not been extensively drained, county soil surveys are an excellent source for hydrological conditions typically associated with a specific map unit.



Dragonfly emerging, (larval cast on the vegetation is a hydrologic indicator)



Crayfish chimney, Withlachoochee River floodplain, (Madison County)

(9) Morphological plant adaptations are specialized structures or tissues produced by certain plants in response to inundation or saturation which normally are not observed when the plant has not been subject to conditions of inundation or saturation. These are often observed in the form of hydric adventitious roots and hypertrophied lenticels. Hydric adventitious roots are typically produced on the stem or trunk of certain plants, when inundated, as an alternative mechanism for aerobic respiration during

a period of anoxia in the soil root zone. Once inundation subsides, these roots cease growth. Hydric adventitious roots are seldom observed rooted into soil. The expression of hydric adventitious roots can vary from only a few individual roots to a bushy abundance which may totally cover the stem. Hypertrophied lenticels are abnormally large lenticels which appear as expanded portions of the outer bark of stems and roots. These also appear to function as a mechanism to enhance opportunities for aerobic respiration. Look for hydric adventitious roots and hypertrophied lenticels on stems of flooded plants such as *Myrica cerifera* (wax myrtle), *Ludwigia* spp. (primrose willow) and *Hypericum* spp. (St. John's-wort). Expanded lenticels can also be found on many species of bottomland hardwood trees. Other examples of morphological plant adaptations produced in response to extended wetness are the conspicuous prop-roots of *Rhizophora mangle* (red mangrove), the "knees" of *Taxodium distichum* (bald cypress), and the buttressing of tree bases as exhibited by *Nyssa sylvatica* var. *biflora* (swamp tupelo), *Ulmus americana* (American elm) and *Quercus laurifolia* (swamp laurel oak).



Hydric adventitious roots and hypertrophied lenticels on stem of *Myrica cerifera* (wax myrtle)

Caution: Once a morphological adaption develops it does not disappear if the site is drained and no longer functions as a wetland.

(10) Secondary flow channels are discrete and obvious natural pathways of water flow landward of the primary bank of a stream watercourse and typically parallel to the main channel. These often occur in conjunction with sediment deposition and water marks. Look for these along streams and rivers, especially adjacent to or within floodplain forests.

(11) Sediment deposition is mineral or organic matter deposited in or shifted to positions indicating water transport. The current of a river or stream during high flow



Butressed roots of *Ulmus americana* var. *floridana* (Florida elm), Peace River (Hardee County)



Prop-roots of *Rhizophora mangle* (red mangrove), Key Largo, (Monroe County)



Buttressed bases of *Taxodium ascendens* (pond cypress), (Leon County)



Sediment deposition, Ochlockonee River floodplain, (Liberty County)

carries sediment that is normally in equilibrium with the lower flow velocity and is thus retained near the bottom as bed flow. When a stream overflows its primary bank and occupies the floodplain, the resultant increase in capacity causes a sudden decrease in velocity in the water outside the main channel. This results in the over bank flow dropping its acquired sediment load in the floodplain usually but not always close to the primary bank. Look for material deposition on rocks and plants especially when the deposition is observed on the upstream surface and not on the downstream surface. Sediment deposited as erosion from uplands is not included in this indicator.

(12) Vegetated tussocks or hummocks are areas where vegetation is elevated above the natural grade on a mound built up of plant debris, roots, and soils so that the growing vegetation is not subject to the prolonged effects of soil anoxia. Look for these in hydric hammocks and in areas of shallow prolonged



Vegetated hummocks

inundation or where the soil is saturated to the surface for long duration. Tree buttressing is often associated with tussocks or hummocks in saturated soils.

(13) Water marks. Water marks are created by the staining effect of a sustained water elevation. This will appear as a distinct line created on fixed objects, including vegetation. The length of time the object has been inundated influences the expression of this indicator, as does the color and sediment burden of the water. Look for this in conjunction with sediment deposition, especially along rivers and streams. Seasonal high water marks in wetlands and other water bodies often appear related to the elevated lichen lines, aquatic moss and liverwort zones and water stained areas of trees, rocks and other objects.



Water marks in hydric hammock, (Citrus County)

Delineation of Wetlands (section 62-340.300, F.A.C.)

This section lays out the physical evaluations which are conducted on site to determine the placement of a wetland boundary. These evaluations are conducted as a continuous process to produce a spatial line or boundary on the ground. The area landward of this line is the ***upland*** and the areas waterward of this line is the ***wetland.*** The line represents ***the landward extent of wetlands.*** The procedures for evaluating the placement of the boundary line should be conducted using **reasonable scientific judgement**.

Direct Application of the Wetland Definition (subsection 62-340.300(1), F.A.C.)

The first evaluation that is performed before delineating a wetland is to determine if the area meets the *definition of a wetland* as stated in subsection 62-340.200(19), F.A.C. The transition between some wetland areas and the uplands is so abrupt that a visual observation is all that is required to established the wetland boundary. If it is determined that the area qualifies as a wetland and the boundary line can be easily located on site independent of the technical procedures described below, then the wetland boundary may be delineated solely on the basis of the on-site characteristics consistent with the wetland definition. When this section is implemented there is an assumption that the boundary line placement is very close, if not equivalent, to the line which would be determined using the technical procedures. Remember that this is a legal boundary with specific characteristics.

If the boundary line cannot easily be located without a closer examination of its characteristics, then the technical procedures of the rule described below shall be followed and adequate descriptions of the in-situ conditions and the placement of the delineation will be recorded.

Technical Delineation Procedures (subsection 62-340.300(2), F.A.C.)

This section provides the conditions for determining when an area qualifies as a wetland. Before using the technical procedures requiring vegetative dominance, it is important to understand the application of the phrase *appropriate vegetative stratum* as presented in section 62-340.400, F.A.C.

Selection of Appropriate Vegetative Stratum (section 62-340.400, F.A.C.)

The rule employs three vegetative strata: canopy, subcanopy, and ground cover. An explanation of each of these terms is found in the definition section of the rule and was further explained previously. When applying the provisions of the rule that use vegetative dominance, only the vegetation in one of these strata is used to evaluate dominance.

Always begin the process using the uppermost stratum which is present. In some wetlands, such as a marsh, the ground cover is the only stratum present and is therefore the uppermost stratum.

The uppermost stratum is not used if the areal extent (coverage by the vegetation) of the stratum is less than 10% of the area (community) being evaluated. In determining coverage of the uppermost strata, ***facultative*** plants are not considered. For example, a forest where *Melaleuca quinquenervia* makes up greater than 90% of the cover of the canopy would be evaluated using either the subcanopy or ground cover, not the canopy. When the ground cover is the uppermost stratum, the 10% coverage is moot as there is no lower stratum that could be used.



Canopy of *Pinus elliottii* (slash pine) growing under inundated conditions (a wetland!)

The canopy is often the uppermost stratum. Do not separate individual "holes in forest" using this provision unless they represent a separate community type. For example, pine flatwoods, which are open forests, frequently have individual areas of less than 10% areal coverage by the pine tree canopy, yet the forest as a whole usually exhibits 40-60% canopy coverage. Remember, anything less than a 100% closed canopy has some area where there is no canopy: view the forest as a unit when it constitutes a uniform community. Conversely, only include the plants actually growing in a specific community in the

determination of appropriate strata. At times, trees in one community may over hang another. A stream is still a water body even if totally covered by overhanging live oaks growing on upland banks. A small upland peninsula extending into a swamp is still an upland even if totally covered by the spreading branches of cypress trees growing in the adjacent swamp.

The uppermost stratum is also not used when the indicator status of the uppermost stratum is clearly in conflict with the hydrologic conditions on-site. A determination that the upper stratum is not an accurate indicator of the true nature of the area being evaluated must be accomplished using reasonable scientific judgment (see Introduction) and requires that the party shifting from the uppermost stratum bear an addition burden of proof. Those wetlands that do not express their wet nature in the canopy can be delineated using this provision. Some severely drained former wetlands that retain their original canopy are also candidates for this provision. When the uppermost stratum is discounted after careful review of all factors related to the on-site hydrology, then the



Seasonally inundated hydric pine flatwoods (a wetland!)

remaining stratum most indicative of the true nature of the site should be used to make the determination. Differences between the indicator status of the vegetative strata do not automatically allow the shifting from the uppermost stratum; additional on-site derived evidence is required. The indicator status of lower strata vegetation can, however, influence the weight attributed to other on-site hydrologic evidence used in arriving at a reasonable scientific judgment regarding whether to shift from the uppermost stratum. Using this principle, the presence of obligate vegetation in a lower stratum would provide greater support to weak hydrologic evidence than would

facultative wet vegetation. While facultative wet vegetation can certainly serve as the basis for a lower strata most indicative of the true hydrologic nature of a site, it is a reasonable scientific judgment to expect that the site would exhibit hydrologic evidence that is convincing for the type of wetland community and its location in the state. In evaluating on-site hydrologic evidence, knowledge of the rainfall status of the site is vital because similar expressions of wetness may provide differing degrees of evidence under differing rainfall conditions. Shifting out of the uppermost stratum may only be used to accurately establish the wetland or upland nature of the community not to reflect the immediate (short term) hydrological status of low, occasional wet uplands or drought impacted wetlands.

Points to remember:

- **This procedure shall be conducted when the indicator status of the top stratum appears not be indicative of the normal hydrology of the area being evaluated.**

- **The evaluation must be backed up by sufficient information for the delineator to be sure that the decision to use another stratum is correct.**

- **This evaluation can be used at any time during the delineation procedure.**

Technical Delineation Procedures (subsection 62-340.300(2), F.A.C.)

The order in which these procedures are used does not matter. The approach used varies from individual to individual. Some will notice the topographic changes and hydrologic indicators before observing vegetation patterns. Others may not make any judgement until evaluating the soil conditions. A knowledge of the applicability of each of the four technical procedures is essential to accurately use the rule. The boundary will be delineated by the procedure (*test*) that distinguishes wetland conditions from upland conditions as defined and represented in the rule.

First, make a determination that the area is a wetland, then starting within the wetland move landward to the point on the slope where the technical procedures of the rule all fail. Variability should be limited to the realm of *reasonable scientific judgement*. If *hydric soil indicators* and *hydrologic indicators* extend beyond the area of listed species dominance, the result must be reviewed with *reasonable scientific judgement*. This allows the evaluation of ecological information as well as all other facts and factors. Once a boundary point is established the delineation typically proceeds parallel to the wetland as an extension of the initial point. Along this boundary fixed points are periodicly marked (flagged) to designate the location. Because the boundary is a continuous feature, the visual line of sight between points must reflect the upland/wetland interface. If it does not, additional points must be flagged. As the delineation continues, remember that **all** the provisions of the methodology are constantly in operation. This requires the delineator to frequently reaccess the technical procedures and use of appropriate strata. Fortunately, most wetland delineations only involve a couple of procedures and the

pattern in which these are used becomes apparent along the way.

62-340.300(2)(a) "A" Test: is the dominance of obligate vegetation over upland vegetation in the appropriate stratum and ecological support for wetland conditions on site in the form of either hydric soils or convincing hydrologic indicators (Figure 1).

OBLIGATE VEGETATION > UPLAND VEGETATION
AND
HYDRIC SOIL CHARACTERISTICS OR RIVERWASH
OR
HYDROLOGIC INDICATORS

Figure 1. The "A" test (obligate plant test) conditions in brief.

62-340.300(2)(b) "B" Test: is the dominance by any combination of obligate and facultative wet vegetation at a coverage of 80% or greater (this is the same as saying that the coverage by upland vegetation must be less than 20%) and ecological support for wetland conditions on site in the form of either hydric soils or convincing hydrologic indicators. (Remember, facultative plant coverage is not included in this comparison.) (Figure 2).

OBLIGATE + FACULTATIVE WET ≥ 80% (UPLAND < 20%)
AND
HYDRIC SOIL CHARACTERISTICS OR RIVERWASH
OR
HYDROLOGIC INDICATORS

Figure 2. The "B" test (facultative wet plant test) conditions in brief.

The Plant Tests "A" Test and "B" Test

Since vegetation is one of the most apparent aspects of a landscape, the use of vegetation dominance is a frequently used procedure for determining a wetland boundary. Neither the "A" nor the "B" test include the use of facultative vegetation, vines, nor aquatic plants in estimating the percent areal coverage for dominance. Many plant species have a variable tolerance to microenvironmental conditions. The vegetation patterns may reflect zones of hydrology across a landscape which may not necessarily coincide with the wetland/upland boundary. When using vegetative dominance to establish the wetland boundary, be sure to consider the remaining technical procedures prior to formalizing the determination.

Both the "A" and "B" tests have additional provisions that allow a positive demonstration of wetland conditions in the absence of either hydric soil indicators or hydrologic indicators when the upper soil profile has been mechanically mixed or when the substrate is not technically a soil. Use of these additional provisions should only be implemented in consultation with a professional soil scientist present on site.

Reticulate Communities are areas where two or more vegetative communities intergrade in a complex labyrinth. In such a situation, the dominant community should be used for the vegetative test. Examples of reticulate communities include: ecotonal flatwoods with mixtures of mesic flatwoods and wet prairies or savannahs, wetland pine rockland areas of the Keys, and wet prairies along the footslopes of the central highlands and some coastal areas of the panhandle. This is not intended to apply when discreet communities can be delineated, such as wetland flowways through mesic flatwoods. Only one hydric soil indicator or one hydrologic indicator subject to reasonable scientific judgement is needed to support the dominance of hydrophytic vegetation.

62-340.300(2)(c) "C" Test: is the use of specific soil situations to delineate wetlands. In the "C" test certain soil situations are identified as providing sufficient evidence to serve as the sole factor in wetland identification and delineation. The "C" test cannot be used in pine flatwoods, improved pastures and drained soils. Both pine flatwoods and improved pastures are defined for purpose of this section only.

> *"Pine flatwoods shall mean a plant community type in Florida occurring on flat terrain with soils which may experience a seasonal high water table near the surface. The canopy species consist of a monotypic or mixed forest of long leaf pine or slash pine. The subcanopy is typically sparse or absent. The ground cover is dominated by saw palmetto with areas of wire grass, gallberry, and other shrubs, grasses and forbs which are not obligate or facultative wet species. Pine flatwoods do not include those wetland communities as listed in the wetland definition contained in subsection 62-340.200(19) which occur in the broader landscape setting of pine flatwoods and which may contain slash pine."*
>
> *"Improved pasture shall mean areas where the dominant native plant community has been replaced with planted or natural recruitment of herbaceous species which are not obligate or facultative wet species and which have been actively maintained for livestock through mechanical means or grazing."*

An area is considered to have drained soils only when the hydrology has been changed to such an extent as to prevent the formation and maintenance of hydric soils as defined in the rule. The definition of hydric soils can be found in the definition section of the wetland delineation rule (Appendix A) and applies to the entire rule. As with any part of the rule, on-site observation and verification of the specific soil conditions mentioned in the "C" test is mandatory.

1. Soil Taxonomy
From the soil classification system (Soil Survey Staff, 1994), six great groups and one soil order are identified as having soils that form only under very poorly drained conditions. The taxonomic names of the six *great groups* are: ***Argiaquolls, Hydraquents, Humaquepts, Sulfaquents, Umbraqualfs,*** and ***Umbraquults***. ***Histosols*** are the order that is included in this section. The organic soils belong to this order. All Histosols are included in the "C" test except the Folists, which do not form under saturated or inundated conditions. In Florida, Folists are found only in the Keys and lower Dade County. The six great groups and the organic soils can be considered to be the wettest of the hydric soils and are always found in wetlands under natural drainage conditions.

Soil Taxonomy has an hierarchial scheme similar to the biological classification used for plants and animals. Moving from the broadest classification level to the most specific, the classification levels of *Soil Taxonomy* are: order, suborder, great group, subgroup, family, and series. The great group level is the third level of soil classification. Within each of the six great groups mentioned in the "C" test, there are from 2 to 10 soil series in Florida. The soil series is the lowest level of classification. Common names are used for soil series which were named after towns, rivers, lakes, or geologic formations in the vicinity of where the soil was first identified as a discrete soil entity. For example, in Florida, the three soil series (Turnbull, McKee, and Riomar) are classified as belonging to the great group *Hydraquents* and can be used in the "C" test. The taxonomic names of the various soil series within a county can be found on the map legend between the text and the aerial photographs in the county soil surveys produced by the USDA - NRCS. Field verification of the great groups within a soil map unit is required. The boundary of the great group or organic soil will define the limit of the wetland using the "C" test.

2. Saline sands
Saline sands are tidal areas that have limited or no plant growth due to high salt concentrations. These areas are generally tidal, very poorly drained, and are found in high marsh areas.

3. Frequently Flooded and Depressional Map Units
Soil mapping units are not a part of soil classification, but are a subdivision of the soil series based on different land use and management. Map units generally have inclusions of other soils series and non-soil. The **frequently flooded** and **depressional** map units are also included as stand-alone criteria in this section of the rule. The county soil surveys have a list of map units in the map legend. Once an area has been located on the aerial photographs, the map unit can be identified from the map unit symbols. Because of the constraints on the detail of soil maps, the boundaries of depressional and frequently flooded areas must be verified in the field. The boundary of the hydric soils within this map unit is the field adjusted boundary of the frequently flooded or depressional map unit. Areas above the adjusted boundary may still inundate or flood but may not meet the duration requirements necessary for wetland formation. Other areas above the boundary may also be inclusions of upland soils within the map unit that

neither inundate nor flood. The boundary of a depressional or frequently flooded map unit can be systematically checked by examining the soils along a traverse moving uphill from the center of the map unit. A soil scientist from the USDA - NRCS can serve as a third party to settle boundary disputes between the petitioner and the regulating agency. Unlike the field test for the great groups and organic soils, the soils within the map unit need only be hydric and proof that they are the soil that the map unit defines is not necessary.

62-340.300(2)(d) "D" Test : is the presence of a hydric soil and a hydrologic indicator (Figure 3). Using this procedure, the presence of a hydric soil and a hydrologic indicator, once subjected to reasonable scientific judgement, represents sufficient information for designating an area as a wetland. The application of reasonable scientific judgement is very important in the use of this procedure. Vegetative dominance by species listed in section 62-340.450, F.A.C., is not required in order to use this procedure. Vegetation present on site may however be considered in the application of reasonable scientific judgement. A list of 13 hydrologic indicators that meet the hydrologic criteria is provided in section 62-340.500, F.A.C., of the rule. Among the hydrologic criteria, hydrologic data specifies that any evidence of a seasonal high water table at or above the surface according to methodologies set forth in *Soil and Water Relationships of Florida's Ecological Communities* (Florida Soil Conservation Service Staff, 1992) can be used as a hydrologic indicator. This allows the hydric soil indicators of muck, mucky texture, gley colors, and sulfidic odor to act as both a hydric soil indicator and a hydrologic indicator.

HYDRIC SOIL INDICATORS + HYDROLOGIC INDICATORS

Figure 3. The "D" test (Hydrologic Indicators Test) in brief

Altered Sites (subsection 62-340.300(3)(a), F.A.C.)

This subsection is only used when the technical procedures discussed above cannot be applied because of man-induced or natural disturbances or alterations. An activity that could produce this scenario would be the clearing and tilling of shallow wetlands or low uplands when no additional drainage is involved. With the vegetation taken away and the soil surface layer scrambled, it may be difficult, if not impossible to use the technical procedures outlined above.

When this is the case, all alternative information relating to conditions on site immediately prior to the alteration shall be considered. The rule provides examples of reliable sources of information.

Two questions to consider while evaluating the available information are:

1. What was the ecological community in place prior to the alteration? (Was this area upland or wetland before the alteration?)

2. Has the alteration had a temporary or permanent effect on the hydrology of the site? Sites, where exempted or permitted dredging or filling activities have altered the hydrology to the extent that it is no longer a reasonable scientific judgement that the site is a wetland, are not included in the altered sites provision. When the only alteration is the removal of the vegetation from a site, it can reasonably be expected that the site, if no further alterations occurred, can and probably will return to its former condition. Lowering of the soil surface may constitute a change to the on-site hydrology.

Wetland Hydrology (section 62-340.550, F.A.C.)

While the rule does not, can not, and should not provide a numerical criteria for the use of the presence of water in the identification and delineation of wetlands, the absence of water under certain circumstances may be used in a backstop mode to evaluate sites which have possibly lost wetland functions through excessive drainage. This provision is used only to refute a wetland delineation established by the other procedures of the rule. The numeric criteria used in this section were developed from standards which, under typical seasonal expression and recurrence, will usually result in the formation of hydric soils. Areas with soils that exhibit hydric soil indicators yet clearly fail these numeric criteria under the terms prescribed in the rule are relict hydric soils. A relict hydric soil does not correlate to current hydrologic conditions extant on site. Use of this provision, through the application of the numeric criteria, requires long-term records or site specific hydrologic data.

Site specific, field-verified, analytic or numerical models may also be used to refute a wetland delineation. A model must demonstrate that the area delineated as a wetland using the procedures of the rule is no longer subject to either regular and periodic inundation or saturation. In order to prevent possible loss of time or waste of capital, the rule mandates that the use of models occur only after agreement by the regulating agency. Rejection of a proposed model by the regulating agency must be accompanied by reasons based on generally accepted scientific and engineering practices.

Surface Waters (section 62-340.600, F.A.C.)

It is the purpose of Chapter 62-340, F.A.C., to provide a methodology for delineating the landward extent of all surface water bodies subject to the legislative intent of subsections 373.421(1) and .414(1), F.S. This intent is expressed in subsection 62-340.600(1), F.A.C., as follows:

> *"For the purposes of section 373.421, F.S., surface waters are waters on the surface of the earth, contained in bounds created naturally or artificially, including, the Atlantic Ocean, the Gulf of Mexico, bays, bayou, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses..."*

Surface waters include *wetlands* as a subset of the types of surface waters found in Florida. *Wetlands* are those areas defined in subsection 62-340.200(19), F.A.C.:

> *"...those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto".*

Some types of surface waters have both wetland and non-wetland components. Some surface waters have no associated wetlands. Some surface waters are all wetland. The technical procedures previously discussed are used whenever the landward boundary of the surface water coincides with the boundary of a wetland as defined. Because of topographic, climatic, and geologic factors, there are areas adjacent to most Florida surface water bodies that regularly flood but which do not develop wetland characteristics. The landward extent of surface waters, when it is other than a wetland, is determined through the location of the *ordinary high water line* (OHWL) for freshwater surface waters, the *mean high water line* (MHWL) for tidal surface waters, and the top of bank or seasonal high water for excavated surface waters as described in subsections 62-340.600(2)(b)(c) and (d), F.A.C. These non-wetland boundary criteria are never used to establish the surface water boundary waterward of a wetland boundary determined using the technical procedures of section 62-340.300 F.A.C. If a wetland is identified landward of the non-wetland surface water boundary, the provisions for wetland delineation can be applied landward and adjacent to the OHWL, MHWL, or top of bank.

Mean high water is an established series of elevations for specific locations along the coast based on the preceding 19 years of tidal data. The elevation for *mean high water* can be located by a professional land surveyor with available NOAA tidal data. The *mean high water line* is the average elevation of the high tides for any particular point on the coast. Half of the normal high tides will be above the MHW line. In some low coastal areas, wetlands occur landward of the MHWL beyond a zone of bare sand created by the continual disturbance of waves. When determining if the upper wetland is either part of the larger tidal waterbody or a separate wetland, *reasonable scientific judgement* should be applied to the analysis of the nature and frequency of the tidal connection. Repeated chronic disturbances such as waves or the disturbances caused by all terrain vehicles do not generally interfere with the placement of the boundary line. Such areas should be evaluated as if those disturbances have not occurred.

Ordinary high water is that point on the slope or bank where the surface water from the water body ceases to exert a dominant influence on the character of the surrounding vegetation and soils. The OHWL frequently encompasses areas dominated by non-listed vegetation and non-hydric soils. When the OHWL is not at a wetland edge, the general view of the area may present an "upland" appearance. This is deceiving in that flooding is common. This area, close to the OHWL, is subjected to an extreme variety of wet and dry conditions. It often proves to be a harsh environment for many plants. This is reflected by the denuded band of sand observed around many Florida lakes.

Water bodies display a cyclic pattern that is expressed through the periodicity of the high and low water elevations above and beyond the typical seasonal variation. The cycle for any given waterbody can be as variable as the water bodies themselves. To determine an accurate elevation for the OHWL, the hydropattern of the waterbody needs to be assessed. This can of course be accomplished through long-term hydrologic data collection. When available, the mean annual flood elevation is an acceptable approximation of the OHWL for flowing water systems. Often, however, this data is not available. An additional way to understand a particular hydropattern is through an evaluation of the age and condition of the plant community on the slope and the structure of the soils. Soil structure is the least used approach as it involves the tedious and time consuming examination and analysis of grain size distribution. Organic content of the soil is also not particularly useful as an indicator for determining the OHWL.

The vegetative characteristics are more prominent and reliable as an indicator in determining the OHWL. Overall, the most productive approach is to locate the least disturbed area along the waterbody and determine the edge of the mature, upland vegetative community. Flooding events are major physical disruption to non-wetland vegetative communities. Between high water events, the community will begin to regenerate, however, there will be an apparent, discrete differential in the age and/or condition of the vegetation in the regeneration zone. Be careful when evaluating the age of the trees. Many species can display their largest form within the OHWL. Some species of pines and *Myrica cerifera* (wax myrtle) provide an excellent example of this situation. *Pinus teada* (loblolly pine), especially, are known to develop fine specimen individuals under conditions that warrant an OHWL evaluation. The condition of the tree rings, if available for analysis, will reflect the age of the trees and periods of high water, drought and fire. *Quercus virginiana* (live oak) is one of the most common species

observed along the OHWL edges of lakes. Don't attempt to core the live oaks. The wood is so dense, the core will probably break and it takes an expert in this field to correctly analyze the information captured within the dense rings. Pines are easy to core and it is also easier to interpret the information which the rings reveal. The number of tree rings will provide an age for the tree. Additionally, the size and condition of individual tree rings will correlate to specific events in the history of the tree. Coring, however, is not necessarily good for the health of the tree and permission should be obtained from the property owner prior to any attempt to core a tree.

High water events leave indicators on the vegetative community, including but not limited to those listed in section 62-340.500, F.A.C., which are correlated to the duration and frequency of the events. When determining an OHWL, additional indicators of use include basal scarring and the partial to complete death of the non-wetland woody vegetation caused by repetitive high water events. Live oaks can be observed with the waterward portion of the tree dead and the landward portion of the tree alive. Basal scarring involves the process of bark saturation (and drying) resulting in a swelling and sometimes, fissuring of the bark.

Features of the overall community can also be of use. A distinct or abrupt change in the community composition, character, age, or distribution will often occur near or at the OHWL. Experience with this type of delineation will reveal more subtle characteristics. To be associated with an OHWL indicators should all agree within a narrow elevational zone.

The OHWL as presented in Chapter 62-340, F.A.C., is to be used only for the purposes of surface water regulatory authority under Chapter 373, F.S. The OHWL as that term is used in this text and in the delineation of wetlands has no relationship with the OHWL determinations conducted by the Division of State Lands of DEP in determining the landward extent of state ownership of sovereignty submerged lands.



The St. Marks River, a surface water body, (Wakulla County)

Exemptions (section 62-340.700, F.A.C.)

This section further expresses the legislative intent regarding the regulation of surface waters by excluding from delineation entirely or by limiting the scope of regulatory review in surface waters approved for use as wastewater treatment areas. The details of this section are summarized below in figure 4.

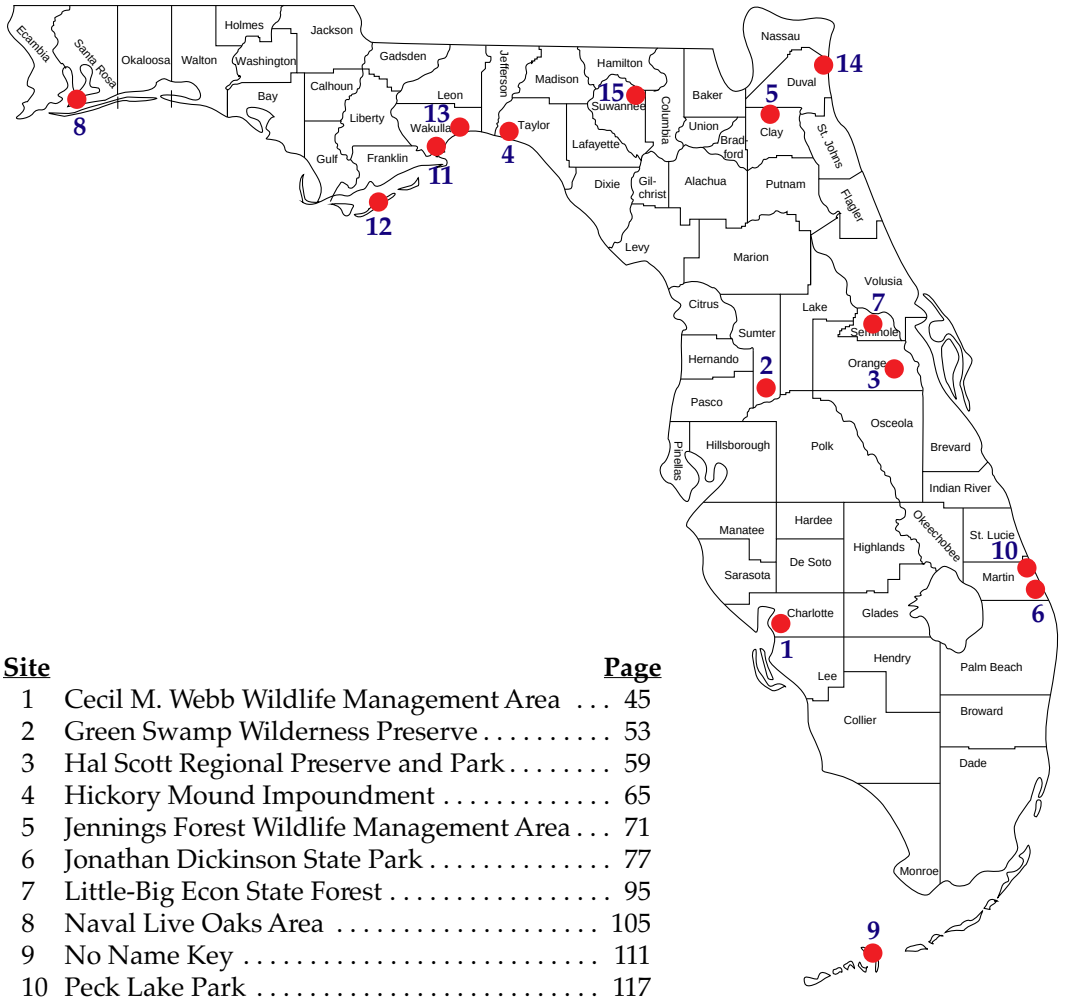
Wastewater Treatment areas except wetlands used for treating effluents under permit.	**Not delineated as Wetlands or Surface Waters** **None of the additional wetland permitting criteria apply**
Small (less than 0.5 acres of combined area) Stormwater Treatment areas	**Not delineated as Wetlands or Surface Waters** **None of the additional wetland permitting criteria apply**
Larger (greater than 0.5 acres of combined area) Stormwater Treatment areas	**Wetland in these systems are delineated** **Only the permitting criteria related to Endangered and Threatened Species apply**
Previously existing wetlands incorporated into Stormwater Treatment areas	**Delineated as wetlands** **Permitting criteria relating to Fish and Wildlife apply**

Figure 4

Mosquito Control (section 62-340.750, F.A.C.)

All areas which were historically *upland* pursuant to Chapter 373, F.S., and which have become *wetland* **solely** because of excavation or impoundment conducted **solely** for the purpose of mosquito control, and which were performed by a governmental entity, shall not be considered wetlands pursuant to Chapter 62-340, F.A.C. In order for the regulating agency to review this exemption, the applicant must provide proof of the conditions as stated in the previous sentence.

Location of Sites



Site		Page
1	Cecil M. Webb Wildlife Management Area	45
2	Green Swamp Wilderness Preserve	53
3	Hal Scott Regional Preserve and Park	59
4	Hickory Mound Impoundment	65
5	Jennings Forest Wildlife Management Area	71
6	Jonathan Dickinson State Park	77
7	Little-Big Econ State Forest	95
8	Naval Live Oaks Area	105
9	No Name Key	111
10	Peck Lake Park	117
11	Purify Bay	125
12	St. George Island State Park	131
13	Saint Marks National Wildlife Refuge	137
14	Little Talbot Island State Park	145
15	Woods Ferry	153

Reference Site Information

Considerable time and effort was required to locate reference sites which were: hydrologically stable, publicly accessible, and secure from general uncontrolled disturbance. The reference sites are all located on properties which are preserves, reserves or management areas. These treasures are here for everyone to use and enjoy, including our future generations. You may not collect plant specimens or otherwise disturb the natural resources in any of these areas without a permit. The reference sites are all small demonstration areas. Please leave them as you find them. Take only pictures. Impacts to the reference sites may alter the information provided to others visiting after you. Several of the sites require prior authorization before entering. This is both for the protection of the visitors and of the natural resources. Fees are required to enter a few of the properties. The fees also go towards protecting the natural resources or enhancing appropriate public use.

If you believe that an alteration has occurred at a reference site, please contact the nearest DEP or WMD resource permitting office and describe the alteration. We will address the situation as soon as possible.

Cecil M. Webb Wildlife Management Area

(Charlotte County)

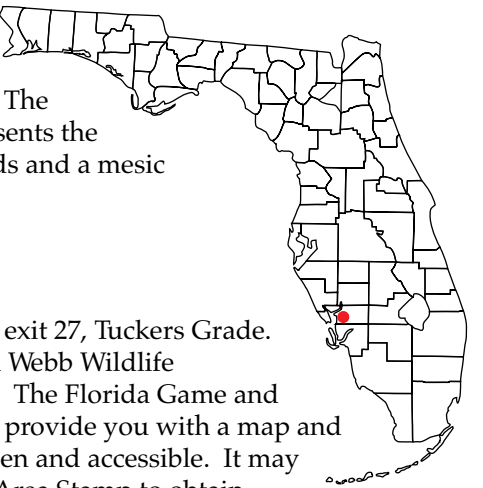
SLOUGH/HYDRIC PINE FLATWOODS



Hydric pine flatwoods

LOCATION

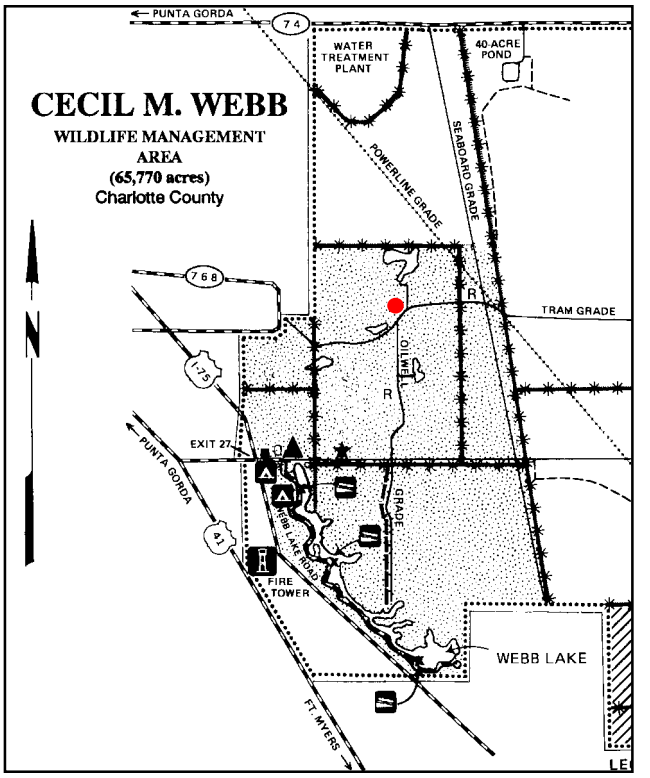
The Cecil M. Webb Wildlife Management Area is located in Charlotte County along the east side of I-75 south of Punta Gorda. The property is an extensive mosaic of mesic and hydric pine flatwoods interspersed with ponds, sloughs, and small areas of hardwood hammock. The reference site is relatively easy to locate and represents the boundary between a slough/hydric pine flatwoods and a mesic pine flatwoods.



ACCESS

The property may be reached from I-75 by way of exit 27, Tuckers Grade. Travel east on Tuckers Grade and stop at the Cecil Webb Wildlife Management Area office which will be on the left. The Florida Game and Freshwater Fish Commission personnel there will provide you with a map and information on which areas of the property are open and accessible. It may be necessary to purchase a Wildlife Management Area Stamp to obtain access. The cost at the time of this printing is $26 per year. The stamps can be obtained

wherever a hunting license may be obtained, but are not available at the management area office. If you wish to visit, please contact the management area office at (941) 639-



1531 or Suncom 721-7161, or the Lakeland regional office at (941) 648-3205 or Suncom 595-3205 prior to your trip. The location of the reference site is not far from the main entrance. Specifically, the reference site is located at the intersection of Oilwell Grade and Tram Grade (as indicated by the red dot on the map). There is a section of upland pine flatwoods along the left side of the road just before the intersection. The wetland boundary is located on the inside of that small upland area and is marked by concrete monuments.

COMMUNITY CHARACTERIZATION

The reference site is a hydric pine flatwoods bordering a shallow freshwater slough located along the headwaters of Alligator Creek. In places, the herbaceous components of the ground cover along with the density of saw palmetto present a clear picture of the difference between the mesic and the hydric flatwoods. However, the wetland boundary in an area such as this is often not defined by sharp breaks in soil characteristics, or in vegetative composition. A slight but perceptible slope is present from the wetland through the upland. Hydrologic indicators are helpful but also may be obscured by the

effects of fire and the shallow inundation and saturation within the outer zones of the wetland.

DELINEATION PROCEDURE

The presence of a wetland is established by the use of a depressional soil mapping unit, Felda fine sand, depressional. Pursuant to subsection 62-340.300(2)(c), F.A.C., the hydric nature of soils within the depressional mapping unit are confirmed by the presence of oxidized rhizospheres. Moving landward from the depressional soil mapping unit, hydric soil indicators continue to be present and the herbaceous vegetation is typical of a hydric flatwoods community, with many obligate grasses and sedges and thin stemmed dicots. The wetland boundary is determined using vegetative dominance and the presence of hydric soil indicators (subsections 62-340.300(2)(a) and (b), F.A.C.). A shift in ground cover dominance marked by the abundance of *Serenoa repens* (saw palmetto) or the absence of hydric soil indicators establishes the wetland/upland boundary. In other places along the boundary, it will be necessary to consider a canopy of *Pinus elliottii* (slash pine). Locating the edge in these areas will require consideration of all facts and factors



Active crayfish burrow in hydric pine flatwoods

relating to the hydrologic nature of the site. At this local, an abundance of crayfish borrows, along with a prevalence of obligate plants in the ground cover, provides sufficient data to conclude that the areas are wetlands in keeping with the wetland definition. The appropriate stratum to use in the application of vegetative dominance would be the ground cover not the canopy. Because crayfish borrows extend landward

of the dominance of listed plants, the provisions of subsection 62-340.300(2)(d), F.A.C., are also evaluated. An obvious decrease in the number of active crayfish chimneys is observed as the vegetative boundary is crossed moving landward. The key word here is *active*. Crayfish are ambulatory creatures and will move their burrow location or burrow entrance with changing ground water elevations. It was acknowledged that water levels had been higher in the recent past. It is not uncommon for mesic pine flatwoods in south Florida to have short periods of surface water inundation during the peak of the rainy season. The presence of the crayfish burrows in the upland was not deemed significant enough to compare to the numerous observations of crayfish chimneys observed waterward of the line. In considering all facts and factors pertaining to the intent of the wetland definition, reasonable scientific judgment did not support the use of subsection 62-340.300(2)(d), F.A.C., in this situation. The wetland boundary line is thus set where there is a vegetative change to a dominance of saw palmetto or a lack of hydric soil indicators.

Vegetation Immediately Waterward of the Wetland Boundary

Ground cover

Amphicarpum muhlenbergianum	FACW	blue maidencane
Cirsium horridulum	UPLAND	thistle
Eleocharis sp.	OBL	hairgrass
Eryngium baldwinii	FAC	coyote-thistle
Juncus sp.	OBL	rush
Melochia corchorifolia	FAC	chocolate weed
Myrica cerifera	FAC	wax myrtle
Panicum tenerum	OBL	bluejoint panicum
Phyla nodiflora	FAC	frog fruit
Pluchea spp.	FACW	marsh fleabane
Rhynchospora microcarpa	OBL	southern beakrush
Schizachyrium rhizomatum	FAC	little bluestem
Setaria geniculata	FAC	bristle grass
Stillingia aquatica	OBL	corkwood

Note: The species diversity in this wetland community is very high. A list of the species characteristic of the internal slough wetland area was recorded but not presented here. Only those species observed landward of the *Hypericum fasciculatum* zone are included. These lists were recorded following a burn and the vegetative species diversity observed was low.

Vegetation Immediately Landward of the Wetland Boundary

Canopy

Pinus elliottii	UPLAND	slash pine

Subcanopy

Pinus elliottii	UPLAND	slash pine

Ground cover

**	*Aristida stricta*	FAC	wiregrass
	Erigeron vernus	FACW	early fleabane
	Melochia villosa	UPLAND	hairy chocolate weed
	Myrica cerifera	FAC	wax myrtle
**	*Serenoa repens*	UPLAND	saw palmetto

** Designates species which are overwhelmingly dominant.

SOIL DESCRIPTIONS

USDA-NRCS Soil Survey of Charlotte County - Sheet 35
The wetland soil is mapped as Felda fine sand, depressional (mapping unit #49)

49 - Felda fine sand, depressional is composed of:

85% - Felda soil	hydric component
10% - Malabar soil	hydric inclusion
5% - Pompano soil	hydric inclusion

The upland soil is mapped as Heights fine sand (mapping unit #70)

70 - Heights fine sand is composed of:

70% - Heights soil	non-hydric component
10% - Felda soil	hydric inclusion
20% - Heights soil	hydric inclusion

Soil Profile Descriptions

Point 1. Seventy-two feet waterward of the wetland boundary line (water table - 2 inches).

Horizon	Depth (in)	
A1	0-2	very dark grayish brown (10YR 3/2) fine sand
E or C	2-12+	grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), and

very dark grayish brown (10YR 3/2) fine sand with yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) oxidized rhizospheres in the upper three inches of the horizon

Hydric soil: Yes
Hydric soil field indicators: presence of oxidized rhizospheres in the upper part of the E horizon.



Point 2.

Point 2. One feet waterward of the wetland boundary line (water table - 9 inches).

Horizon	Depth (in)	
A1	0-3	very dark gray (10YR 3/1) fine sand, many fine and few medium roots
A2	3-5	dark gray (10YR 4/1) fine sand with dark yellowish brown (10YR 4/4) oxidized rhizospheres, common medium roots
E or C	5-12+	grayish brown (10YR 5/2) fine sand with yellowish brown (10YR 5/6) oxidized rhizospheres, few large and medium roots

Hydric soil: Yes
Hydric soil field indicators: presence of oxidized rhizospheres in the A2 and E horizons.



Point 3. in the South Florida flatwoods areas, the upland soils (non-hydric) tend to be darker in color (more organic matter) then the hydric soils.

Point 3. Fifty feet landward of the wetland boundary line (water table - 14 inches).

Horizon	Depth (in)	
A1	0-4	very dark gray (10YR 3/1) fine sand, many fine roots
A2	4-6	dark gray (10YR 4/1) fine sand, common fine and medium roots
B?	6-11	dark grayish brown (10YR 4/2) fine sand with yellowish brown (10YR 5/6) oxidized rhizospheres, common fine and medium roots
Cr	11+	white (10YR 8/1) very crumbly limestone

Hydric soil: No
Hydric soil field indicators: presence of oxidized rhizospheres in the B horizon were below six inches.

Green Swamp Wilderness Preserve

(Sumter County)

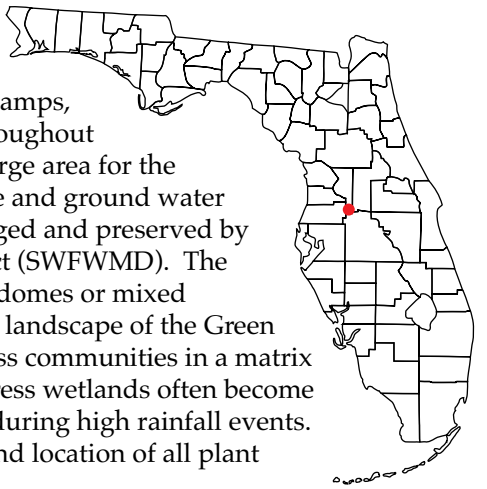
CYPRESS DOME



Interior of a cypress dome

LOCATION

The Green Swamp is an important ecosystem of central Florida. Located between Tampa and Orlando, the drainage from the Green Swamp forms the headwaters of the Withlacoochee, Hillsborough, Oklawaha, and Peace River watersheds. This vast area of bay swamps, shrub bogs and cypress swamps interspersed throughout low ridges and pine flatwoods is a primary recharge area for the Floridan aquifer. Due to its importance in surface and ground water supplies, portions of the Green Swamp are managed and preserved by the Southwest Florida Water Management District (SWFWMD). The cypress swamps of the area are typically cypress domes or mixed hardwood-cypress strands. Much of the wetland landscape of the Green Swamp has an abundance of these isolated cypress communities in a matrix of pine flatwoods. These seemingly isolated cypress wetlands often become connected by sheetflow over the pine flatwoods during high rainfall events. Fire plays an important role in the composition and location of all plant communities in the Green Swamp area.



ACCESS

The reference site, known as Cypress Dome #6 by the SWFWMD, is located within the Green Swamp Wildlife Management Area in Sumter County. The reference site is approximately 2.5 miles east of State Road 471, approximately 7 miles south of the intersection of S.R. 471 with State Road 50. Look for the sign, "Green Swamp, Southwest Florida Water Management District". At this point S.R. 471 intersects with South Grade, an unpaved road. Take South Grade east to Tanic Grade. Take Tanic Grade south from this intersection, parallelling Devil's Creek Swamp, to the intersection with Three Mile Grade. Take Three Mile grade north. The site is approximately one mile from the intersection of Tanic Grade and Three Mile Grade on the south side of Three Mile Grade.

COMMUNITY CHARACTERIZATION

A cypress dome is a shallow, forested, circular depression with a domed cross sectional profile created by a growth pattern that concentrates the larger trees in the central area. Cypress domes get most of their water from the surrounding flatwoods. The boundaries of cypress domes are maintained by periodic fires, which prevent invasion of hydrophytic tree species into the pine flatwoods.

DELINEATION PROCEDURE

The reference site wetland boundary is the landward edge of the ecotone of a cypress dome dominated by *Taxodium ascendens* (pond cypress). Upland of the ecotone is a low pine flatwoods dominated by *Pinus palustris* (longleaf pine). Beginning in the cypress dome, a wetland identified by the use of the definition in subsection 62-340.200(19), F.A.C., the vegetative dominance provisions of subsections 62340.300(2)(a) and (b), F.A.C., are followed landward, examining for either the presence of hydric soils or hydrologic indicators along this transect. Vegetative dominance by hydrophytic species within the ground cover of the ecotone extends to the pine flatwoods. While hydric soils extend landward of the hydrophytic plant dominance, additional hydrologic indicators are not present to support the use of subsection 62-340.300(2)(d), F.A.C. The wetland boundary is located where vegetative dominance by hydrophytic species is lost.

The following plant lists with corresponding soils descriptions were prepared during the visit to the delineation site. The first list describes the vegetation found waterward of the delineation line. The second lists those species found landward of the delineation line. Lastly, there are descriptions and photographs of soil profiles from each location.

Vegetation Waterward of the Wetland Boundary

Canopy

Taxodium ascendens	OBL	cypress, pond

Subcanopy

Taxodium ascendens	OBL	cypress, pond

Ground cover

Agalinis sp.	UPLAND	false-foxglove
Andropogon virginicus var. *glaucus* (Hackel)	FAC	broom-sedge
Bacopa caroliniana	OBL	water-hyssop
Bigelowia nudata	FACW	rayless goldenrod
Carex spp.	FACW	sedges
Centella asiatica	FACW	coinwort
Cyperus haspan	FACW	nut sedge
Erianthus giganteus	OBL	plumegrass, sugarcane
Eriocaulon compressum	OBL	pipewort
Eriocaulon decangulare	OBL	pipewort
Eupatorium leptophyllum	OBL	marsh thoroughwort
Gratiola spp.	FACW	hedgehyssop
Helenium pinnatifidum	FACW	flatwoods sneezeweed
Hypericum cistifolium	OBL	St. John's-wort
Juncus repens	OBL	rush
Juncus polycephalus	OBL	rush
Juncus trigonocarpus	OBL	rush
Lachnanthes caroliniana	FAC	redroot
Ludwigia virgata	OBL	ludwigia
Myrica cerifera	FAC	bayberry, southern
Panicum hemitomon	OBL	maidencane
Panicum longifolium	OBL	panicum, tall thin
Paspalum praecox	OBL	paspalum
Pluchea rosea	FACW	camphor-weed
Polygala cymosa	FACW	milkwort
Polygonum hydropiperoides	OBL	smartweed
Pontederia cordata	OBL	pickerel weed
Rhexia sp.	FACW	meadow beauty
Rhynchospora cephalantha	OBL	beakrush
Rhynchospora decurrens	OBL	beakrush
Rhynchospora fascicularis	FACW	beakrush
Rhynchospora microcarpa	OBL	beakrush
Rhynchospora microcephala	FACW	beakrush
Sagittaria graminea	OBL	arrowhead
Scleria sp.	FACW	nut-rush

Sphagnum spp.	OBL	sphagnum moss
Utricularia inflata	OBL	bladderwort
Utricularia purpurea	OBL	bladderwort
Woodwardia virginica	FACW	chain fern
Xyris elliotii	OBL	yellow-eyed grass
Xyris fimbriata	OBL	yellow-eyed grass

Vegetation Landward of the Wetland Boundary

Canopy

Pinus palustris	UPLAND	pine, longleaf

Subcanopy

Myrica cerifera	FAC	bayberry, southern
Pinus palustris	UPLAND	pine, longleaf

Ground cover

Andropogon virginicus var. *glaucus* (Hackel)	FAC	broom-sedge
Aster dumosus	UPLAND	aster
Aristida stricta	FAC	three-awn grass, pineland
Carphephorus carnosus	FACW	chaffhead, pineland
Centella asiatica	FACW	coinwort
Elephantopus carolinianus	UPLAND	elephant's-foot
Eupatorium spp.	FAC	thoroughworts
Hedyotis (=*Oldenlandia*)*boscii*	UPLAND	hedyotis
Hypericum tetrapetalum	FAC	St. John's-wort, four-petal
Ilex cassine	OBL	holly, dahoon
Ilex glabra	UPLAND	gallberry
Lyonia ferruginea	UPLAND	fetter-bush
Myrica cerifera	FAC	bayberry, southern
Panicum dichotomiflorum	FACW	panicum, fall
Pinus palustris	UPLAND	pine, longleaf
Rhynchospora ciliata	FACW	beakrush, ciliate
Rhynchospora spp.	FACW	beakrush
Schizachyrium scoparium	FAC	bluestem
Serenoa repens	UPLAND	saw palmetto
Solidago tortifolia	UPLAND	goldenrod
Vaccinium myrsinites	UPLAND	shiny blueberry
Xyris caroliniana	FACW	yellow-eyed grass, Carolina

SOIL DESCRIPTIONS

USDA-NRCS Soil Survey of Sumter County - Sheet 12
Cypress Dome No. 6
The wetland is identified by a wet spot symbol within the upland soil on field sheet 12.
The upland soil is mapped as Vero fine sand (mapping unit #67).

67 - Vero fine sand is composed of:

60% - Vero soil	non-hydric component
10% - EauGallie soil	non-hydric inclusion
10% - Paisley soil	hydric inclusion
20% - Vero soil	hydric inclusion

Soil Profile Descriptions

Point 1. twelve feet waterward of the wetland boundary line (water table - 0 inches).

Horizon	Depth (in)	
Oa	0-0.5	black (10YR 2/1) muck
A1	0.5-2	black (10YR 2/1) mucky fine sand, common fine roots
A2	2-4	very dark gray (10YR 3/1) fine sand, common fine roots
A3	4+	dark gray (10YR 4/1) fine sand, few fine roots

Hydric soil: Yes
Hydric soil field indicators: presence of 0.5 inches of muck in the Oa horizon.

Point 2. one foot waterward of the wetland boundary line (water table - four inches).

Horizon	Depth (in)	
A1	0-2	black (10YR 2/1) mucky fine sand, many fine roots
A2	2-3	black (10YR 2/1) fine sand, few fine roots
E1	3-6	dark gray (10YR 4/1) fine sand, few fine and few medium roots
E2	6-20	gray (10YR 6/1) fine sand, few fine roots
Bh	20+	dark grayish brown (10YR 4/2) fine sand

Hydric soil: Yes
Hydric soil field indicators: presence of 2 inches of mucky texture in the A1 horizon.

Point 3. five feet landward of the wetland boundary line (water table - eight inches).

Horizon	Depth (in)	
A1	0-1.5	black (10YR 2/1) mucky fine sand, many fine roots
A2	1.5-4	very dark gray (10YR 3/1) fine sand, common fine roots
E1	4-9	dark gray (10YR 4/1) fine sand, common fine and few medium roots
E2	9-21	light brownish gray (10YR 6/2) fine sand, few fine roots
Bh	21+	dark reddish brown (5YR 3/4) fine sand

Hydric soil: Yes
Hydric soil field indicators: presence of four inches of greater than 70% coated sand grains (combination of A1 and A2 horizons).

Point 4. thirty feet landward of the wetland boundary line (water table not observed).

Horizon	Depth (in)	
A1	0-4	very dark gray (10YR 3/1) fine sand, common fine roots
A2	4-6	dark gray (10YR 4/1) fine sand, common fine roots
E	6-17	grayish brown (10YR 5/2) fine sand, few fine and few medium roots
Bh	17+	dark brown (10YR 3/3) fine sand, few fine roots

Hydric soil: No
Hydric soil field indicators: none.

Hal Scott Regional Preserve and Park

(Orange County)

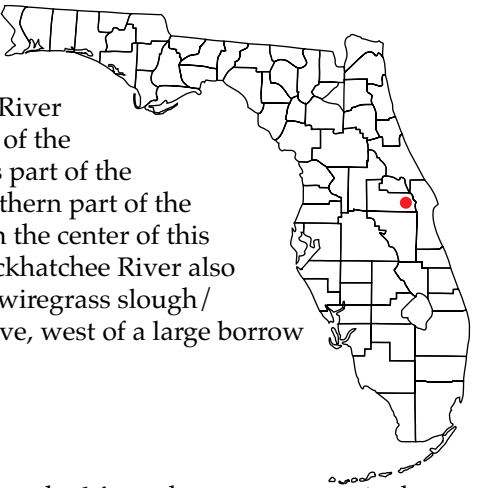
WET PRAIRIE



A wiregrass wet prairie depression

LOCATION

The Hal Scott Regional Reserve and Park is located in east Orange County, southeast of the city of Orlando, within the northwest quadrant of the intersection of the Bee Line Expressway (S.R. 528) and Dallas Blvd. The property is owned and managed by the St. Johns River Water Management District (SJRWMD). Portions of the property were purchased using funds obtained as part of the mitigation for the beltway construction in the southern part of the county. The Econlockhatchee River flows through the center of this property. Several streams tributary to the Econlockhatchee River also occur on the property. The reference site is a wet wiregrass slough/ prairie located in the eastern portion of the preserve, west of a large borrow pit.



ACCESS

The Hal Scott Regional Reserve and Park may be reached from the expressway via the

Dallas Blvd exit. Travel north on Dallas Blvd approximately 2 miles and the entrance is on the left (west). Coming from the north, follow S.R. 50 south to S.R. 520. From S.R. 520 turn (south) into the Wedgefield subdivision on Maxim Parkway. From Maxim Parkway turn left onto Bancroft, then right on to Meredith Parkway to Dallas Blvd. Turn left (south) on Dallas Blvd. and the entrance to the park will be 1.6 miles south on the right side (west) of the road. Access information may be obtained form the SJRWMD Land Management Division at (407) 897-4311. The reference site wetland boundary is along the south edge of an *Aristida stricta* (wiregrass) slough/wet prairie immediately west of the borrow pit.

COMMUNITY CHARACTERISTICS

A wet prairie is a type of wetland which is maintained by a combination of fire and wetness. Frequent fires, by restricting the invasion of woody perennials, are an important factor in the maintenance of a prairie system. The vegetation of the prairie system is fire adapted. Wet prairies are routinely dry enough to burn, usually on a seasonal basis. Wet prairies are also either seasonally inundated or saturated. The wet prairie vegetative community must therefore also be tolerant of anaerobic soil conditions. Verification of a wet prairie and the wetland boundary is usually limited to the observation of the vegetation dominance and hydric soil indicators. Hydrologic indicators are often not apparent within a wet prairie system. Vegetative cover and dominance by hydrophytic species within wet prairie systems is subject to natural seasonal change. Within the reference site wet prairie, the dominant plants observed are *Amphicarpum muhlenbergianum* (blue maidencane, FACW) and *Aristida stricta* (wiregrass, FAC). Both of these species are present throughout the year. The species occurring with the dominant species at the time of observation (listed below) may not always be apparent.

Wiregrass is a dominant ground cover in several different vegetative communities where fire is a frequent occurrence. Wiregrass is also tolerant of a wide range of moisture conditions and is classified as a facultative species in Chapter 62-340, F.A.C. Dominance of wiregrass in the ground cover appears to be related more to the fire history of a site than to the hydrological regime.

DELINEATION PROCEDURE

Wet prairie is a type of wetland identified in the wetland definition, but it is often not immediately recognizable as a wetland. At this reference site, subsections 62-340.300(2)(a) and (b), F.A.C., are used to establish that the central area is in fact a wetland. Wiregrass, as a facultative plant, while numerically dominant is not used in determining vegetative dominance for locating the boundary between the wetland and upland. Vegetative dominance by hydrophytic species is established at this reference site by obligate species within the wiregrass dominated community. The wetland nature of the site is confirmed by the presence of hydric soil indicators. At this reference site *algal mats*, a hydrologic indicator, are also present, further supporting the conclusion that the reference site is a wetland. Moving landward, the wetland boundary is established where vegetative dominance using subsections 62-340.300(2)(a) and (b), F.A.C., is no

longer present. Hydric soil indicators extend beyond the vegetative dominance in some areas but are not definitive of wetland conditions.

Vegetation Interior To The Wetland Boundary - Vegetation List recorded March 6, 1995

Aristida spiciformis	FAC	bottlebrush three awn grass
Aster sp.	FAC/FACW	aster
Andropogon virginicus	FAC	broomsedge
Baccharis halimifolia	FAC	salt bush
Drosera sp.	OBL/FACW	sundew
Eustachys sp.	FAC/FACW	finger grass
Fuirena sp.	OBL	umbrella sedge
Hypericum cistifolium	FACW	St. John's wort
Hypericum fasciculatum	OBL	marsh St. John's wort
Mikania scandens	Vine	climbing hempvine
Myrica cerifera	FAC	wax myrtle
Panicum scabrisculum	OBL	wooly panicum
Pityopsis graminifolia	FAC	golden aster
Sacciolepis indica	FAC	Indian cupscale
Scleria sp.	FACW	bald-rush
Sonchus sp.	UPLAND	sow thistle
Quercus pumila	UPLAND	running oak
Xyris brevifolia	OBL	short leaf yellow-eyed grass

Vegetation Upland Of The Wetland Boundary.

Aristida stricta	FAC	wiregrass
Aristida spiciformis	FAC	bottlebrush three-awn grass
Andropogon virginicus	FAC	broomsedge
Asimina sp.	UPLAND	pawpaw
Befaria racemosa	UPLAND	tarflower
Drosera sp.	OBL/FACW	sundew
Eragrostis sp.	FAC	love grass
Euthamia sp.	UPLAND	flat-topped goldenrod
Hypericum reductum	UPLAND	Atlantic St. John's wort
Hypericum tetrapetalum	FAC	St. John's wort
Ilex glabra	UPLAND	gallberry
Lyonia fruticosa	UPLAND	fetterbush
Lyonia lucida	FACW	fetterbush
Penstemon australis	UPLAND	beard tongue
Pityopsis graminifolia	UPLAND	golden aster
Quercus pumila	UPLAND	running oak
Rhexia sp.	FACW	meadow beauty
Schizachyrium spp.	FAC	bluestem
Serenoa repens	UPLAND	saw palmetto
Vaccinium myrsinites	UPLAND	low blueberry

SOIL DESCRIPTIONS

USDA - NRCS Orange County Soil Survey - Sheet 58 Section 22
Mapped as Smyrna fine sand (mapping unit #44)

44 - Smyrna fine sand is composed of:

70% - Smyrna soil	non-hydric component
5% - Pineda soil	hydric inclusion
20% - Smyrna soil	hydric inclusion
5% - Wabasso soil	non-hydric inclusion

Soil Profile Descriptions

Point 1. Eight feet waterward of the saw palmetto edge. (Water table - 22 inches)

Horizon	Depth (in)	
Oa	0-1	black (10YR 2/1) mucky fine sand
A1	1-2	black (10YR 2/1) fine sand
A2	2-4	very dark gray (10YR 3/1) fine sand
E or C	4-12	dark gray (10YR 4/1) fine sand

Hydric soil: Yes
Hydric soil field indicators: four inches of greater than 70% coatings on the sand grains.



Point 1

Point 2. Thirty feet upland of the saw palmetto edge - towards borrow pit. (Water table > 12 inches)

Horizon	Depth (in)	
A1	0-1	very dark gray (10YR 3/1) fine sand with many fine roots
A2?	1-3	dark gray (10YR 4/1) fine sand with common medium roots
A3?	3-12	very dark gray (10YR 3/1) fine sand (50% coated) with many medium roots

Hydric soil: No
Hydric soil field indicators: none



Point 2

Hickory Mound Impoundment

(Taylor County)

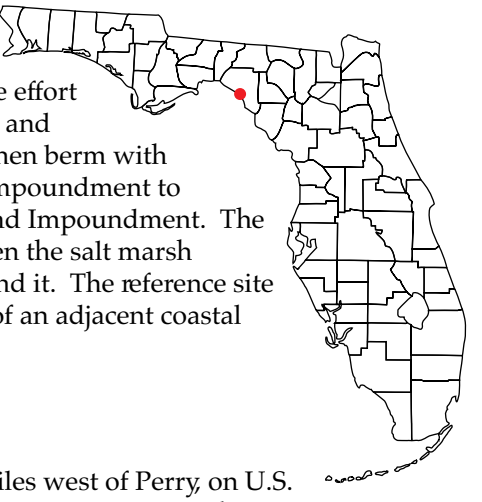
BRACKISH MARSH



Coastal hammock/brackish water marsh

LOCATION

Hickory Mound is located in coastal Taylor County. This region is characterized by large expanses of salt marsh punctuated by "tree islands" of low coastal hammocks. The reference site is adjacent to a tidal marsh and a manmade brackish water marsh. As a cooperative effort between Buckeye Cellulose and the Florida Game and Fresh Water Fish Commission (FGFWFC), an earthen berm with culverts was built in 1968 to create a fluctuating impoundment to enhance waterfowl habitat. This is Hickory Mound Impoundment. The FGFWFC regulates the saltwater exchange between the salt marsh seaward of the berm and the brackish marsh behind it. The reference site is within the brackish marsh on the western side of an adjacent coastal hammock.



ACCESS

The Hickory Mound Impoundment is about 20 miles west of Perry, on U.S. Highway 98. The sign for Hickory Mound Impoundment is east of the Ecofina River.

Turn south onto Cow Creek Grade, a secondary road and travel past the game checkpoint station. Continue on the berm, past the culvert/floodgate and look for an observation tower and picnic area. The reference site is about 100 feet to the south of the tower along the western edge of a coastal hammock island.

COMMUNITY CHARACTERIZATION

Hickory Mound Impoundment is an area of extensive salt marshes, brackish marshes, coastal hammocks (tree islands), and hydric hammocks. The salt marsh is dominated by *Spartina* spp. (cordgrass); the brackish marsh has a diverse mixture of emergent herbaceous perennials (mostly grasses and sedges). *Cladium jamaicense* (sawgrass) and *Sabal palmetto* (sabal palm) dominate the landward portion of the brackish marsh. There is little topographic relief in coastal Taylor County and a slight rise in elevation can support a forested coastal hammock similar to those found landward of the salt marsh. Tree "islands" of coastal hammock vegetation dominated by *Quercus virginiana* (live oak) and *Pinus elliottii* (slash pine) with a *Serenoa repens* (saw palmetto) ground cover are found within the marsh.

DELINEATION PROCEDURE

The reference site is in an ecotone between the brackish marsh and coastal hammock. Beginning in the brackish marsh, a wetland identifiable by direct reference to the wetland definition, vegetative dominance is followed landward, examining either for the presence of hydric soils or hydrologic indicators (subsections 62-340.300(2)(a) and(b), F.A.C.). Hydrologic indicators consisted of observed inundation, rack lines and more than two inches of mucky texture in the upper soil profile. Continuing landward toward the coastal hammock, dominance by hydrophytic plants was lost within the ecotone between the brackish marsh and the hammock. Hydric soils and hydrologic indicators, however, extended farther landward into the edge of the coastal hammock beneath a canopy of *Quercus virginiana* (live oak). The wetland boundary occurs at the point where the mucky texture in the soil is less than two inches. Hydric soil is present beyond this point but neither vegetative dominance nor hydrologic indicators provide sufficient evidence using reasonable scientific judgment, to extend the wetland boundary to the limits of hydric soil.

The following plant lists with corresponding soils descriptions were prepared during the June 1995 visit to the delineation site. The first list describes the vegetation found waterward of the delineation line. The second lists those species found landward of the delineation line. Lastly, there are descriptions and photographs of corresponding soil samples from each location.

Vegetation Immediately Waterward of the Wetland Boundary.

Canopy

Quercus virginiana	UPLAND	oak, live

Subcanopy

Ilex vomitoria	FAC	yaupon holly
Sabal palmetto	FAC	palm, cabbage

Ground cover

Ammannia latifolia	OBL	toothcup
Bacopa monnieri	OBL	water-hyssop
Cyperus spp.	FACW	flatsedge
Distichlis spicata	OBL	saltgrass, seashore
Eleocharis sp.	OBL	spikerush
Juncus roemerianus	OBL	needle rush
Leptochloa fascicularis	FACW	bearded sprangle-top
Lycium carolinianum	OBL	Christmas berry
Scirpus pungens	OBL	sword-grass; three square bulrush
Spartina alterniflora	OBL	cordgrass, saltmarsh

Vegetation Immediately Landward of the Wetland Boundary.

Canopy

Pinus elliottii	UPLAND	slash pine
Quercus virginiana	UPLAND	oak, live
Sabal palmetto	FAC	palm, cabbage

Ground cover

Andropogon glomeratus (Campbell)	FACW	bluestem, bushy
Campsis radicans	VINE	trumpet creeper
Callicarpa americana	UPLAND	beautyberry
Digitaria sp.	UPLAND	crabgrass
Erythrina herbacea	UPLAND	coralbean

Panicum virgatum	FACW	switchgrass
Pteridium aquilinum	UPLAND	bracken fern
Quercus virginiana	UPLAND	oak, live
Rhus copallina	UPLAND	winged sumac
Rubus trivialis	FAC	southern dewberry
Serenoa repens	UPLAND	saw palmetto
Smilax bona-nox	VINE	greenbrier; catbrier
Solidago sempervirens	FACW	golden-rod, seaside
Spartina bakeri	FACW	cordgrass, sand
Toxicodendron radicans	UPLAND	poison ivy

SOIL DESCRIPTIONS

USDA-NRCS Taylor County Soil Survey - Sheet 38
The wetland soil is mapped as Clara, Meadowbrook, and Bodiford soils, frequently flooded (mapping unit #34)
The upland soil is mapped as Leon fine sand, rarely flooded (mapping unit #71)

Soil Profile Descriptions

Point 1. Twenty feet waterward of the wetland boundary line.

Horizon	Depth (in)	
Oa	0-4	black (10YR 2/1) muck
A1	4-5	black (10YR 2/1) mucky fine sand
A2	5-7	very dark gray (10YR 3/1) fine sand
E	7-16	gray (10YR 5/1) fine sand; oxidized rhizospheres were present
Bh	16-24	very dark brown (10YR 2/2) fine sand
C	24+	light brown gray (10YR 6/2) fine sand

Hydric soil: Yes
Hydric soil field indicators: four inches of muck (horizon Oa).



Point 1: wetland soil



Point 2: upland soil

Point 2. Ten feet landward of the wetland boundary line.

Horizon	Depth (in)	
A	0-3	dark gray brown (10YR 4/2) fine sand
E	3-31	light brown gray (10YR 6/2) fine sand
Bh	31+	very dark grayish brown (10YR 3/2) fine sand

Hydric soil: No
Hydric soil field indicators: none

Jennings Forest Wildlife Management Area

(Clay County)

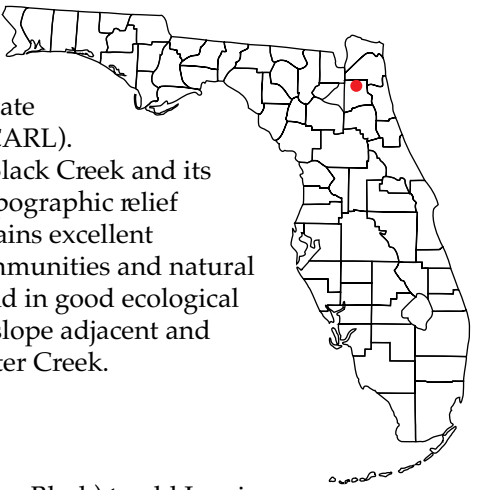
HYDRIC SEEPAGE SLOPE



Wetland boundary/pond pine seepage slope

LOCATION

Jennings State Forest is located in northern Clay county adjacent to the Duval County line and immediately southwest of the Cecil Field Naval Air Station. The acquisition of the property is a joint effort of the St. Johns River Water Management District (SJRWMD) and the state Conservation and Recreational Lands program (CARL). Jennings State Forest protects the headwaters of Black Creek and its tributaries. The landscape exhibits substantial topographic relief throughout the parcel. Jennings State Forest contains excellent examples of longleaf pine/wiregrass sandhill communities and natural seepage slopes which are hydrologically stable and in good ecological condition. The reference site is a hydric seepage slope adjacent and tributary to Mill Branch, a tributary of Yellow Water Creek.



ACCESS

To visit Jennings State Forest, take S.R. 21 (Blanding Blvd.) to old Jennings

Rd. and travel west to Live Oak Lane. Turn north onto Live Oak Lane and go to the gated entrance. Once through the gate stay to the right (Forest Rd. 13) and cross Wheeler Branch. Continue to Forest Rd 14 then turn west and travel approximately 1.5 miles to Forest Rd 15. Take Forest Rd 15 to Mill Branch. The reference site is on the seepage slope south of (up the hill from) the creek and east of the road. Please contact the SJRWMD Land Management Division at (904) 329-4404 prior to your visit, as you will need a key to the gate to obtain access.

COMMUNITY CHARACTERIZATION

The reference site is located along the south side of Mill Branch on a seepage slope dominated by *Pinus serotina* (pond pine). Pond pine slope forests are vegetative communities which extend both above and below wetland boundaries. This is typically indicated by changes in the soil characteristics from very poorly drained (hydric) to poorly drained (non-hydric). The subcanopy is generally scant and the groundcover generally low enough to walk through (unless the area has been subjected to fire suppression). A subtle shift in the composition of the ground cover is observed landward (up slope), as the nature of the pond pine forest changes from a hydric to non-hydric slope. Ground water in close proximity to the soil surface is the defining feature of seepage wetlands. In general, the wetland boundary line within pond pine slope forests will be located by hydric soil indicators.

DELINEATION PROCEDURE

Mill Creek is a surface water body as described by section 62-340.600, F.A.C. A narrow hardwood floodplain lies adjacent and contiguous to the creek. This area is identified in the Clay County soil survey as a frequently flooded mapping unit. Subsection 62-340.300(c), F.A.C., establishes that a frequently flooded mapping unit is a wetland when the soil internal to the mapping unit is confirmed to be hydric by in-situ analysis. Hydric soil indicators are present within the hard wood floodplain but are somewhat obscured by the alluvial processes of the stream. Moving landward from the stream side wetland, a change in the vegetative community occurs as the landscape topography abruptly slopes upward. The vegetative community of the slope is a pond pine forest. The canopy dominance meets the provisions of subsection 62-340.300(2)(b), F.A.C. Vegetative dominance in the canopy continues up slope until merging into a sandhill community where vegetative dominance by hydrophytic species is lost. Establishing the wetland boundary, using vegetative dominance, requires additional ecologic support by either hydrologic indicators or hydric soil indicators. The hydrologic indicators typically encountered on wetland seepage slopes are usually contained within the soil. By following hydric soil indicators up slope, the wetland boundary is established within the zone of vegetative dominance (subsection 62-340.300(2)(b), F.A.C.) at the point where the indicators are no longer present.

When evaluating slope conditions, it is often helpful to first look at the upland. This provides physical clues for discriminating subtle, but contrasting characteristics, that separate the hydric from non-hydric portions of the slope.

The following plant lists, with corresponding soils descriptions, were prepared during a visit to this reference site. The common plant species of the seepage slope community and the sandhill community are listed below. Descriptions and photographs of soil profiles are also provided from each location.

Vegetation of the Seepage Slope Community, Waterward of the Wetland Boundary.

Canopy

Gordonia lasianthus	FACW	loblolly bay
Magnolia virginiana var. *australis*	OBL	sweetbay magnolia
Persea palustris	OBL	swamp bay
Pinus elliottii	UPLAND	slash pine
Pinus serotina	FACW	pond pine

Subcanopy

Gordonia lasianthus	FACW	loblolly bay
Magnolia virginiana var. *australis*	OBL	sweetbay magnolia
Persea palustris	OBL	swamp bay
Pinus serotina	FACW	pond pine

Ground cover

Aristida stricta	FAC	pineland three-awn grass
Arundinaria gigantea	FACW	giant cane
Gaylussacia frondosa	FAC	dangleberry
Ilex coriacea	FACW	bay-gall holly
Ilex glabra	UPLAND	gallberry
Kalmia hirsuta	UPLAND	wicky
Lyonia lucida	FACW	fetter-bush
Myrica cerifera	FAC	southern bayberry
Osmunda cinnamomea	FACW	cinnamon fern
Pteridium aquilinum	UPLAND	bracken fern
Rhododendron canescens	UPLAND	pinxter azalea
Serenoa repens	UPLAND	saw palmetto
Toxicodendron vernix	FACW	poison sumac
Vaccinium corymbosum	FACW	highbush blueberry
Vaccinium myrsinites	UPLAND	shiny blueberry

Vegetation of the Sandhill Community, Landward of the Wetland Boundary.

Canopy

Pinus palustris	UPLAND	pine, longleaf

Subcanopy

Quercus incana	UPLAND	blue-jack oak
Quercus leavis	UPLAND	turkey oak
Quercus marilandica	UPLAND	black-jack oak

Ground cover

Andropogon virginicus	FAC	broom-sedge
Aristida stricta	FAC	three-awn grass, pineland
Cassia fasciculata	UPLAND	partridge pea
Licania michauxii	UPLAND	gopher apple
Lyonia ferruginea	UPLAND	fetter-bush
Pteridium aquilinum	UPLAND	bracken fern
Serenoa repens	UPLAND	saw palmetto
Sorghastrum secundum	UPLAND	lopside Indiangrass
Tephrosia virginiana	UPLAND	goat's rue
Vaccinium arboreum	UPLAND	sparkleberry

SOIL DESCRIPTIONS

USDA-NRCS Soil Survey of Clay County - Sheet 2
The wetland soil is mapped as Rutlege-Osier complex, frequently flooded (mapping unit #29).

45% - Rutlege soil	hydric component
40% - Osier soil	hydric inclusion
15% - Pamlico soil	hydric inclusion

The upland soil is mapped as Penney fine sand, 0 to 5 percent slope (mapping unit #5).

Soil Profile Descriptions

Point 1. fifteen feet waterward of the wetland boundary line (water table - twelve inches).

Horizon	Depth (in)	
A1	0-5	black (10YR 2/1) mucky fine sand, many medium roots
A2	5-8	black (10YR 2/1) fine sand, few medium roots
E or C	8-13	dark gray (10YR 4/1) fine sand with common medium faint gray (10YR 5/1) mottles, few fine and medium roots



Point 1

Hydric soil: Yes
Hydric soil field indicators: five inches of mucky texture in horizon A1.

Point 2. fifteen feet waterward of the wetland boundary line (water table - twenty inches).

Horizon	Depth (in)	
Oi	1-0	litter
A1	0-9	dark gray (10YR 4/1) fine sand, many medium and few large roots
A2	9-13	dark gray (10YR 4/1) fine sand with common fine distinct gray (10YR 6/1) mottles, few medium roots
E or C	13-21+	light brownish gray (10YR 6/2) fine sand, few fine roots

Hydric soil: No
Hydric soil field indicators: none



Point 2

Jonathan Dickinson State Park

(Martin County)

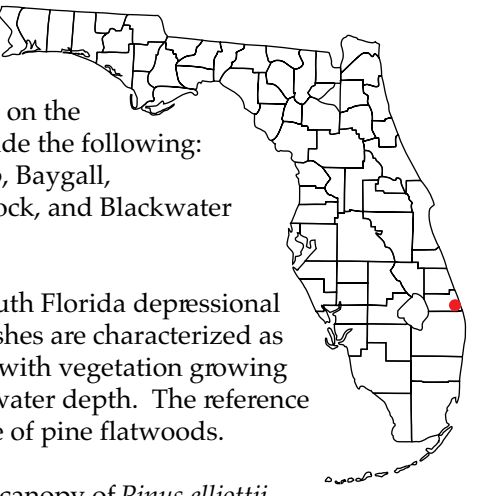
DEPRESSION MARSH



Depression marsh

LOCATION

Jonathan Dickinson State Park consists of 11,383 acres situated in southern Martin County. This is a region of xeric uplands, mesic to dry flatwoods dominated by *Pinus elliottii* var. *densa* (South Florida slash pine) and forested/herbaceous wetlands. The Natural Communities described within the park are based on the Florida Natural Areas Inventory (FNAI) and include the following: Mesic/Dry Flatwoods, Depressional Marsh, Scrub, Baygall, Floodplain Forest, Strand Swamp, Hydric Hammock, and Blackwater Stream.



Two reference sites, both excellent examples of south Florida depressional marshes, are located in the park. Depression marshes are characterized as shallow, rounded depressions in a sand substrate with vegetation growing in concentric bands defined by hydroperiod and water depth. The reference sites selected are located within a larger landscape of pine flatwoods.

These are mesic to dry flatwoods dominated by a canopy of *Pinus elliottii*



Mesic pine flatwoods looking upland from wetland boundary of southern marsh

var. *densa* (South Florida slash pine) and a well developed understory consisting of *Serenoa repens* (saw palmetto), *Ilex glabra* (gallberry), *Lyonia lucida* (fetterbush), *Hypericum* spp.(St. John's-wort), *Ilex cassine* (dahoon holly), *Myrica cerifera* (wax myrtle), and *Asimina reticulata* (pawpaw). The herbaceous layer is dominated by *Aristida stricta* (wiregrass), *Aristida rhizomorpha* (Florida three-awn), *Pteridium aquilinum* (bracken fern), *Rhexia nuttallii* (meadowbeauty), *Xyris* spp.(yellow-eye grass), *Carphephorus paniculatus* (carphephorus), *Hypoxis juncea* (yellow-star grass) and *Pterocaulon virgatum* (blackroot). The occurrence of the depressional marshes in this otherwise flat landscape is a factor of the local topography and soils which prevent rapid runoff or infiltration.

ACCESS

The entrance to Jonathan Dickinson State Park is on the west side of U.S. Highway 1 in southern Martin County, between Hobe Sound and Jupiter. After entering the park, follow the main road towards the picnic and boating area. The first reference site is located along the north side of the depressional marsh immediately west of the road as it turns due south. The second reference site can be reached only by hiking approximately one quarter mile west on the first access road south of the first reference site. The second reference site is located along the north side of the depressional marsh southeast of the road.

GENERAL COMMUNITY CHARACTERIZATION OF BOTH SITES

Both marshes are typical in appearance in being dominated throughout by hydrophytic

plants. The duration of inundation (hydroperiod) influences the dominant plant communities. Maidencane (*Panicum hemitomon*) for example, cannot tolerate continuous flooding and requires a drawdown during a portion of the annual hydroperiod (Kushian *in* Ecosystems of Florida, 1991). Thus, it is significant that both reference sites contain areas dominated by maidencane, usually in the deepest area. A band of St. John's-wort (*Hypericum fasciculatum*) occurs landward of the maidencane zone. The shallow rooted species, such as St. John's-wort (*Hypericum* spp.), are killed by drying and fire but quickly reseed during wet periods, while rhizomatous species such as maidencane survive these extremes underground. As a result, zones of dominance migrate up and down slope in response to changing water conditions (B. H. Winchester, personal communication to Kushian *in* Ecosystems of Florida, 1991).

Due to variable soil conditions and hydroperiods the ecotone between marsh and flatwoods is often reticulate in nature. This is the palmetto "edge" often seen around depression marshes. It is here that we find the highest diversity of herbaceous plant species associated with these wetlands. The wetland boundary will most often occur in this ecotone.

The marshes differ in the degree of slope along the wetland/upland boundary which is expressed as differences in the vegetative transition within the fringe zone of *Serenoa repens* (saw palmetto). The fringing palmetto zone along the northern reference site consists of patches of *Serenoa repens* intermixed with areas dominated by grasses or gallberry. The southern marsh site has a steeper gradient at the edge and a more apparent community change from the wetland to the upland. The palmetto edge at the southern reference site is continuous and distinct.

GENERAL DELINEATION PROCEDURE

The marshes chosen as reference sites are identifiable as wetlands by direct use of the wetland definition. Further, each reference site is represented on the Martin County soil survey as a depressional mapping unit (**Waveland sand, depressional**). Areas mapped in County Soil surveys as frequently flooded or depressional are wetlands contingent on in-situ confirmation of the hydric soil characteristics (subsection 62-340.300(2)(c), F.A.C.). Hydric soil indicators within these areas are readily confirmed. Implementing subsection 62-340.300(2)(c), F.A.C., is a technical exercise that most often requires the expertise of a soil scientist because it is necessary to located the edge of the depressional area as mapped on the soil map. Once the edge of the depressional unit is located, then the other provisions of Chapter 62-340, F.A.C., must be examined to discern whether the wetland being delineated extends landward of the depressional area.

NORTHERN MARSH

• Observations begin in the marsh at the edge of the "*Hypericum* zone", a site clearly within the depressional soil mapping unit. *Hypericum fasciculatum* is an ecologically obligate wetland plant which often develops as an apparent broad band of vegetation within inundated areas of a marsh. Vegetative dominance in this zone meets the provisions of subsection 62-340.300(2)(a), F.A.C. Further supporting this conclusion, at

this location, is the presence of greater than two inches of mucky texture at the soil surface. Starting at the landward edge of this zone, the dominance of obligate and facultative wet species is followed landward with a coincident examination for the presence of the hydric soil indicators and hydrologic indicators. During this progression, the presence of obligated species became negligible and vegetative dominance shifts to subsection 62-340.300(2)(b), F.A.C.

• Moving outward into the ecotone, the vegetative pattern became dominated in part by



Northern depression marsh looking in from wetland boundary

large clumps of *Serenoa repens* (saw palmetto). At this point, using only vegetative dominance and hydric soil indicators, would produce a sinuous, hydrologically inconsistent boundary line. The soil profile within the waterward portions of the *Serenoa* clumps exhibit at least two inches of mucky texture at the surface indicating the presence of water at or above the surface for extended periods of time. The depth of mucky texture decreases moving landward through the *Serenoa*. By using the provisions of subsection 62-340.300(2)(d), F.A.C., a consistent line is established for the wetland boundary.

• The accurate placement of the wetland boundary based upon hydrologic indicators and not along the landward edge of the *Serenoa* patches was confirmed by measuring the elevation of the points along the lines. The waterward edge of the *Serenoa* clumps do not occur at a consistent elevation. The elevations of the points consistent with the hydrologic indicators are well within the range of each other. Placement of the wetland boundary along the waterward edge of the *Serenoa* patches for a reticulated vegetative community of this type would neglect the presence of evidence of inundation above the

Serenoa patches.

The assumed elevations of the five points determining the wetland boundary using subsection 62-340.300(2)(d), F.A.C., are:

#1	9.30'	#4	9.36′
#2	9.42′	#5	9.50'
#3	9.44'		

Vegetation within the Marsh

Marsh Interior
Canopy and Subcanopy

Taxodium ascendens	OBL	pond cypress

Ground cover

Panicum hemitomon	OBL	maidencane

Hypericum Fringe
Ground cover

Eriocaulon compressum	OBL	pipewort
Eriocaulon decangulare	OBL	pipewort
Fuirena scirpoidea	OBL	umbrella sedge
Hypericum fasciculatum	OBL	St. Johns wort
Panicum erectifolium	OBL	erect-leaf witch grass
Xyris spp.	OBL	yellow-eyed grass
Xyris ambigua	OBL	yellow-eyed grass
Xyris elliottii	OBL	yellow-eyed grass
Lycopodium alopecuroides	FACW	clubmoss
Scleria spp.	FACW	bald rush
Utricularia spp.	OBL	bladderwort

Vegetation Immediately Waterward of the Wetland Boundary

Canopy and Subcanopy

Pinus elliottii	UPLAND	slash pine

Groundcover

Hypericum fasciculatum	OBL	St. Johns wort
Sphagnum spp.	OBL	sphagnum moss

Utricularia spp.	OBL	bladderwort
Xyris ambigua	OBL	yellow-eyed grass
Xyris elliottii	OBL	yellow-eyed grass
Utricularia subulata	OBL	bladderwort
Utricularia cornuta	OBL	bladderwort
Utricularia juncea	OBL	bladderwort
Andropogon glomeratus	FACW	broom sedge
Drosera capillaris	FACW	pink sundew
Panicum dichotomum	FACW	panicum
Rhynchospora ciliaris	FACW	beak rush
Rhynchospora fascicularis	FACW	beak rush
Aristida rhizomophora	FAC	three-awn grass
Aristida spiciformis	FAC	three-awn grass
Aristida stricta	FAC	wire grass
Myrica cerifera	FAC	wax myrtle
Ilex glabra	UPLAND	gallberry

Vegetative Immediately Landward of the Wetland Boundary Line

Canopy and Subcanopy

Pinus elliottii	UPLAND	slash pine

Ground cover

Scleria spp.	FACW	bald rush
Aristida rhizomophora	FAC	three-awn grass
Aristida spiciformis	FAC	three-awn grass
Aristida stricta	FAC	wire grass

Vegetation In the Upland

Canopy and Subcanopy

Pinus elliottii	UPLAND	slash pine

Ground cover

Burmannia biflora	OBL	burmannia
Scleria spp.	FACW	bald rush
Aristida rhizomophora	FAC	three awn grass
Aristida stricta	FAC	wire grass
Schizachyrium scoparium	FAC	bluestem
Myrica cerifera	FAC	wax myrtle
Satureja rigida	UPLAND	pennyroyal
Ilex glabra	UPLAND	gallberry

SOUTHERN MARSH

• The initial review of the plant communities reveals a distinct break between the outer area of the depressional marsh, dominated by FACW plant species, and the upland pine flatwoods, dominated by *Serenoa repens*. This apparent edge corresponds to a visual estimate of the landward extent of the depressional mapping unit. Often however, as is the case here, the true wetland boundary is different from the depressional mapping unit boundary as depicted in the soil survey. Use of the palmetto edge as an interpretation of the depressional mapping unit boundary at this site results in a boundary which is not reflective of a consistent water level as determined by on-site elevations. This would not be unusual for a seepage area, but in a flatwoods landscape the elevation of the wetland boundary should, in most cases, be consistent. By using the provisions of subsection 62-340.300(2)(d), F.A.C. A wetland boundary is established based upon the occurrence of two or more inches of mucky texture in conjunction with the hydric soil indicators, that reflects a consistent water level. Portions of this boundary are located slightly landward of the waterward edge of the saw palmetto.

Vegetation Within The Marsh

Ground cover

Hypericum fasciculatum	OBL	St. John's-wort, marsh
Panicum erectifolium	OBL	witchgrass, erect-leaf
Panicum hemitomon	OBL	maidencane
Taxodium ascendens	OBL	cypress, pond

Note: the *Hypericum* had adventitious rooting. The *Taxodium* showed signs of fire, even in the deepest portion of this marsh.

Vegetation Immediately Waterward of the Wetland Boundary

Shallow portions of marsh up to the first stunted *Pinus elliottii* var. *densa* and not past the *Serenoa repens*. This wetland/upland line is more abrupt as the palmetto is less reticulate in its growth pattern and the uplands are drier with sandy soils and sandhill vegetation.

Ground cover

Andropogon glomeratus (Campbell)	FACW	bluestem, bushy
Aristida spiciformis	FAC	bottlebrush, three-awn
Balduina atropurpurea	FACW	honeycomb-head, purple
Bigelowia nudata	FACW	golden-rod, rayless
Ctenium spp.	FACW	toothache grass
Cyperus spp.	FACW	flatsedge

Drosera capillaris	FACW	sundew, pink
Eleocharis baldwinii	OBL	spikerush
Eriocaulon decangulare	OBL	pipewort
Fuirena scirpoidea	OBL	umbrella-sedge
Juncus spp.	OBL	rush
Lycopodium alopecuroides	FACW	clubmoss
Oxypolis filiformis	OBL	water drop-wort
Rhexia petiolata	FACW	meadow-beauty, white
Rhynchospora tracyi	FACW	beakrush
Sabatia bartramii	OBL	rose-gentian, Bartram's
Sphagnum spp.	OBL	sphagnum mos
Utricularia subulata	OBL	bladderwort
Xyris ambigua	OBL	yellow-eyed grass
Xyris spp.	OBL	yellow-eyed grass

Vegetation Immediately Landward of the Wetland Boundary

Pine flatwoods. This is a dry pine flatwoods site. It is of note that the palmetto is most dense at the edge of the wetland.

Canopy

Pinus elliottii var. *densa*	UPLAND	So. Florida slash pine

Subcanopy

Pinus elliottii var. *densa*	UPLAND	So. Florida slash pine

Ground cover

Andropogon glomeratus (Campbell)	FACW	bluestem, bushy
Aristida stricta	FAC	three-awn grass, pineland
Hypoxis juncea	FACW	stargrasses, yellow
Ilex glabra	UPLAND	gallberry
Schizachyrium scoparium	FAC	bluestem
Scleria reticularis	FACW	nutrush
Serenoa repens	UPLAND	saw palmetto

Note: this plant list was compiled during the winter season and some components of the summer flora will be missing. Also, this area has been burned recently.

SOILS DESCRIPTIONS

NOTHERN MARSH
USDA - NRCS Martin County Soil Survey - Sheet 42

The wetland soil is mapped as Waveland sand, depressional (mapping unit #5).
The upland soil is mapped as Waveland sand (mapping unit #4).

5 - Waveland sand, depressional is composed of:

100% - Waveland soil	hydric component

4 - Waveland sand is composed of:

40% - Waveland soil	non-hydric component
40% - Immokalee soil	non-hydric inclusion
10% - St. Johns soil	hydric inclusion
10% - Waveland soil	hydric inclusion

Soil Profile Descriptions

Point 2-1. Five-eight feet waterward of the wetland boundary line (inundation present).

Horizon	Depth (in)	
Oa	0-2	black (10YR 2/1) muck
A	2-3	very dark gray (10YR 3/1) fine sand
E or C	3+	gray (10YR 5/1) fine sand

Hydric soil: Yes
Hydric soil field indicators: presence of two inches of muck in the Oa horizon.



Point 2-2

Point 2-2. Six feet waterward of the wetland boundary line (water table - 7 inches).

Horizon	Depth (in)	
A1	0-4	black (10YR 2/1) mucky sand; many medium roots
A2	4-9	very dark gray (10YR 3/1) sand; few medium and fine roots
E or C	9-15+	gray (10YR 5/1) fine sand; few medium and large roots

Hydric soil: Yes
Hydric soil field indicators: presence of more than two inches of mucky texture (sand) in the A1 horizon.



Point 2-4a

Point 2-4a. Just waterward of the wetland boundary line (water table - 10 inches).

Horizon	Depth (in)	
A1	0-2	black (10YR 2/1) mucky sand
A2	2-10	very dark gray (10YR 3/1) sand
E or C	10+	light brownish gray (10YR 6/2) sand

Hydric soil: Yes
Hydric soil field indicators: presence of two inches of mucky texture (sand) in the A1 horizon.



Point 2-4b

Point 2-4b. Just landward of the wetland delineation line (water table - 11 inches).

Horizon	Depth (in)	
A1	0-4	black (10YR 2/1) sand;
A2	4-8	very dark gray (10YR 3/1) and gray (10YR 5/1) sand; stripped matrix
A3	8-12	dark gray (10YR 4/1) sand
E or C	12+	gray (10YR 6/1) sand

Hydric soil: Yes
Hydric soil field indicators: presence of four inches of greater than 70% coated sand grains in the A1 horizon.



Point 2-5

Point 2-5. Landward of the wetland boundary line.

Horizon	Depth (in)	
A1	0-1/2	black (10YR 2/1) mucky sand; few fine roots
A2	1/2-4	very dark gray (10YR 3/1) and gray (10YR 5/1) sand
E or C	4+	dark gray (10YR 4/1) and gray (10YR 6/1) sand

Hydric soil: No
Hydric soil field indicators: no hydric soil field indicators present.

SOUTHERN MARSH
USDA - NRCS Martin County Soil Survey - Sheet 42

The wetland soil is mapped as Waveland sand, depressional (mapping unit #5).
The upland soil is mapped as Waveland sand (mapping unit #4).

5 - Waveland sand, depressional is composed of:

100% - Waveland soil	hydric component

4 - Waveland sand is composed of:

40% - Waveland soil	non-hydric component
40% - Immokalee soil	non-hydric inclusion
10% - St. Johns soil	hydric inclusion
10% - Waveland soil	hydric inclusion



Point 2-2

Soil Profile Descriptions

Point 2-2. Waterward of the wetland boundary line (water table - 7 inches).

Horizon	Depth (in)	
A1	0-4	black (10YR 2/1) sand
A2	4-11	dark gray (10YR 4/1) sand
E or C	11+	gray (10YR 5/1) sand

Hydric soil: Yes
Hydric soil field indicators: presence of four inches of greater than 70% coated sand grains in the A1 horizon.

Point 2-3a. Waterward of the wetland boundary line (water table - 9 inches).

Horizon	Depth (in)	
A1	0-6	black (10YR 2/1) sand
E or C	6+	gray (10YR 5/1) sand

Hydric soil: Yes
Hydric soil field indicators: presence of four inches of greater than 70% coated sand grains in the A1 horizon.

Point 2-3b. Landward of the wetland boundary line.

Horizon	Depth (in)	
A	0-5	very dark gray (10YR 3/1) and light gray (10YR 7/1) sand
E or C	5+	gray (10YR 5/1) and light gray (10YR 7/1) sand

Hydric soil: No
Hydric soil field indicators: no hydric soil field indicators present.



Point 2-3b

Point 2-4. Landward of the wetland boundary line.

Horizon	Depth (in)	
A	0-2	gray (10YR 5/1) sand
E or C	2+	gray (10YR 7/1) sand

Hydric soil: No
Hydric soil field indicators: no hydric soil field indicators present.



Point 2-4

Little-Big Econ State Forest

(Seminole County)

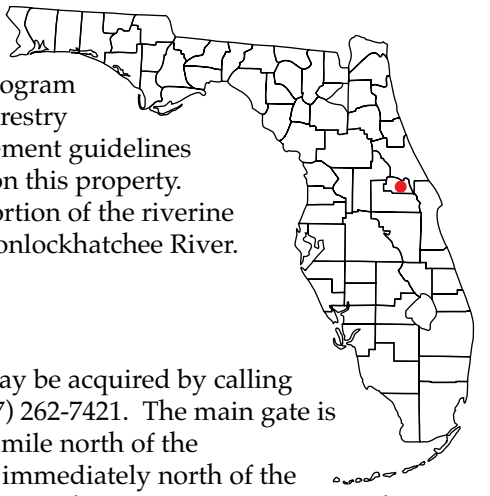
DEPRESSION MARSH AND RIVERINE SWAMP



Econlockhatchee River floodplain wetland/riverine swamp

LOCATION

The Little-Big Econ State Forest is located south of Geneva between C.R. 426 and C.R. 419 in Seminole County. The property is part of a cooperative program involving the St. Johns River Water Management District (SJRWMD), the state Conservation and Recreational Lands program (CARL), Seminole County, and the Division of Forestry (DOF). The DOF is currently developing management guidelines for the property. Two reference sites are located on this property. One site is an isolated marsh and the other is a portion of the riverine swamp contained within the floodplain of the Econlockhatchee River.



ACCESS

Permits are required to enter this property and may be acquired by calling the SJRWMD at (407) 897- 4311 or the DOF at (407) 262-7421. The main gate is located on Snow Hill Rd. approximately one half mile north of the Econlockhatchee River. The marsh site is located immediately north of the main gate entrance on the west side of Snow Hill Rd. The river swamp site is on the

north side of the Econlockhatchee River also immediately west of Snow Hill Rd.

COMMUNITY CHARACTERIZATION - DEPRESSION MARSH

The reference site is an isolated, depression marsh located in the northern portion of the property, close to the main entrance. A depression marsh wetland is generally a small rounded depression in a sand substrate with vegetation growing in distinct bands reflective of the hydroperiod and water depth. These open, bowl shaped wetlands are subject to both very wet and very dry conditions. Although it is likely that this site was originally situated within a pine flatwoods, the surrounding area has been converted to improved pasture. The outer edge of the marsh has been severely impacted by the associated activities including disking and seeding with pasture grass. Both the vegetative community and the upper portion of the soil profile reflect this disturbance. Although the upper portion of the soil profile has been mixed, the soil still retains hydric indicators. The combination of disking and the introduction of *Paspalum notatum* (bahia grass) has altered the vegetative dominance of the landward most zone of the marsh.

DELINEATION PROCEDURE - DEPRESSION MARSH

An initial inspection of the depression marsh establishes that the area is a wetland by direct application of the wetland definition. As would be expected from the location of the reference site within a pasture, the influence of pasture grasses on the vegetative dominance of the landward zone of the marsh is quickly revealed. Although not placed on the vegetative index, bahia grass does display a strong tolerance for wetland conditions and is often observed as a dominant component in the ground cover of disturbed wetlands. This is also the situation for several other species of pasture grass including *Axonopus furcatus*, *A. affinis* and *A. compressus* (carpet grasses) and *Cynodon dactylon* (Bermuda grass). Because of the confounding effect on vegetative dominance elicited by the presence of pasture grasses growing in the wetland, subsections 62-340.300(2)(a) and (b), F.A.C., are not used in determining the wetland boundary at this reference site.

When vegetative dominance can not be used to locate the edge of the wetland, hydrologic indicators often provide the necessary data with which to make decisions. The center of the marsh contains a small clump of *Nyssa sylvatica* var. *biflora* (swamp tupelo) trees which provides a clear hydrologic indicator in the form of a distinct lichen line. Further, although the soils of the landward zone of the marsh were disturbed by the disking, hydric soil indicators are still evident. The combination of the clear hydrologic indicator and the presence of hydric soil indicators allow the application of subsection 62-340.300(d), F.A.C. In order to use the distinct lichen line as a hydrologic indicator, it is necessary to establish that it does not reflect either relict or atypical conditions (reasonable scientific judgment). At this site, there is no sign of significant drainage that would lead to an altered hydrologic regime. A laser level was used to record the elevation of the lichen line and to project this elevation onto the surrounding land. The elevation of the lichen line corresponds very well with the landward extent of existing hydric soil indicators. Because mechanical mixing of the upper soil profile typically obliterates many of the hydric soil indicators, the current extent of hydric soil is regarded

as a conservative approximation which further supports the legitimate use of the lichen line. Using subsection 62-340.300(2)(d), F.A.C., the wetland boundary is established where a combination of hydric soil indicators (> 70% organic coating) and hydrologic indicators (the elevation of a lichen line on a swamp tupelo from the center of the depression) are both present. The wetland boundary line is marked with concrete monuments.

If the hydrologic indicator had not been present, subsection 62-340.300(3), F.A.C., the altered site provision, would have applied. The altered site provision is only to be used when the primary parameters of soil, vegetation, and hydrologic indicators can not be used to establish an accurate wetland boundary.

Vegetation Within the Marsh
(Observations recorded March 6, 1995)

(from the central area of the marsh)
Canopy/subcanopy

	Nyssa sylvatica var. *biflora*	OBL	water tupelo

Ground cover

	Bacopa spp.	OBL	water-hyssop
	Centella asiatica	FACW	coin wort
	Hydrocotyle spp.	FACW	water pennywort
	Ludwigia repens	OBL	ludwigia
	Micranthemum spp.	OBL	baby tears
	Panicum repens	FACW	torpedo grass
	Polygonum spp.	OBL	smartweed
	Pontederia cordata	OBL	pickerelweed
**	*Scirpus* spp.	OBL	bulrush
	Utricularia sp.	OBL	bladderwort

Vegetation Immediately Waterward of the Wetland Boundary line
(Observations recorded March 6, 1995)

(from the landward zone of the marsh)
Ground cover

	Andropogon virginicus	FAC	broomsedge
**	*Axonopus furcatus*	FAC	big carpet grass
	Baccharis halimifolia	FAC	salt bush
**	*Paspalum notatum*	UPLAND	bahia grass
	Carex albolutescens	FACW	sedge

Circeum horridulum	UPLAND	thistle
Desmodium sp.	UPLAND	beggar's lice
Eleocharis vivipara	OBL	hair grass
Eragrostis spp.	FAC	love grass
Eupatorium capillifolium	FAC	dog fennel
Euthamia sp.	FAC	bushy goldenrod
Hedyotis uniflora (*Oldenlandia*)	FAC	bluets
Hydrocotyle spp.	FACW	water pennywort
Juncus spp.	OBL	rush
Phyla nodiflora	FAC	frog-fruit
Myrica cerifera	FAC	wax myrtle
Panicum anceps	FAC	panic grass
Panicum dichotomum	FACW	panic grass
Panicum strigosum	FAC	panic grass
Paspalum urvillei	FAC	vasey grass
Rhynchospora fascicularis	FACW	beak-rush
Rhynchospora microcarpa	OBL	beak-rush
Sabal palmetto	FAC	cabbage palm
Scoparia dulcis	FAC	sweet broom
Scirpus spp.	OBL	bulrush
Scleria spp.	FACW	bald-rush
Sisyrinchium atlanticum	FACW	eastern blue-eyed grass
Solidago spp.	UPLAND	goldenrod
Sonchus sp.	UPLAND	sow thistle

** Designates species which are overwhelmingly dominant

Landward of the wetland boundary line the vegetation continues to be dominated by *Paspalum notatum* (bahia grass).

COMMUNITY CHARACTERIZATION - RIVERINE SWAMP

The reference site is the wetland limits of the Econlockhatchee River floodplain along the north side of the river. The wetland area is characterized by a canopy composed of species tolerant of periods of surface water inundation. Inundation is most frequent during the peak of the summer rainy season. As with most floodplain forests, a gradual slope is present. The depth and duration of inundation for any typical flooding event is a factor of this slope. The upper most extent of the community experiences less inundation than the portion at lower elevations.

DELINEATION PROCEDURES - RIVERINE SWAMP

The Econlockhatchee River is a surface water body identifiable by the use of section 62-430.600, F.A.C. Beginning at the river and moving landward, the vegetative dominance meets the provisions of subsections 62-340.300(2)(a) and (b), F.A.C., and is supported by the presence of hydric soil. Vegetative dominance continues landward to a point on the slope where the dominance of facultative wet species in the canopy rapidly gives way to the increasing influence of *Quercus virginiana* (live oak). Here, the provisions of subsection 62-340.300(2)(b), F.A.C., are no longer met in the canopy. The ground cover likewise changes, as *Serenoa repens* (saw palmetto) becomes a significant component. Hydric soil indicators also fall out where the canopy dominance changes from *Quercus laurifolia* (swamp laurel oak) to *Quercus virginiana* (live oak). The wetland boundary occurs at this break in communities.

Floodplains may or may not have hydric soil indicators because inundation does not always result in the creation of markers in the soil profile. It is important to note that the actual landward extent of some rivers may not be the limits of the associated wetlands, but rather are defined by the ordinary high water line. Please refer to section 62-340.600, F.A.C., in the main text of this document for further discussion of the ordinary high water line.

Vegetation Immediately Waterward of the Wetland Boundary Line

Canopy

Carpinus caroliniana	FACW	ironwood
Liquidambar styraciflua	FACW	sweetgum
Pinus elliottii	UPLAND	slash pine
Pinus serotina	FACW	pond pine
Quercus laurifolia	FACW	swamp laurel oak
Sabal palmetto	FAC	swamp cabbage

Subcanopy

Carpinus caroliniana	FACW	ironwood

Ground cover

Axonopus furcatus	FAC	big carpet grass
Carex albolutescens	FACW	sedge
Centella asiatica	FACW	coinwort
Chasmanthium sessiliflorum	FAC	spangle grass
Hypericum hypericoides	FAC	St. John's wort
Hypoxis leptocarpa	FACW	yellow star grass
Mitchella repens	UPLAND	partridge berry
Oxalis sp.	UPLAND	wood sorrel
Panicum sp.	FAC	panic grass

Vegetation Immediately Landward of the Wetland Boundary Line

Canopy

Pinus elliottii	UPLAND	slash pine
Quercus virginiana	UPLAND	live oak

Subcanopy

Crataegus crus-galli	UPLAND	hog-apple

Ground cover

Chasmanthium sessiliflorum	FAC	spangle grass
Erythrina herbacea	UPLAND	coral bean
Serenoa repens	UPLAND	saw palmetto

SOIL DESCRIPTIONS

Depression Marsh
USDA-NRCS Soil Survey of Seminole County - Sheet 25
The wetland is indicated by a wet spot symbol on the field sheet.
The upland soil is mapped as Myakka and EauGallie fine sand (mapping unit #20).

20 - Myakka and EauGallie fine sand is composed of:

48% - Myakka soil	non-hydric component
22% - EauGallie soil	non-hydric component
10% - EauGallie soil	hydric inclusion
10% - Myakka soil	hydric inclusion
5% - Pompano soil	hydric inclusion
5% - Basinger soil	hydric inclusion

Soil Profile Descriptions

Point 1. twenty feet waterward of the wetland boundary line (water table - 20 inches).

Horizon	Depth (in)	
A1	0-1	black (10YR 2/1) mucky fine sand, many fine roots
A2	1-5	black (10YR 2/1) fine sand, common medium roots
AE	5-9	black (10YR 2/1) and dark gray (10YR 4/1) fine sand, few medium roots
E or C	9-12+	gray (10YR 5/1) fine sand, common mdium roots

Hydric soil: Yes
Hydric soil field indicators: greater than four inches of 70% or more coated sand grains.

Point 2. twenty feet landward of the wetland boundary line (water table - below 24 inches).

Horizon	Depth (in)	
A	0-5	very dark gray (10YR 3/1) and gray (10YR 6/1) fine sand, many fine roots
E or C	5-12+	gray (10YR 5/1) fine sand, few medium roots

Hydric soil: No
Hydric soil field indicators: none

Riverine Swamp
USDA-NRCS Soil Survey of Seminole County - Sheet 25
The wetland soils are mapped as Pompano fine sand, occasionally flooded (mapping unit #28) and **Basinger and Delray fine sands** (mapping unit #9).

28 - Pompano fine sand, occasionally flooded is composed of:

90% - Pompano soil	hydric component
10% - Nittaw soil	hydric inclusion

9 - Basinger and Delray fine sands is composed of:

60% - Basinger soil	hydric component
32% - Delray soil	hydric component
4% - Malabar soil	hydric inclusion
4% - Wabasso soil	non-hydric inclusion

The upland soil is mapped as Myakka and EauGallie fine sand (mapping unit #20).

20 - Myakka and EauGallie fine sand is composed of:

48% - Myakka soil	non-hydric component

22% - EauGallie soil	non-hydric component
5% - Basinger soil	hydric inclusion
10% - EauGallie soil	hydric inclusion
10% - Myakka soil	hydric inclusion
5% - Pompano soil	hydric inclusion

Soil Profile Descriptions

Point 1. twelve feet waterward of the wetland boundary line.

Horizon	Depth (in)	
A	0-1	very dark gray (10YR 3/1) fine sand with black (10YR 2/1) 1-2cm organic accretions, many fine roots
AE	1-6	very dark gray (10YR 3/1) fine sand with yellowish brown (10YR 5/6) oxidized rhizospheres in the lower part, common fine and few medium roots
B	6-10+	dark grayish brown (10YR 4/2) loamy fine sand with fine medium prominent yellowish brown (10YR 5/6) mottles, few fine roots

Hydric soil: Yes
Hydric soil field indicators: organic accretions in the A horizon, and oxidized rhizospheres in the AE horizon.



Point 1

Point 2. 45 feet landward of the wetland boundary line.

Horizon	Depth (in)	
A	0-7	very dark gray (10YR 3/1) very fine sand, many fine and few medium roots
C	7-12+	dark grayish brown (10YR 4/2) and brown (10YR 5/3) fine sand, few fine roots

Hydric soil: No
Hydric soil field indicators: none



Point 2

Naval Live Oaks Area

(Santa Rosa County)

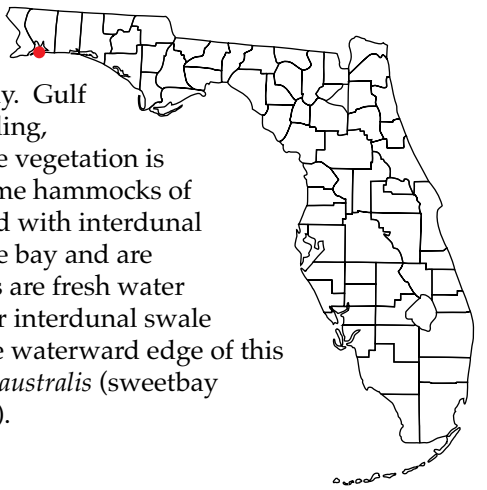
FRESHWATER INTERDUNAL SWALE



Maritime hammock

LOCATION

The Naval Live Oaks Area, part of the Santa Rosa Island National Seashore, is located in coastal Santa Rosa county. The park includes large areas of tidal marsh and maritime coastal hammock. The reference site is located on the peninsula between Santa Rosa sound and East Bay. Gulf Breeze is the nearest town. The land is gently rolling, reflecting a history of coastal dunes. Seaward, the vegetation is stunted by the wind, producing the dense maritime hammocks of live oak. The maritime hammocks are punctuated with interdunal swales. Some of these swales are connected to the bay and are dominated by salt marsh vegetation, while others are fresh water marshes. The reference site is part of a freshwater interdunal swale dominated by *Cladium jamaicense* (sawgrass). The waterward edge of this wetland is dominated by *Magnolia virginiana* var. *australis* (sweetbay magnolia) and *Myrica cerifera* (southern bayberry).



ACCESS

This reference site is located west of the visitors center at the Naval Live Oaks area of Gulf Islands National Seashore. The visitor center is located between Gulf Breeze and Navarre on U.S. Highway 98. Parking is available in the visitor center parking area. The site is easily reached by a trail that parallels Santa Rosa sound. Access is through the visitor center, across the deck in back, and west on the hiking trail. The interdunal swale can be reached in a few minutes by a pleasant walk through a maritime hammock. The wetland boundary is marked with wooden posts.

COMMUNITY CHARACTERIZATION

The reference site is a freshwater marsh of an interdunal swale. The center of this wetland is dominated by *Caladium jamaicense* (sawgrass) with an outer zone of *Magnolia virginiana* var. *australis* (sweetbay magnolia) and *Myrica cerifera* (southern bayberry). The wetland boundary is established immediately upslope from the sweetbay magnolia. Landward of the boundary line, the maritime forest of *Quercus geminata* (sand live-oak), *Magnolia grandiflora* (southern magnolia), *Carya glabra* (pignut hickory) and *Persea borbonia* (redbay) produces a closed canopy of twisting branches.



Sawgrass marsh within interdunal swale

DELINEATION PROCEDURE

The deepest portion of the interdunal swale is a marsh dominated by sawgrass, a wetland that is identifiable by using the wetland definition. Surrounding the marsh is dense forest. Beginning at the marsh/forest interface, vegetative dominance by hydrophytic species in the canopy, corroborated by hydric soil indicators (subsections 62-340.300(2)(a) and (b), F.A.C.), is followed landward. The initial canopy encountered is composed of sweetbay magnolia, an obligate species and *Persea borbonia* (red bay), an upland species. The wetland boundary is established where the areal extent of sweetbay no longer exceeds the areal extent of upland species. Landward of the *Magnolia virginiana* var. *australis* zone, the composition of the canopy changed rapidly to upland species. Similarly the soil also changes from hydric to non-hydric. Further observation showed that recent extreme inundation, probably associated with the tropical storms of July and August of 1994 has killed the *Myrica cerifera* around the edge of this wetland but not the *Magnolia virginiana* var. *australis*.

Vegetation of the Wetland Interior.

Ground cover

Cephalanthus occidentalis	OBL	buttonbush
Caladium jamaicense	OBL	sawgrass

Vegetation Immediately Waterward of the Wetland Boundary.

Canopy

Magnolia virginiana var. *australis*	OBL	magnolia, sweetbay
Persea borbonia	UPLAND	bay, red

Subcanopy

Myrica cerifera	FAC	bayberry, southern

Vegetation Immediately Landward of the Wetland Boundary.

Canopy

Magnolia grandiflora	UPLAND	magnolia, southern
Persea borbonia	UPLAND	bay, red
Pinus elliottii	UPLAND	slash pine
Quercus hemisphearica	UPLAND	oak, laurel
Quercus geminata	UPLAND	oak, sand-live

Subcanopy

Myrica cerifera	FAC	bayberry, southern

Ground Cover

Aronia arbutifolia	FACW	red chokeberry
Bignonia capreolata	VINE	cross-vine

SOIL DESCRIPTIONS

USDA-NRCS Santa Rosa County Soil Survey - Sheet 83
The soil is mapped as Kureb sand, 0 to 8 persent slope.

Soil Profile Descriptions

Transect 1:
Point 1-1. One foot waterward of the wetland boundary line (water table - one inch).

Horizon	Depth (in)	
Oe	3-0	dark reddish brown (5YR 3/3) peat
Oa	0-1	black (10YR 2/1) muck
A1	1-3	black (10YR 2/1) mucky fine sand
A2	3+	very dark gray (10YR 3/1) fine sand

Hydric soil: Yes
Hydric soil field indicators: one inches of muck (horizon Oa), three inches of mucky texture

Point 1-2. Ten feet landward of the wetland boundary line (water table - ten inches).

Horizon	Depth (in)	
Oe	1-0	dark reddish brown (5YR 3/3) peat
A1	0-2	brown (7.5YR 4/2) fine sand
A2	2-7	dark gray (10YR 4/1) fine sand
E or C	7+	gray (10YR 5/1) fine sand

Hydric soil: No
Hydric soil field indicators: none

Transect 2:
Point 2-1. One foot waterward of the wetland boundary line (water table - one inch).

Horizon	Depth (in)	
Oe	2-0	dark reddish brown (5YR 3/3) peat
Oa	0-1	black (10YR 2/1) muck
A1	1-3	black (10YR 2/1) mucky fine sand
A2	3+	very dark gray (10YR 3/1) fine sand

Hydric soil: Yes
Hydric soil field indicators: one inches of muck in the Oa horizon and three inches of mucky texture in the A1 horizon.



Point 2-2

Point 2-2. Ten feet landward of the wetland boundary line (water table - eight inch).

Horizon	Depth (in)	
Oe	2-0	dark reddish brown (5YR 3/3) peat
A	0-4	dark gray (10YR 4/1) fine sand
E or C	4+	gray (10YR 5/1) fine sand

Hydric soil: No
Hydric soil field indicators: none

No Name Key

(Monroe County)

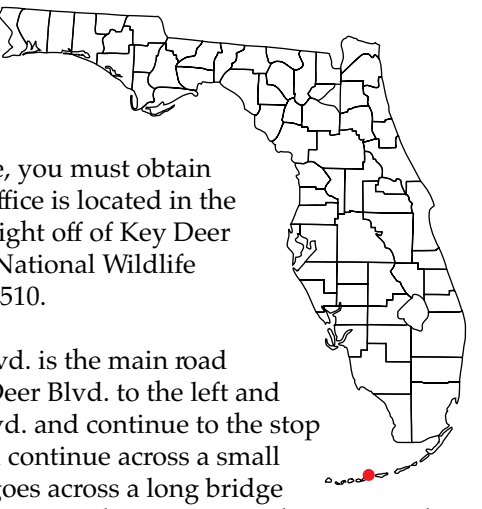
BUTTONWOOD FOREST



Buttonwood Forest

LOCATION

No Name Key is located immediately east of Big Pine Key, within the National Key Deer Refuge. The reference site is located on the east end of the island.



ACCESS

To enter this area of the National Key Deer Refuge, you must obtain permission from the Refuge Headquarters. The office is located in the shopping center that is one block from the traffic light off of Key Deer Blvd. Contact the Refuge Manager, Florida Keys National Wildlife Refuge, P.O. Box 430510, Big Pine Key, Fl. 33043-0510.

Take Key Deer Blvd. to Watson Blvd. Key Deer Blvd. is the main road through Big Pine Key and will fork left into Key Deer Blvd. to the left and Wilder Rd. to the right. Take a right at Watson Blvd. and continue to the stop sign. At the stop sign turn left onto Avenue A and continue across a small bridge and through a residential area. This road goes across a long bridge to No Name Key. Continue on this road across the key to the east end of the island. The

road dead ends at a concrete barrier. Parking is allowed on the shoulder of the road. Along the right side (south side) of the road, approximately 100 feet from the barrier, is a ditch filled with mangroves. The reference site is located between the tropical hardwood hammock and the buttonwood forest, about 100 feet from the road.

COMMUNITY CHARACTERIZATION

The reference site is located adjacent to a buttonwood forest. The wetland is only inundated by the highest tides during certain times of the year, and remains dry for long periods. The soils are rocky and often without continuous plant cover. The forest nearest the wetland boundary is dominated by *Conocarpus erecta* (buttonwood). This is an open forest with salt-tolerant herbaceous perennials and woody shrubs such as *Fimbristylis castanea* (fringe-rush), *Monanthochloe littoralis* (Key grass), *Spartina patens* (saltmeadow cordgrass), *Spartina spartinae* (Gulf cordgrass), and *Sporobolus virginicus* (seashore dropseed). The ecotone between the wetland and tropical hammock is dominated by *Manilkara bahamensis* (wild dilly), *Coccoloba uvifera* (sea grape), *Randia aculeata* (indigo berry), and *Reynosia septentrionalis* (darling plum).

To facilitate identification of the woody vegetation of the keys we recommend *Native Trees and Shrubs of the Florida Keys* by J. Paul Scurlock.

DELINEATION PROCEDURE

The wetland boundary is located at the landward interface of the buttonwood forest and the tropical hammock. Beginning in the fringing mangrove swamp (located east of the buttonwood forest), a wetland identified by the use of the definition in subsection 62-340.200(19), F.A.C., the dominance of obligate and facultative wet vegetation is followed landward using the provisions of subsection 62-340.300(2)(a), F.A.C. The mangrove swamp, composed of *Rhizophora mangle* (red mangrove), *Laguncularia racemosa* (white mangrove), and *Avicennia germinans* (black mangrove), grades into an open forest of buttonwood. Soils and hydrologic indicators are present along a transect from the mangrove forest through the buttonwood forest. Using subsection 62-340.300(2)(b), F.A.C., the wetland delineation extended through the open canopy of the buttonwood forest to the ecotone between the buttonwood forest and tropical hammock. Proceeding landward within the ecotone, dominance by hydrophytic plants is lost as are hydric soil indicators (upper soil surface contains organic soil impurities from the Folists found in the tropical hammock and the marl color grades from very dark grey to grey). For this reference site the wetland boundary is placed at the interface between the buttonwood forest and the tropical hammock.

The following plant lists with corresponding soils descriptions were prepared during the December 1994 visit to the delineation site. The common plant species in the buttonwood forest and tropical hammock are listed below. Soil descriptions and photographs follow the plant lists.

Vegetation Immediately Waterward of the Wetland Boundary

Canopy

Manilkara bahamensis	FACW	wild dilly
Conocarpus erectus	FACW	buttonwood
Coccoloba uvifera	UPLAND	seagrape

Subcanopy

Manilkara bahamensis	FACW	wild dilly
Conocarpus erectus	FACW	buttonwood

Ground cover

Monanthochloe littoralis	OBL	Key grass
Spartina patens	FACW	saltmeadow cordgrass
Spartina spartinae	OBL	Gulf cordgrass
Sporobolus virginicus	OBL	seashore dropseed
Fimbristylis castanea	OBL	fringerush

Vegetation Immediately Landward of the Wetland Boundary

Canopy

Coccolobba diversifolia	UPLAND	pigeon plum
Eugenia axillaris	UPLAND	white stopper
Eugenia foetida	UPLAND	Spanish stopper
Metopium toxiferum	FAC	poison wood
Psidium longipes	UPLAND	long-stalked stopper
Manilkara bahamensis	FACW	wild dilly
Manilkara zapota	UPLAND	sapodilla

Subcanopy

Coccolobba diversifolia	UPLAND	pigeon plum
Eugenia axillaris	UPLAND	white stopper
Eugenia foetida	UPLAND	Spanish stopper
Metopium toxiferum	FAC	poison wood
Psidium longipes	UPLAND	long-stalked stopper
Randia aculeata	FAC	indigo berry
Reynosia septentrionalis	UPLAND	darling plum
Manilkara zapota	UPLAND	sapodilla

Ground cover

Ernodea littoralis	FAC	golden creeper

Morinda royoc	FACW	Keys rhubarb

SOILS DESCRIPTION

USDA - NRCS Monroe County Soil Survey - Sheet 6

The wetland soil is mapped as Rock outcrop-Cudjoe complex, tidal (mapping unit #8). **The upland soil is mapped as Matecumbe muck, occasionally flooded** (mapping unit #3).

8 - Rock outcrop-Cudjoe complex, tidal is composed of:

60% - Rock outcrop	non-soil
40% - Cudjoe soil	hydric component

3 - Matecumbe muck, occasionally flooded is composed of:

95% - Matecumbe soil	non-hydric component
5% - Keylargo soil	hydric inclusion



Point 1: Marl soil

Typical Soil Profile Descriptions

Point 1. Waterward of the wetland delineation line.

Horizon	Depth (in)	
A	0-2	light brownish gray (10YR 6/2) marl
R	2+	limestone

Hydric soil: Yes
Hydric soil field indicators: presence of marl in the A horizon.

Point 2. Landward of the wetland delineation line.

Horizon	Depth (in)	
Oa1	0-3	black (5YR 2.5/1) muck (peat)
Oa2	3-5	black (5YR 2.5/1) gravelly muck
R	5+	limestone



Point 2: Folists soil

Hydric soil: No
Hydric soil field indicators: no hydric soil field indicators present.

Peck Lake Park

(Martin County)

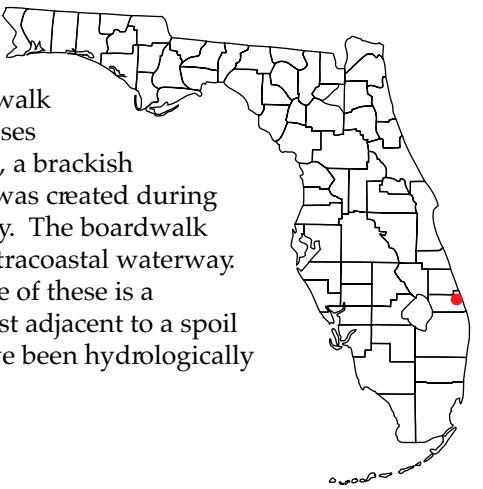
HARDWOOD SWAMP AND MANGROVE SWAMP



Tidally influenced Australian Pines

LOCATION

Peck Lake Park is adjacent to the Hobe Sound National Wildlife Refuge and north of Jupiter Island. The park is owned and maintained by Martin County. There is a boardwalk through the park from the parking area out to the Intracoastal Waterway. The boardwalk begins at the edge of the mesic flatwoods and passes through a hardwood swamp, a mangrove swamp, a brackish slough, and onto a spoil island. The spoil island was created during the dredging of the Atlantic Intracoastal Waterway. The boardwalk ends on the other side of the spoil island at the intracoastal waterway. There are two reference sites within the park. One of these is a freshwater swamp, the second is a mangrove forest adjacent to a spoil island. All the wetlands observed in the park have been hydrologically altered.



ACCESS

From U.S. Highway 1, about 8 miles south of Stuart, turn east on Osprey Street and cross A1A (Dixie Highway). Turn north (left) onto Gomez Avenue and look for the park

entrance within about 1/4 mile. Parking and facilities are available in the park and access is free. The reference sites are easily observable from the boardwalk.

COMMUNITY CHARACTERIZATION - HARDWOOD SWAMP

The freshwater swamp at this site is dominated by a canopy of *Ilex cassine* (dahoon holly) and *Persea palustris* (swamp bay). The forest is growing in an interdunal swale adjacent to a pine flatwoods. The ecotone between the pine flatwoods and hardwood swamp is narrow, occurring within a zone dominated by *Serenoa repens* (saw palmetto) immediately landward of the swamp. The interior of the swamp has a ground cover dominated by *Blechnum serrulatum* (swamp fern).

DELINEATION PROCEDURE - HARDWOOD SWAMP

The wetland boundary established for this reference site lies between a freshwater swamp (interdunal swale) and a pine flatwoods. Proceeding from within the freshwater swamp, a wetland identifiable by direct application of the wetland definition, the dominance of wetland vegetation is followed landward, examining either the presence of hydric soil indicators or the presence of hydrologic indicators (subsections 62-340.300(2)(a) and (b), F.A.C.). Vegetative dominance is established using subsection 62-340.300(2)(a), F.A.C., within the canopy of the hardwood swamp and continues up to the ecotone, where vegetative dominance is lost. Here, there is an abrupt change from the hydrophytic canopy and ground cover species of the hardwood swamp to saw palmetto dominance. Within this ecotone, hydrologic indicators are present in the form of more than two inches of mucky texture in the upper soil profile. Using subsection 62-340.300(2)(d), F.A.C., the wetland boundary extends a short distance into the saw palmetto thicket until the hydrologic indicators in the soil are no longer present. The exclusion of fire from the surrounding flatwoods has allowed fire intolerant hydrophytic species such as dahoon holly and *Gordonia lasianthus* (loblolly bay) to reach subcanopy tree size within the flatwoods landward of the wetland boundary.

The following plant lists, with corresponding soils descriptions, were prepared during the December 1994 visit to the reference site. The common plant species in the freshwater swamp and pine flatwoods are listed below. Descriptions and photographs of soil samples are included from each location.

Vegetation of the Freshwater Swamp, Immediately Waterward of the Wetland Boundary.

Canopy

Gordonia lasianthus	FACW	loblolly bay
Ilex cassine	OBL	dahoon holly
Persea palustris	OBL	swamp bay

Subcanopy

Ilex cassine	OBL	dahoon holly

Ground cover

Blechnum serrulatum	FACW	swamp fern
Ilex cassine	OBL	dahoon holly
Myrica cerifera	FAC	wax myrtle
Persea palustris	OBL	swamp bay
Quercus laurifolia	FACW	swamp laurel oak
Serenoa repens	UPLAND	saw palmetto
Vitus rotundifolia	VINE	grape

Vegetation of the Pine Flatwoods, Immediately Landward of the Wetland Boundary.

Canopy

Gordonia lasianthus	FACW	loblolly bay
Pinus elliottii var. *densa*	UPLAND	south Florida slash pine
Quercus virginiana	UPLAND	live oak

Subcanopy

Ilex cassine	OBL	dahoon holly
Myrica cerifera	FAC	wax myrtle

Ground cover

Befaria racemosa	UPLAND	tar flower
Ilex glabra	UPLAND	gallberry
Lyonia fruticosa	UPLAND	fetterbush
Pteridium aquilinum	UPLAND	bracken fern
Rhus copallina	UPLAND	smooth sumac
Serenoa repens	UPLAND	saw palmetto
Vitus rotundifolia	VINE	grape

COMMUNITY CHARACTERIZATION - MANGROVE SWAMP

The mangrove community consists of a canopy composed of *Rhizophora mangle* (red mangrove), *Avicennia germinans* (black mangrove), *Laguncularia racemosa* (white mangrove), and the introduced *Schinus terebinthifolius* (Brazilian pepper). This is a hydrologically altered mangrove community as is evidenced by the spoil piles between the swamp and the Intracoastal Waterway. It might be best to consider this an overwash swamp that is frequently inundated by water from the Intracoastal Waterway. The spoil island adjacent to the mangrove swamp is naturalized with Brazilian pepper and *Casuarina litorea* (Australian pine).

DELINEATION PROCEDURE - MANGROVE SWAMP

The wetland boundary established for this reference site lies between a mangrove swamp and an Australian pine dominated spoil pile. Proceeding from within the mangrove swamp, a wetland identified by direct application of the wetland definition, the dominance of wetland vegetation is followed landward, examining either the presence of hydric soil indicators or the presence of hydrologic indicators (subsections 62-340.300(2)(a) and (b), F.A.C.). Supporting hydrologic indicators include pneumatophores from black mangrove and a well developed rack line. Within the canopy of the mangrove swamp, subsection 62-340.300(2)(a), F.A.C., is used up to the edge of the spoil pile where vegetative dominance by hydrophytic vegetation is no longer applicable. Proceeding past the canopy of mangroves, hydrologic indicators become the appropriate mechanism for establishing the wetland boundary (subsection 62-340.300(2)(d), F.A.C.). Pneumatophores are found beyond the rack lines, beneath the Australian pines. The soils of the spoil bank are disturbed, however hydric soil indicators have developed. Based on the hydrologic indicators and the use of reasonable scientific judgment, the wetland boundary is placed in the area where the pneumatophores end and the Australian pines begin to dominate the canopy.

The following plant lists, with corresponding soils descriptions, were prepared during the December 1994 visit to the reference site. The common plant species in the mangrove swamp and Australian pine dominated spoil pile are listed below. Descriptions and photographs of soil samples are included from each location.

Vegetation of the Mangrove swamp, Immediately Waterward of the Wetland Boundary.

Canopy

Avicennia germinans	OBL	mangrove, black
Laguncularia racemosa	OBL	mangrove, white
Rhizophora mangle	OBL	mangrove, red
Schinus terebinthifolius	FAC	pepper-tree, Brazilian
Casuarina litorea	UPLAND	Australian pine

Vegetation of the Australian Pine Dominated Spoil Pile, Immediately Landward of the Wetland Boundary.

Canopy

Casuarina litorea	UPLAND	Australian pine

Ground cover

Abrus precatorius	UPLAND	rosary pea
Cassia bicapsularis	VINE	climbing cassia
Habenaria odontopetala	FACW	rein orchid
Plumbago scandens	UPLAND	wild plumbago
Sabal palmetto	FAC	cabbage palm
Schinus terebinthifolius	FAC	Brazilian pepper

SOIL DESCRIPTIONS

Hardwood swamp.
USDA - NRCS Martin County Soil Survey - Sheet 26

The wetland soil is mapped as Okeelanta muck (mapping unit #22).
The upland soil is mapped as Salerno sand (mapping unit #35).

22 - Okeelanta muck is composed of:

100% - Okeelanta soil	hydric component

39 - Salerno sand is composed of:

70% - Salerno soil	non-hydric component
30% - Pineda soil	hydric inclusion

Soil Profile Descriptions

Point 1. Six feet waterward of the wetland boundary line (water table - 12 inches).

Horizon	Depth (in)	
Oi	1-0	dark reddish brown (5YR 2.5/2) litter; small amount of muck and mucky fine sand in the lower part of the horizon; many medium and fine roots
A1	0-3	dark gray (10YR 4/1) fine sand, with black (10YR 2/1) organic accretions;
A2	3-7	very dark gray (10YR 3/1) fine sand, with few medium distinct gray (10YR 5/1) mottles; common medium roots
E or C	7-15+	gray (10YR 5/1) fine sand; few medium roots

Hydric soil: Yes
Hydric soil field indicators: presences of organic accretions in the A1 horizon.



Point 1: Hardwood swamp

Mangrove swamp
USDA - NRCS Martin County Soil Survey - Sheet 26

The wetland soil is mapped as Okeelanta Variant muck (mapping unit #50).
The upland soil is mapped as Quartzipsamments, 0 to 8 percent slope (mapping unit #39).

50 - Okeelanta Variant muck is composed of:

100% - Okeelanta Variant soil hydric component

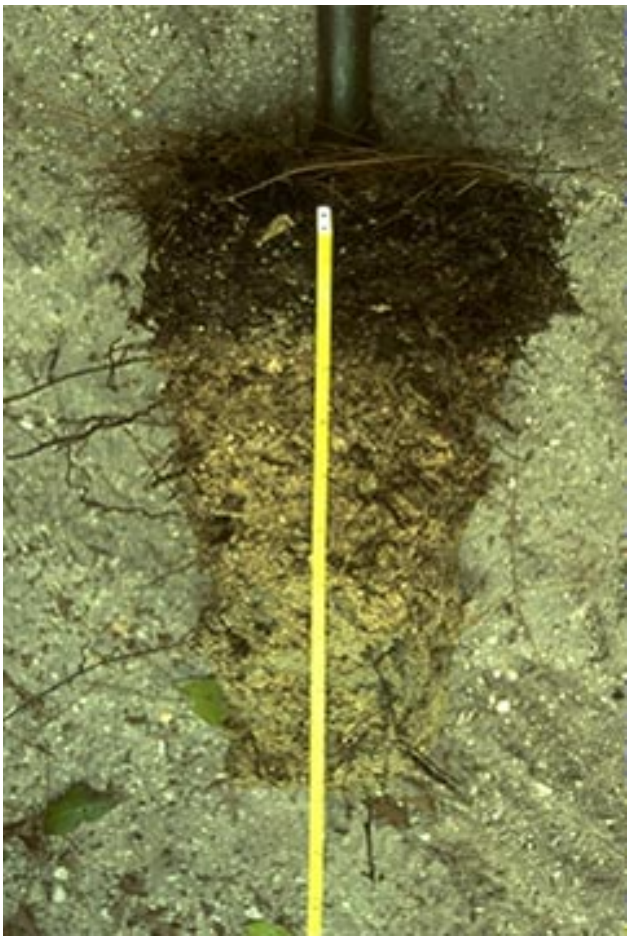
39 - Quartzipsamments, 0 to 8 percent slope is composed of:

5 to 20 feet thick deposits of mixed sand and shell materials

Soil Profile Descriptions

Point 1. Five feet waterward of the wetland boundary line (water table - 8 inches).

Horizon	Depth (in)	
Oi	3-0	black (10YR 2/1) litter; Australian pine needles
Oa	0-1	black (10YR 2/1) muck
C	1-9+	light gray (10YR 7/1) mixed sand and shell fragments; overburden materials from the dredging of the Intercoastal Waterway; few large, many medium and fine roots.



Hydric soil: Yes
Hydric soil field indicators: presence of 0.5 inches of muck in the Oa horizon.

Point 1: Hydric soil under Australian pine.

Point 2. Twenty feet waterward of the wetland boundary line (water table - 34 inches).

Horizon	Depth (in)	
Oi	3-0	black (5YR 2.5/2) litter; Australian pine neddles
C	0-9+	light gray (10YR 7/2) mixed sand and few shell fragments; common fine and medium roots.

Hydric soil: No
Hydric soil field indicators: no hydric soil field indicators present.

Purify Bay

(Wakulla County)

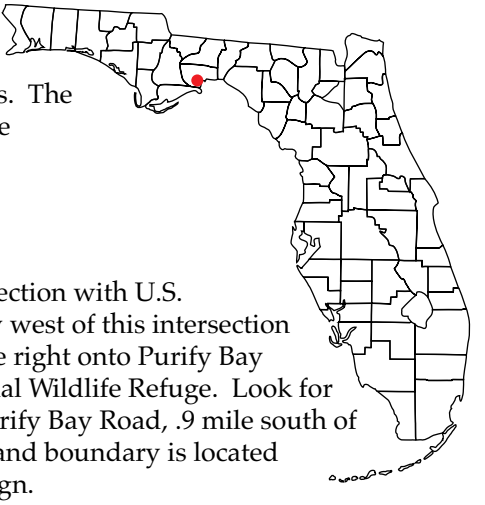
BAYHEAD SWAMP



Looking into a bayhead wetland from the pine flatwoods

LOCATION

Purify Bay is located in southern coastal Wakulla County, within the St. Marks National Wildlife Refuge. In general this portion of the Refuge is characterized as poorly drained, low pine flatwoods containing numerous areas of irregularly shaped forested sloughs and flowways. The reference site is a bayhead community within pine flatwoods.



ACCESS

To visit the reference site, take U.S. 98 to its intersection with U.S. Highway 319 (Crawfordville Hwy.). Immediately west of this intersection (on Hwy. 98) take Hwy. 375 south, then stay to the right onto Purify Bay Road, which runs south into the St. Marks National Wildlife Refuge. Look for the Florida Trail marker along the west side of Purify Bay Road, .9 mile south of the entrance sign to the wildlife refuge. The wetland boundary is located approximately 100 feet west of the Florida Trail sign.

COMMUNITY CHARACTERIZATION

Purify Bay is an example of a bayhead wetland. Bayheads are peat-filled depressions that typically support evergreen hardwoods such as *Magnolia virginiana* var. *australis* (sweetbay magnolia), *Gordonia lasianthus* (loblolly bay) and *Cliftonia monophylla* (black titi). This reference site is located at the base of a very shallow slope. Moisture is provided from ground water and runoff from the surrounding pine flatwoods. Within the ecotone between the flatwoods and the deeper portion of the bayhead is a zone where the seepage of water from the uplands emerges from the mineral soil and maintains a saturated peat layer. Here, sphagnum moss and various evergreen shrubs grade into the taller evergreen hardwoods of the deeper portion of the bayhead. Within the interior of the bayhead is a small blackwater slough or shallow stream.

The structure of a bayhead is maintained by infrequent, periodic fire. Bayheads are rarely dry enough to burn. Fire may burn and kill the top most portion of the hardwoods at the edge of the bayhead and the typical domed appearance is due in part to this phenomenon.

The reference site is forested by a canopy composed of sweetbay magnolia, loblolly bay, *Nyssa sylvatica* var. *biflora* (swamp tupelo), and *Taxodium ascendens* (pond cypress). Pond cypress and swamp tupelo are dominant in deeper areas with sweetbay magnolia and loblolly bay more common on the edge. Black titi dominated the subcanopy and groundcover and in some areas become a canopy component. Soils are peaty and saturated, including the ecotone of the wetland. The center of the wetland is inundated except during droughts.

The pine-dominated upland, landward of the wetland, had recently burned. Stump sprouts of gordonia and black titi were found within the ecotone.

DELINEATION PROCEDURE

The wetland boundary lies within an ecotone between a pine flatwoods and a bayhead dominated by black titi, sweetbay magnolia, swamp tupelo, loblolly bay, and pond cypress. Beginning within the bayhead, a wetland identified by the use of the definition in subsection 62-340.200(19), F.A.C., the dominance of obligate and facultative wet vegetation is followed landward up to the ecotone between the bayhead and the flatwoods. At this point, subsections 62-340.300(2)(a) and(b), F.A.C., are no longer appropriate as dominance by hydrophytic species ends. Hydric soils and hydrologic indicators (greater than 2 inches of mucky texture) continue into the ecotone. The wetland boundary is established slightly landward of the limits of vegetative dominance using, subsection 62-340.300(2)(d), F.A.C., at the point where hydrologic indicators are not present.

The following plant lists with corresponding soils descriptions were prepared during the May 1995 visit to the reference site. The common plant species in the bayhead wetland and the flatwoods are listed below. Soil descriptions and photographs follow the vegetative list. Note: the subcanopy landward of the ecotone has been killed to the

ground by fire.

Wetland Vegetation List

Canopy

Cliftonia monophylla	FACW	buckwheat-tree
Gordonia lasianthus	FACW	bay, loblolly
Magnolia virginiana var. *australis*	OBL	magnolia, sweetbay
Nyssa sylvatica var. *biflora*	OBL	tupelo, swamp
Taxodium ascendens	OBL	cypress, pond

Subcanopy

Cliftonia monophylla	FACW	buckwheat-tree
Gordonia lasianthus	FACW	bay, loblolly
Nyssa sylvatica var. *biflora*	OBL	tupelo, swamp
Taxodium ascendens	OBL	cypress, pond

Ground cover

Aronia arbutifolia	FACW	red chokeberry
Clethra alnifolia	FACW	sweet pepper bush
Cyrilla racemiflora	FAC	cyrilla, swamp
Gordonia lasianthus	FACW	bay, loblolly
Ilex coriacea	FACW	holly, bay-gall
Ilex glabra	UPLAND	gallberry
Lyonia ligustrina	FAC	maleberry
Lyonia lucida	FACW	fetter-bush
Lyonia mariana	FACW	fetter-bush
Pteridium aquilinum	UPLAND	bracken fern
Rhododendron viscosum	FACW	azalea, swamp
Scleria spp.	FACW	nutrush
Serenoa repens	UPLAND	saw palmetto
Smilax laurifolia	VINE	bamboo vine
Sphagnum spp.	OBL	sphagnum moss
Vaccinium corymbosum	FACW	blueberry, highbush
Vitis rotundifolia	VINE	muscadine grape

Upland Vegetation List

Canopy

Planted Pine

Pinus elliottii	UPLAND	slash pine

Subcanopy
None, as the site had recently been burned and the subcanopy to the edge of the bayhead has been killed by fire.

Ground cover

Carphephorus paniculatus	FAC	deer-tongue
Clethra alnifolia	FACW	sweet pepper bush
Cyrilla racemiflora	FAC	cyrilla, swamp
Cuscuta sp.	VINE	dodder
Gaylussacia frondosa	FAC	dangleberry
Gordonia lasianthus	FACW	bay, loblolly
Hypericum drummondii	UPLAND	St. John's-wort, Drummond's
Ilex coriacea	FACW	holly, bay-gall
Ilex glabra	UPLAND	gallberry
Lyonia lucida	FACW	fetter-bush
Myrica cerifera	FAC	bayberry, southern
Pteridium aquilinum	UPLAND	bracken fern
Rhus copallina	UPLAND	winged sumac
Quercus minima	UPLAND	oak, dwarf live
Quercus pumila	UPLAND	oak, running
Scleria spp.	FACW	nutrush
Serenoa repens	UPLAND	saw palmetto
Sporobolus floridanus	FACW	dropseed, Florida
Vaccinium myrsinites	UPLAND	shiny blueberry
Vitis rotundifolia	VINE	muscadine grape

SOIL DESCRIPTIONS

USDA - NRCS Wakulla County Soil Survey - Sheet 30

Soil Profile Descriptions

Point 1-2a. One foot waterward of the wetland boundary line.

Horizon	Depth (in)	
Oe	1-0	dark brown (7.5YR 3/3) sand
A1	0-5	very dark gray (10YR 3/1) sand
A2	5-12	dark gray (10YR 4/1) sand
E	12-24	brown (10YR 5/2) sand
Bh	24+	black (10YR 2/1) sand

Hydric soil: Yes
Hydric soil field indicators: five inches of greater than 70% coatings on the sand grains (horizon A1).



Point 1-2a

Point 1-2b. One foot landward of the wetland boundary line.

Horizon	Depth (in)	
A1	0-4	black (10YR 2/1) sand with many fine roots
A2	4-8	black (10YR 2/1) sand with few fine roots
E	8-13	dark gray (10YR 4/1) sand
Bh	13+	black (10YR 2/1) sand

Hydric soil: No
Hydric soil field indicators: none - the A1 and A2 horizons were salt and pepper in appearance (50% coatings on the sand grains).



Point 1-2b



Point 1-3

Point 1-3. Twenty foot landward of the wetland boundary line.

Horizon	Depth (in)	
Oe	1-0	black (5YR 2.5/1) peat
A	0-3	black (10YR 2/1) sand
E1	3-9	gray (10YR 5/1)
E2	9-23	grayish brown (10YR 5/2) sand
Bh	23-34+	dark brown (7.5YR 3/2) sand

Hydric soil: No
Hydric soil field indicators: none

St. George Island State Park

(Franklin County)

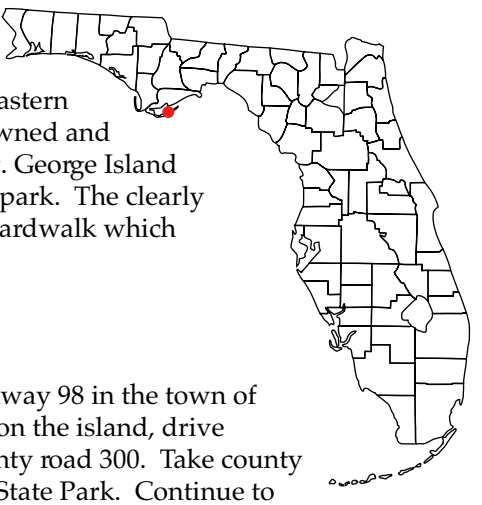
INTERDUNAL SWALE



Looking across the interdunal swale wetland boundary into pine flatwoods

LOCATION

St. George Island is a barrier island located directly south of the towns of Eastpoint and Apalachicola. It is part of a chain of barrier islands associated with Apalachicola River/ Apalachicola Bay estuary. The island is accreting on the western end and eroding at the eastern end. The western half of the island is privately owned and heavily developed, while the eastern half is the St. George Island State Park. The reference site is found within the park. The clearly defined wetland boundary is accessible from a boardwalk which crosses the wetland.



ACCESS

St. George Island may be reached from U. S. Highway 98 in the town of Eastpoint via the St. George Island Bridge. Once on the island, drive approximately 1/4 mile to the intersection of county road 300. Take county road 300 east to the entrance of St. George Island State Park. Continue to the parking lot of the first beach facility. The reference site is on the north side of the

road, adjacent to the boardwalk. The boardwalk leads over coastal dunes and through pine flatwoods to an interdunal swale wetland.

COMMUNITY CHARACTERIZATION

The reference site is an interdunal swale located within a pine flatwoods community on the Apalachicola Bay side of the island. The surrounding pine flatwoods are also interspersed with scrub communities. Interdunal swales are depressional wetland features in the pine flatwoods landscape. The topographic boundary, however, is often masked by vegetation, such as *Ilex glabra* (gallberry) and *Baccharis* spp. (saltbush) and is not always obvious. The reference site is dominated by a canopy of *Pinus elliottii* (slash pine) and a ground cover of *Cladium jamaicense* (saw grass). The interdunal swale of the reference site is a freshwater wetland immediately adjacent to tidal waters.

DELINEATION PROCEDURE

A distinct topographic break marks the boundary between the interdunal swale wetland and the pine flatwoods. This break is observable from the boardwalk. The wetland is characterized by a *Pinus elliottii* canopy with a *Cladium jamaicense* groundcover. The vegetative boundary between the wetland and pine flatwoods is also distinct but less obvious in that the pine canopy is contiguous with that of the pine flatwoods.

The interdunal swale is a wetland identified by using the definition in section 62-340.200(19), F.A.C. Moving landward from the central depression, the provisions of subsection 62-340.300(2)(a), F.A.C. are used in establishing the wetland boundary. Hydrologic indicators, in the form of algal mats and aufwuchs, are present. The wetland boundary is established at the point where hydrologic indicators and hydric soil indicators are no longer present (subsection 62-340.300(d), F.A.C). This is coincident with the topographic break that defines the depression and is dominated by a thin band of *Myrica cerifera* (wax myrtle) and *Ilex glabra* (gallberry). Because of the discrete change from wetland to upland conditions the provisions of subsection 62-340.300(1), F.A.C. could also be used to delineate this site.

The following plant lists with corresponding soils descriptions were prepared during the November 15, 1994 visit to the delineation site. The common plant species in the seepage slope community and the sandhill community are listed below. Descriptions and photographs of soil profiles are also provided from each location.

Vegetation Immediately Waterward of the Wetland Boundary

Canopy

Pinus elliottii	UPLAND	slash pine

Subcanopy

Baccharis angustifolia	FAC	groundsel tree
Baccharis halimifolia	FAC	salt bush

Ground cover

Andropogon glomeratus	FACW	bushy bluestem
Cladium jamaicense	OBL	sawgrass
Eupatorium mikanioides	FACW	semaphore
Hydrocotyle sp.	FACW	water pennywort
Ipomoea sagittata	VINE	glades morning glory
Juncus roemerianus	OBL	black needlerush
Panicum rigidulum	FACW	red topped panicum
Panicum virgatum	FACW	switch grass
Phyla nodiflora	FAC	frog-fruit
Pinus elliottii	UPLAND	slash pine
Rhynchospora microcarpa	OBL	southern beakrush
Rubus trivialis	VINE	trailing blackberry
Sagittaria lancifolia	OBL	lance-leaf sag
Setaria geniculata	FAC	bristle grass
Spartina bakeri	FACW	sand cordgrass
Toxicodendron radicans	VINE	poison ivy

Vegetation of scrubby flatwoods, landward of the Wetland Boundary Line

Canopy

Pinus elliottii	UPLAND	slash pine

Ground cover

Agalinis sp.	UPLAND	false foxglove
Cladonia sp.	UPLAND	deer moss
Conradina sp.	UPLAND	rosemary
Lechea sp.	UPLAND	pinweed
Schizachyrium maritimum	FAC	maritime bluestem
Smilax sp.	VINE	cat-briar
Uniola paniculata	UPLAND	sea oats

SOIL DESCRIPTIONS

USDA-NRCS Franklin County Soil Survey - Sheet 40

Soil Profile Descriptions

Point 1. Six feet waterward of the wetland boundary line (water table - one inch).

Oe	0.5-0	litter layer
Oa	0-1	black (10YR 2/1) muck
A1	1-3	black (10YR 2/1) mucky sand
A2	3-5	very dark gray (10YR 3/1) sand
E or C	5-11+	light brownish gray (10YR 6/2) sand with light gray (10YR 7/1) mottles

Hydric soil: Yes
Hydric soil field indicators: one inch of muck (horizon Oa), two inches of mucky texture (horizon A1).



Point 1

Point 2. Fifteen feet landward of the wetland boundary line (water table - 31 inches).

A	0-4	gray (10YR 6/1) sand
E or C	4-31+	white (10YR 8/1) sand

Hydric soil: No
Hydric soil field indicators: none



Point 2

Saint Marks National Wildlife Refuge

(Wakulla County)

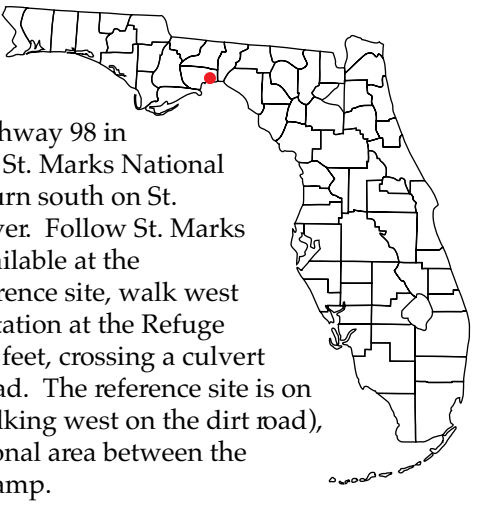
STRAND SLOUGH



Hardwood strand

LOCATION

The St. Marks National Wildlife Refuge encompasses nearly all of coastal Wakulla and Jefferson Counties. The reference site is a hardwood strand swamp located just west of the Refuge headquarters in Wakulla County.



ACCESS

This reference site is easily reached from U.S. Highway 98 in the vicinity of the town of Newport. Signs for the St. Marks National Wildlife Refuge are conspicuous. From U.S. 98, turn south on St. Marks road, which is just east of the St. Marks River. Follow St. Marks road to the entrance of the Refuge. Parking is available at the headquarters near the entrance. To reach the reference site, walk west along the dirt road that is to the west of the pay station at the Refuge Headquarters. Continue west approximately 500 feet, crossing a culvert where a portion of the strand drains under the road. The reference site is on the west side of the strand swamp (on the left walking west on the dirt road), about 100 feet south of the grass road, in the ecotonal area between the flatwoods and the deep portion of the strand swamp.

COMMUNITY CHARACTERIZATION

A strand swamp is a shallow, forested, elongated, basin, dominated mostly by deciduous hardwoods such as *Acer rubrum* (red maple), *Nyssa sylvatica* var. *biflora* (swamp tupelo), and *Ulmus americana* var. *floridana* (Florida elm). Strand swamps form where there is a depression such that the downward flow of water generates a channel (Ewel *in* Ecosystems of Florida, 1991). At the reference site, the gradient from the surrounding pine flatwoods is gentle, even so, flowing water was observed in the deepest portion of this swamp. Moisture for the strand swamp is supplied by ground water and drainage from the surrounding poorly drained flatwoods. As with the cypress dome swamp and the bayhead, the largest trees are found in the interior of the strand swamp, where the peat soils are deepest and fire is least frequent. The wetland boundary is located at the landward edge of the ecotone between the strand swamp and the pine flatwoods. Fire is an important component in the maintenance of this plant community. Fire suppresses the hardwood trees typically associated with wetlands. The ecotone between the deep strand swamp and the pine flatwoods, although a wetland, is a creation of the limitation on the growth of hardwood hydrophytic vegetation caused by infrequent but periodic fire. As of May, 1995, fire suppression at the reference site has allowed tree species associated with the strand swamp to invade the *Pinus elliottii* (slash pine) and *Serenoa repens* (saw palmetto) dominated pine flatwoods.

DELINEATION PROCEDURE

The wetland boundary for this reference site lies at the landward edge of the ecotone between the strand swamp and the pine flatwoods. The strand swamp is dominated by red maple, swamp tupelo, *Magnolia virginiana* var. *australis* (sweetbay magnolia), and *Taxodium ascendens* (pond cypress). Beginning within the strand swamp, subsections 62-340.300(2)(a) and (b), F.A.C., are used to establish the wetland based upon the dominance of obligate and facultative wet vegetation and the presence of hydrologic indicators (*i.e.* elevated lichen lines and adventitious roots) and hydric soil indicators. Vegetative dominance extends landward into the fairly broad ecotone where it is lost. Hydrologic indicators (greater than 2 inches of mucky texture in the upper soil profile) and hydric soil indicators continue landward to the interface of the ecotone and the pine flatwoods. The wetland boundary is established where the soils have lost the organics necessary to support the hydrologic indicator. Some hydrophytic vegetation is found landward of the wetland boundary. This appears attributable to fire suppression.

The first list describes the vegetation found waterward of the wetland boundary. The second lists those species found landward of the wetland boundary. There are descriptions and photographs of soil samples from each location provided following the vegetation information.

Vegetation within the Wetland

Canopy

Acer rubrum	FACW	maple, red
Magnolia virginiana var. *australis*	OBL	magnolia, sweetbay
Nyssa sylvatica var. *biflora*	OBL	tupelo, swamp
Pinus elliottii	UPLAND	slash pine
Ulmus americana var. *floridana*	FACW	Florida elm
Taxodium ascendens	OBL	pond cypress

Subcanopy

Acer rubrum	FACW	maple, red
Magnolia virginiana var. *australis*	OBL	magnolia, sweetbay
Sabal palmetto	FAC	palm, cabbage
Ulmus americana var. *floridana*	FACW	Florida elm

Ground cover

Amphicarpum muhlenbergianum	FACW	blue maidencane
Campsis radicans	VINE	trumpet creeper
Carex spp.	FACW	sedges
Cladium jamaicense	OBL	sawgrass
Clematis crispa	UPLAND	leather flower
Hibiscus moscheutos	OBL	rosemallow, swamp
Hypericum hypericoides	FAC	St. Andrew's cross
Lycopus rubellus	OBL	bugleweed
Osmunda cinnamomea	FACW	fern, cinnamon
Osmunda regalis	OBL	fern, royal
Panicum dichotomum	FACW	panicum
Rhynchospora miliacea	OBL	beakrush, millet
Rhynchospora spp.	FACW	beakrush
Sabal palmetto	FAC	palm, cabbage
Sagittaria graminea	OBL	arrowhead
Saururus cernuus	OBL	lizard's tail
Smilax laurifolia	VINE	bamboo vine
Thelypteris spp.	FACW	shield fern
Toxicodendron radicans	UPLAND	poison ivy
Ulmus americana var. *floridana*	FACW	Florida elm

Vegetation Landward of the Wetland Boundary

Canopy

Pinus elliottii	UPLAND	slash pine

Subcanopy

Acer rubrum	FACW	maple, red
Pinus elliottii	UPLAND	slash pine

Ground cover

Acer rubrum	FACW	maple, red
Ampelopsis arborea	VINE	peppervine
Chasmanthium sessiliflorum	FAC	long-leaf Chasmanthium
Gaylussacia frondosa	FAC	dangleberry
Hypericum hypericoides	FAC	St. Andrew's cross
Hypericum microsepalum	UPLAND	St. John's-wort
Ilex cassine	OBL	holly, dahoon
Ilex glabra	UPLAND	gallberry
Lyonia ferruginea	UPLAND	fetter-bush
Myrica cerifera	FAC	bayberry, southern
Osmunda cinnamomea	FACW	fern, cinnamon
Parthenocissus quinquefolia	VINE	Virginia creeper
Pteridium aquilinum	UPLAND	bracken fern
Rhus copallina	UPLAND	winged sumac
Rubus spp.	FAC	blackberries
Serenoa repens	UPLAND	saw palmetto
Vitis aestivalis	VINE	summer grape

SOIL DESCRIPTIONS

USDA - NRCS Wakulla County - Sheet 22 Section 8
The wetland soil is mapped as Tooles-Nutall-Chaires fine sand (Mapping unit #29)
The upland soil is mapped as Chaires fine sand (Mapping unit #10)

29 - Tooles-Nutall-Chaires fine sand is composed of:

30%	- Tooles soil	non-hydric component
25%	- Nutall soil	hydric component
20%	- Chaires soil	hydric component
10%	- Chaires soil	non-hydric inclusion
5%	- Nutall soil	non-hydric inclusion
10%	- Tooles soil	hydric inclusion

10 - Chaires fine sand is composed of:

70%	- Chaires soil	non-hydric component
25%	- Chaires soil	hydric component
5%	- Tooles soil	hydric component

Soil Profile Descriptions

Point 1. Ten feet waterward of wetland delineation line.

Horizon	Depth (in)	
Oe	2-0	very dark gray brown (10YR 3/2) peat or litter
Oa	0-5	black (10YR 2/1) muck with many fine roots
A	5-10	very dark gray (10YR 3/1) fine sand
E or C	10-18+	dark gray (10YR 4/1) fine sand

Hydric soil: Yes
Hydric soil field indicators: five inches of muck

Point 2a. One foot waterward of the wetland delineation line.

Horizon	Depth (in)	
Oe	1-0	black (5YR 2.5/1) peat or litter
A	0-3	black (N/0) mucky fine sand
E1 or C1	3-5	grayish brown (2.5Y 5/2) fine sand with dark gray (10YR 4/1) mottles
E2 or C2	5-24+	brown (10YR 5/3) fine sand with yellowish brown (10YR 5/4) mottles



Point 2a

Hydric soil: Yes
Hydric soil field indicators: greater than two inches of mucky texture

Point 2b. One foot landward of the wetland delineation line.

Horizon	Depth (in)	
Oe	1-0	black (5YR 2.5/1) peat or litter
A1	0-1	black (N/0) mucky fine sand
A2	1-5	black(10Y 2/1) fine sand
AE	5-9	black(10Y 2/1) fine sand with gray (10YR 6/1) mottles
E or C	9-29+	gray (10YR 6/1) fine sand



Hydric soil: No
Hydric soil field indicators: none

Point 2b

Point 3. Fifteen feet landward of the wetland delineation line.

Horizon	Depth (in)	
Oe	1-0	black (5YR 2.5/1) peat or litter
A	0-3	black (10Y 2/1) fine sand
E1	3-7	dark gray (10YR 4/1) fine sand
E2	7-20	light brownish gray (10YR 6/2) fine sand
Bh	20+	very dark gray brown (10YR 3/2) fine sand

Hydric soil: No
Hydric soil field indicators: none

Little Talbot Island State Park

(Duval County)

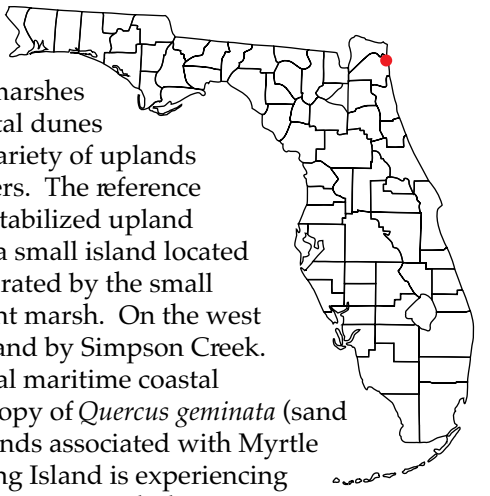
SALT MARSH



Northeast view of the delineation site

LOCATION

Little Talbot Island State Park consists of coastal islands located north of the mouth of the St. Johns River in Duval County. The park is south of Amelia Island in Nassau County and Big Talbot Island in Duval, and north of Ft. George Island. The park is located between the marshes of the Fort George River to the west and the coastal dunes of the Atlantic Ocean to the east and includes a variety of uplands and tidally influenced wetlands and surface waters. The reference site represents the interface of a salt marsh with stabilized upland dune system. The barrier island, Long Island, is a small island located immediately west of Little Talbot Island and separated by the small intertidal waterway, Myrtle Creek, and its adjacent marsh. On the west side, Long Island is separated from Big Talbot Island by Simpson Creek. Uplands on Long Island are comprised of a typical maritime coastal hammock community with a well developed canopy of *Quercus geminata* (sand live oak) on a stabilized dune system. The wetlands associated with Myrtle Creek are inundated twice daily by the tides. Long Island is experiencing continued erosion due to the constant movement of sand with the tides.



Erosion is evident along the north side of Long Island where the roots of sand live oaks are exposed. This activity of nature is not expected to dramatically change the wetland boundary as described here for several years barring the effects of an extraordinary event.

ACCESS

The reference site is located on the west shoreline of Long Island approximately one thousand feet north of U.S. Highway A1A. Parking is available along the highway. Although the access is open, the site may be inundated, depending on tidal stage. The wetland boundary is marked by concrete monuments.



Salt marsh dominated by *Spartina alterniflora* (smooth cordgrass) and *Juncus roemerianus* (black needle rush)

COMMUNITY CHARACTERIZATION

The reference site is part of the Simpson Creek salt marsh, which is adjacent to a xeric-mesic coastal hammock on Long Island. Simpson Creek flows between Big Talbot Island and Long Island. The central area of the salt marsh, referred to as the low marsh, is dominated by *Spartina alterniflora* (smooth cordgrass) and *Juncus roemerianus* (black needle rush). As the elevation of the gentle sloping shoreline increases, the vegetative community shifts to a greater diversity of herbaceous plants including *Sesuvium maritima* (sea-purslane), *Sporobolus virginicus* (seashore dropseed), and *Spartina patens* (salt-meadow cordgrass). This area is generally referred to as the high marsh. The vegetative



Interior view of maritime hammock, note the *Quercus geminata* (sand live oak) and *Serenoa repens* (saw palmetto)

composition of the high marsh at its landward extent includes *Iva frutescens* (tall marsh elder) and *Ilex vomitoria* (yaupon). Landward of this point, the community abruptly shifts to an upland community dominated by mesic vegetation and then mixed mesic-xeric vegetation along the slopes of the dune. Similarly, the soil shows a quick transition from hydric to non-hydric conditions between the high marsh and the mesic coastal hammock community.

DELINEATION PROCEDURE

Beginning in the low marsh, a wetland identified by the use of the definition in subsection 62-340.200(19), F.A.C. The dominance of obligate and facultative wet vegetation is followed landward, examining the presence of either hydric soils or hydrologic indicators. The marsh vegetation is dominated by salt marsh species such as *Spartina alterniflora* (smooth cordgrass) and *Spartina patens* (salt meadow cordgrass). The provisions of subsections 62-340.300(2)(a) and (b), F.A.C., are used up to the ecotone between the high marsh and maritime hammock. The transition between these plant

communities is often abrupt. In addition to vegetative dominance by hydrophytic species and the presences of hydric soils, hydrologic indicators, in the form of fiddler crab burrows, are abundant throughout the high marsh. Through the use of subsection 62-340.300(2)(a), F.A.C., the wetland boundary is placed within the ecotone of high marsh and the coastal maritime hammock at the point where dominance by hydrophytic vegetation and the presence of hydric soil indicators ceases.

Because the reference site is a surface water body subjected to direct tidal effects, the provisions of section 62-340.600, F.A.C., need to be addressed with respect to the mean high water line (MHWL). Mean high water can represent the boundary of a surface water, but only when it extends beyond the provisions for wetland delineation. In other words, the MHWL is applicable only if the wetland boundary does not extend landward of the MHWL elevation. The MHWL is clearly located where the dominance shifts from *Spartina patens* to *Batis maritima*, and *Salicornia virginica*.

The following plant lists with corresponding soils descriptions were prepared during the visit to the delineation site on December 6, 1994. The common plant species observed waterward and landward of the wetland boundary are listed in the following tables. A note about cordgrass: *Spartina alterniflora* grows in a two forms, tall and short. The tall form grows close to the creek channels in the deepest portion of the salt marsh. The short form is observed more landward than the tall form.

Vegetation of the salt marsh, immediately waterward of the wetland boundary.

Ground cover

Aster tenuifolius	OBL	saltmarsh aster
Atriplex pentandra (= *A. arenaria*)	UPLAND	seabeach orach
Batis maritima	OBL	saltwort
Borrichia frutescens	OBL	sea oxeye
Fimbristylis castanea	OBL	saltmarsh fimbristylis
Juncus roemerianus	OBL	black needle rush
Lycium carolinianum	OBL	wolf-berry
Muhlenbergia capillaris	OBL	long-awn muhly
Salicornia virginica	OBL	glasswort
Sesuvium maritima	FACW	sea-purslane
Solidago sempervirens	FACW	seaside goldenrod
Spartina alterniflora	OBL	smooth cordgrass
Spartina patens	OBL	saltmeadow cordgrass
Sporobolus virginicus	OBL	seashore dropseed

Vegetation of the maritime hammock, immediately landward of the wetland boundary.

Canopy

Quercus geminata	UPLAND	sand live oak

Subcanopy

Quercus geminata	UPLAND	sand live oak
Quercus myrtifolia	UPLAND	myrtle oak
Myrica cerifera	FAC	wax myrtle

Ground cover

Fimbristylis sp.	FACW	fringe grass
Galactea elliottii	VINE	milk-pea
Ilex ambigua	UPLAND	Carolina holly
Ilex opaca	FAC	American holly
Ilex vomitoria	FAC	yaupon
Myrica cerifera	FAC	wax myrtle
Panicum ciliaris	FAC	panic grass
Persea borbonia	UPLAND	red bay
Pinus elliottii	UPLAND	slash pine
Quercus geminata	UPLAND	sand live oak
Quercus virginiana	UPLAND	live oak
Scleria triglomerata	FACW	nut-rush
Serenoa repens	UPLAND	saw palmetto
Smilax spp.	VINE	green briar
Solidago odora	UPLAND	woods goldenrod
Toxicodendron radicans	VINE	poison ivy

SOIL DESCRIPTIONS

USDA-NRCS Soil Survey of City of Jacksonville, Duval County - Sheet 20
The wetland soil is mapped as Tisonia mucky peat (mapping unit #34).

90%	- Tisonia soil	hydric component
5%	- Pamlico soil	hydric inclusion
5%	- Pottsburg soil	hydric inclusion

The upland soil is mapped as Kureb fine sand, 8 to 20 percent slope (mapping unit #15).

Soil Profile Descriptions

Point 1. Thirteen feet waterward of the wetland boundary line (water table - nine inches).

Horizon	Depth (in)	
A	0-7	very dark gray (10YR 3/1) fine sand, many fine and medium roots
C	7-15+	very dark gray (10YR 3/1) fine sand with gray (10YR 5/1) mottles, few fine roots

Hydric soil: Yes
Hydric soil field indicators: sulfidic odor in both the A and C horizons; oxidized rhizospheres in the A horizon.



Point 1: wetland soil

Point 2. Fifteen feet landward of the wetland boundary line (water table - 39 inches).

Horizon	Depth (in)	
Oi	1-0	litter
A	0-5	dark gray (10YR 4/1) fine sand with gray (10YR 6/1) mottles, common medium roots
E or C	5-15+	light gray (10YR 7/1) fine sand, few fine and large roots

Hydric soil: No
Hydric soil field indicators: none, the A horizon has a salt and pepper appearance.



Point 2: upland soil

Woods Ferry

(Suwannee County)

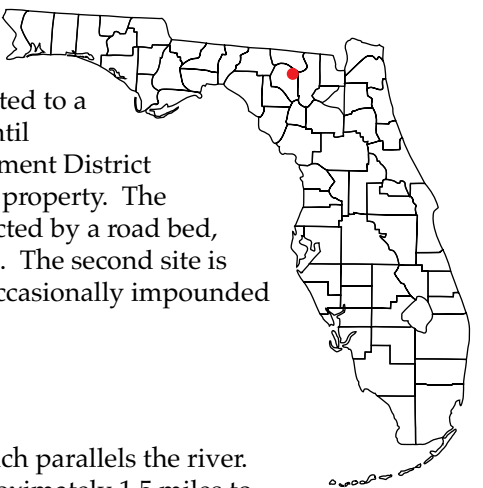
SWAMP CUTOVER/FLATWOODS AND STREAM SEEPAGE SLOPE



Stream seepage slope

LOCATION

The Woods Ferry property is located adjacent to the Suwannee River approximately five miles northeast of Live Oak. The property historically consisted of long slopes of upland pine forest dominated by nearly pure stands of *Pinus palustris* (longleaf pine) intersected by several small streams running north to the Suwannee River floodplain. The area was converted to a pine plantation and has been managed as such until purchased by the Suwannee River Water Management District (SRWMD). Two reference sites are located on the property. The surficial flow through the first site has been restricted by a road bed, although the date of the road activity is unknown. The second site is located on a slope adjacent to a stream which is occasionally impounded by beavers.



ACCESS

The property may be reached from C.R. 136A which parallels the river. From I-10 take the U.S.129 exit and go north approximately 1.5 miles to S.R. 136A. Turn east on S.R.136A and travel approximately 5.5 miles to 57th road. Turn

on to 57th road and continue straight to the entrance of the Woods Ferry tract. The reference sites are not easy to locate without assistance. Individuals desiring to visit the sites should first contact either the DEP/Wetlands Evaluation and Delineation Section or the Suwannee River Water Management District.

COMMUNITY CHARACTERIZATION - SWAMP/CUTOVER FLATWOODS

The floodplain of the Suwannee River does not extend to this site, although the discharge from this wetland may flow into the Suwannee floodplain. The canopy of the wetland is dominated by *Nyssa sylvatica* var. *biflora* (swamp tupelo), *Acer rubrum* (red maple), and *Quercus laurifolia* (swamp laurel oak). The flatwoods surrounding the wetland were heavily impacted by silviculture operations.

DELINEATION PROCEDURE - SWAMP/CUTOVER FLATWOODS

The wetland is a mixed hardwood swamp and is identifiable by direct reference to the wetland definition. The wetland delineation begins at the edge of the swamp tupelo dominated portion of the swamp and extends landward following hydric soil indicators and a dominance of listed vegetation in the canopy (subsections 62-340.300(2)(a)and(b), F.A.C.). The vegetative community changes during the landward progression from swamp tupelo canopy to swamp laurel oak canopy to slash pine canopy. At the point where slash pine are encountered, the canopy is sparse. When the uppermost strata constitutes less than 10% cover, one of the remaining strata and not the upper most strata, is used for the evaluation of vegetative dominance. In this situation, the ground cover is the appropriate stratum to use. The ground cover under the slash pine is dominated by *Lyonia lucida* (fetterbush), *Cyrilla racemiflora* (titi), and *Andropogon glomeratus* (broomsedge). The groundcover includes several facultative species as conspicuous elements, which do not enter into the evaluation of vegetative dominance. Using the provisions of subsection 62-340.300(2)(b), F.A.C., the point where hydric soil indicators are no longer present is established as the wetland boundary.

Vegetation Immediately Waterward of Wetland Boundary.

Canopy

	Pinus elliottii	UPLAND	slash pine

Ground cover

**	*Andropogon glomeratus*	FACW	broomsedge
	Aronia arbutifolia	FACW	red chokeberry
	Boehmeria cylindrica	OBL	bog hemp
**	*Cyrilla racemiflora*	FAC	titi
	Eupatorium perfoliatum	FACW	boneset
	Euthamia sp.	FAC	flat-topped goldenrod

Ilex glabra	UPLAND	gallberry
Osmunda cinnamomea	FACW	cinnamon fern
Panicum dichotomum	FACW	panic grass
Persea palustris	OBL	swamp bay
Pluchea sp.	FACW	marsh fleabane
Rhexia nuttallii	FACW	meadow beauty
Serenoa repens	UPL	saw palmetto
Smilax glabra	VINE	glaucus cat-briar
Solidago fistulosa	FACW	marsh goldenrod

Vegetation Immediately Landward of the Wetland Boundary.

Canopy

Pinus elliottii	UPLAND	slash pine

Ground cover

	Andropogon glomeratus	FACW	broomsedge
	Cyrilla racemiflora	FAC	titi
**	*Ilex glabra*	UPLAND	gallberry
	Panicum dichotomum	FACW	panic grass
	Pinus elliottii	UPLAND	slash pine
**	*Serenoa repens*	UPLAND	saw palmetto

** Designates species which are overwhelmingly dominant.

COMMUNITY CHARACTERIZATION - STREAM SEEPAGE SLOPE

This site consists of a small blackwater stream, the associated floodplain, and the contributing hydric seepage slope. The stream is a surface water body pursuant to section 62-340.600, F.A.C. flowing through a floodplain swamp, a wetland identifiable by direct use of the wetland definition. Within the swamp forest, which is dominated by *Nyssa ogeche* (Ogeechee tupelo), *Taxodium distichum* (bald cypress), *Acer rubrum* (red maple), *Nyssa sylvatica* var. *biflora* (swamp tupelo), *Fraxinus caroliniana* (popash), and *Betula nigra* (river birch), numerous hydrologic indicators are present. These consist of obvious water marks, rafted debris, adventitious roots, buttresses and hummocks. Above the floodplain swamp is a hydric seepage slope forest dominated by a canopy of *Quercus laurifolia* (swamp laurel oak), *Liquidambar styraciflua* (sweetgum), and *Pinus elliottii* (slash pine) with a cinnamon fern dominated ground cover. Hydric seepage slopes are wetlands which seldom experience deep or sustained inundation, but which provide a long term discharge of near surface ground water to other vegetative communities, usually other wetland communities.

DELINEATION PROCEDURE - STREAM SEEPAGE SLOPE

The delineation of the wetland boundary begins at the edge of the floodplain swamp, which is identifiable as a wetland directly from the definition. Since the hydrologic indicators are so pronounced, attempting to establish the wetland boundary using subsection 62-340.300(2)(d), F.A.C., is an appropriate place to start. While an examination of the hydrologic indicators does not produce a consistent elevation, this is not unexpected for the small streams of the area, which are subject to frequent, short term, flooding events. Additionally, this stream has a history of periodic impoundment by beavers which also contributes to the variation in hydrologic indicators (reasonable scientific judgement). By comparing the use of hydrologic indicators with vegetative dominance (subsections 62-340.300(2)(a) and(b), F.A.C.), it is apparent that the vegetative dominance and the highest level of sustained inundation, as reflected by the hydrologic indicators observed, are very close in elevation. Because beavers may have influenced the expression of the hydrologic indicators, it is a reasonable scientific judgement to use the vegetative dominance and not the hydrologic indicators to establish the wetland boundary, although in this case the differences between the two approaches would be slight. Further support for this decision is: 1. the degree of slope, and 2.the nature of the vegetative dominance, which is more typical of sustained saturation and perhaps additionally only brief periods of shallow inundation. The deeper inundation evidenced by the most elevated of the hydrologic indicators is best attributed to the occasional alteration of stream characteristics caused by the beavers. Vegetative dominance on the slope is established using subsection 62-340.300(2)(b), F.A.C. Hydric soil indicators, however, do not extend to the limits of vegetative dominance, thus the wetland boundary is located where vegetation is no longer supported by the presence of hydric soils. As an additional note, SRWMD staff indicated that the ten-year flood elevation occurs above the wetland boundary in an area of dense saw palmetto.

Vegetation Immediately Waterward of the Wetland Boundary, Not Including the Stream Channel Floodplain Swamp

Canopy

Acer rubrum	FACW	red maple
Cyrilla racemiflora	FAC	titi
Liquidambar styraciflua	FACW	sweetgum
Nyssa sylvatica var. biflora	OBL	swamp tupelo
Pinus elliottii	UPLAND	slash pine
Quercus laurifolia	FACW	swamp laurel oak

Subcanopy

Acer rubrum	FACW	red maple
Cyrilla racemiflora	FAC	titi
Myrica cerifera	FAC	wax myrtle
Cyrilla racemiflora	FAC	titi

Ground cover

	Clethra alnifolia	FACW	sweet pepperbush
	Cyrilla racemiflora	FAC	titi
	Ilex glabra	UPLAND	gallberry
	Myrica cerifera	FAC	wax myrtle
**	*Osmunda cinnamomea*	FACW	cinnamon fern
	Osmunda regalis	OBL	royal fern
	Persea palustris	OBL	swamp bay
	Serenoa repens	UPLAND	saw palmetto
	Smilax glabra	VINE	glaucus cat-briar
	Vaccinium corymbosum	FACW	high bush blueberry

Vegetation Immediately Landward of the Wetland Boundary.

Canopy

Pinus elliottii	UPLAND	slash pine

Ground cover

	Clethra alnifolia	FACW	sweet pepperbush
	Osmunda cinnamomea	FACW	cinnamon fern
**	*Serenoa repens*	UPLAND	saw palmetto

** Designates species which are overwhelmingly dominant.

SOIL DESCRIPTIONS

Swamp/Cutover Flatwoods
USDA-NRCS Soil Survey of Suwannee County - Sheet 15

The wetland is associated with a pond in the below mentioned upland soil.
The upland soil is mapped as Leon fine sand, 0 to 2 percent slope (mapping unit #LfA)

LfA - Leon fine sand, 0 to 2 percent slope is composed of:

80% - Leon soil	non-hydric component
10% - Leon soil	hydric inclusion
10% - Pomello soil	non-hydric inclusion

Soil Profile Descriptions

Point 1. Landward Edge of Swamp (water table - 7 inch depth)

Horizon	Depth (in)	
Oe	1-0	dark reddish brown (5YR 2.5/2) peat and root mat
Oa	0-1	dark reddish brown (5YR 2.5/2) muck
A	1-5	black (N 2/0) fine sand
E	5-15	light brownish gray (10YR 6/2) fine sand

Hydric: Yes
Hydric soil field indicators: Accumulation of muck and/ or depth of dark topsoil

Point 2. Immediately Waterward of Wetland Boundary Line

Horizon	Depth (in)	
Oe	1-0	dark reddish brown (5YR 2.5/2) peat and root mat
A1	0-8	black (N 2/0) fine sand with approximately 20% of the sand grains uncoated with organics

Hydric: Yes
Hydric soil field indicators: depth of dark topsoil

Point 3. Immediately Landward of Wetland Boundary Line

Horizon	Depth (in)	
Oe	1-0	dark reddish brown (5YR 2.5/2) root mat
A1	0-2	black (N 2/0) fine sand
A2	2-8	black (N 2/0) with a salt and pepper appearance

Hydric: No
Hydric soil field indicators: none

Stream Seepage Slope
USDA-NRCS Soil Survey of Suwannee County - Sheet 6

The wetland soil is mapped as Alluvial land (mapping unit # Al)

Al - Alluvial land is composed of:

90% - Alluvial land	hydric component
10% - Plummer soil	non-hydric inclusion

The upland soil is mapped as Leon fine sand, 0 to 2 percent slope (mapping unit # LfA)

LfA - Leon fine sand, 0 to 2 percent slope is composed of:

80% - Leon soil	non-hydric component
10% - Leon soil	hydric inclusion
10% - Pomello soil	non-hydric inclusion

Soils where verified in the field, but the descriptions for the soils are missing.

Literature

Beever, James W. and Kimberley A. Dryden. 1992. Red-Cockaded Woodpeckers and Hydric Slash Pine Flatwoods. p. 693-700. *In* Trans. 57th North American Wildlife and Natural Resources Conference.

Breen, Ruth Schornherst. 1963. Mosses of Florida, an illustrated manual. University of Florida Press, Gainesville.

*Campbell, C. 1983. Systematics of the *Andropogon virginicus* Complex (GRAMINEAE). Journal of the Arnold Arboretum. 64:171-254.

Clewell, Andre F. 1985. Guide to the Vascular Plants of the Florida Panhandle. University Presses of Florida, Tallahassee.

*Correll, D. and H. 1982. Flora of the Bahama Archipelago. A.R. Gantner, Germany.

*Easley, Caroline M. and Walter S. Judd, 1993. Vascular Flora of Little Talbot Island, Duval County, Florida. Castanea 58(3): 162-177.

Ewel, Katherine C. 1991. Swamp. p. 281-323. *In* R.L.Myers and J.J. Ewel (ed.) Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to the Natural Communities of Florida. Tallahassee, Florida.

*Florida Soil Conservation Staff. 1992. Soil and Water Relationships of Florida's Ecological Communities. Gainesville, Florida.

*Godfrey, R. 1988. Trees, Shrubs and Woody Vines of Northern Florida and Adjacent Georgia & Alabama. Univ. Ga. Press, Athens.

*Godfrey, R. and J. Wooten. 1979. Aquatic and Wetland Plants of Southeastern United States: Monocotyledons. Univ. Ga. Press, Athens.

*Godfrey, R. and J. Wooten. 1979. Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. Univ. Ga. Press, Athens.

*Hall, D. 1978. The Grasses of Florida. Doctoral Dissertation. Univ. of Fla., Gainesville.

Hull, Clark H., John M. Post, Jr., Manuel Lopez, and Robert G. Perry. 1989. Analysis of Water Level Indicators in Wetlands: Implications for the Design of Surface Water Management Systems. *In* Wetlands: Concerns and Successes. American Water Resources Association.

Kushlan, James A. 1991. Freshwater Marshes. p. 324-363. *In* R.L.Myers and J.J. Ewel (ed.) Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

*Lellinger, D. 1985. Ferns & Fern-Allies of the United States & Canada. Smithsonian Institution Press, Washington D.C.

Reese, William Dean. 1984. Mosses of the Gulf South. Louisiana State University Press, Baton Rouge.

Scurlock, J. Paul. 1987. Native Trees and Shrubs of the Florida Keys. Laurel Press, Inc., Bethel Park, Pennsylvania

*Soil Survey Staff. 1990. Keys to Soil Taxonomy, fourth edition. SMSS technical monograph no. 19. VPI&SU, Blacksburg, Virginia.

USDA - Soil Conservation Service. 1991. Hydric Soils of the United States. In cooperation with the National Technical Committee for Hydric Soils. USDA-SCS, Washington, DC.

Wunderlin, Richard P. 1982. Guide to the Vascular Plants of Central Florida. University Presses of Florida, Tampa.

* cited in the rule.

Chapter 62-340, F.A.C.

DELINEATION OF THE LANDWARD EXTENT OF WETLANDS AND SURFACE WATERS

62-340.100 Intent.
62-340.200 Definitions.
62-340.300 Delineation.
62-340.400 Selection of Appropriate Vegetative Stratum.
62-340.450 Vegetative Index.
62-340.500 Hydrologic Indicators.
62-340.550 Wetland Hydrology.
62-340.600 Surface Waters.
62-340.700 Exemptions for Treatment or Disposal Systems.
62-340.750 Exemption for Surface Waters or Wetlands Created by Mosquito Control Activities.

62-340.100 Intent.

(1) This rule's intent is to provide a unified statewide methodology for the delineation of the extent of wetlands and surface waters to satisfy the mandate of section 373.421, F.S. This delineation methodology is intended to approximate the combined landward extent of wetlands as determined by a water management district and the Department immediately before the effective date of this rule. Before implementing the specific provisions of this methodology, the regulating agency shall attempt to identify wetlands according to the definition for wetlands in subsection 373.019 (17), F.S. and subsection 62-340.200 (19), F.A.C. below. The landward extent of wetlands shall be determined by the dominance of plant species, soils and other hydrologic evidence indicative of regular and periodic inundation or saturation. In all cases, attempts shall be made to locate the landward extent of wetlands visually by on site inspection, or aerial photointerpretation in combination with ground truthing, without quantitative sampling. If this cannot be accomplished, the quantitative methods in paragraph 62-301.400 (1) (c), F.A.C., shall be used unless the applicant or petitioner and regulating agency agree, in writing, on an alternative method for quantitatively analyzing the vegetation on site. The methodology shall not be used to delineate areas which are not wetlands as defined in subsection 62-340.200 (19) F.A.C., nor to delineate as wetlands or surface waters areas exempted from delineation by statute or agency rule.

(2) The Department shall be responsible for ensuring statewide coordination and consistency in the delineation of surface waters and wetlands pursuant to this rule, by providing training and guidance to the Department, Districts, and local governments in implementing the methodology.

Specific Authority: 373.421, F.S.
Law Implemented: 373.019, 373.421, F.S.
History: New 7-1-94, Formerly 17-340.100.

62-340.200 Definitions. When used in this chapter, the following terms shall mean:

(1) "Aquatic plant" means a plant, including the roots, which typically floats on

water or requires water for its entire structural support, or which will desiccate outside of water.

(2) "Canopy" means the plant stratum composed of all woody plants and palms with a trunk four inches or greater in diameter at breast height, except vines.

(3) "Diameter at Breast Height (DBH)" means the diameter of a plant's trunk or main stem at a height of 4.5 feet above the ground.

(4) "Facultative plants" means those plant species listed in subsection 62-340.450 (3) of this chapter. For the purposes of this rule, facultative plants are not indicators of either wetland or upland conditions.

(5) "Facultative Wet plants" means those plant species listed in subsection 62-340.450 (2) of this chapter.

(6) "Ground Cover" means the plant stratum composed of all plants not found in the canopy or subcanopy, except vines and aquatic plants.

(7) "Ground truthing" means verification on the ground of conditions on a site.

(8) "Hydric Soils" means soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

(9) "Hydric Soil Indicators" means those indicators of hydric soil conditions as identified in Soil and Water Relationships of Florida's Ecological Communities (Florida Soil Conservation ed. Staff 1992).

(10) "Inundation" means a condition in which water from any source regularly and periodically covers a land surface.

(11) "Obligate plants" means those plant species listed in subsection 62-340.450 (1) of this chapter.

(12) "Regulating agency" means the Department of Environmental Protection, the water management districts, state or regional agencies, local governments, and any other governmental entities.

(13) "Riverwash" means areas of unstabilized sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers or streams so frequently that they may support little or no vegetation.

(14) "Saturation" means a water table six inches or less from the soil surface for soils with a permeability equal to or greater than six inches per hour in all layers within the upper 12 inches, or a water table 12 inches or less from the soil surface for soils with a permeability less than six inches per hour in any layer within the upper 12 inches.

(15) "Seasonal High Water" means the elevation to which the ground and surface water can be expected to rise due to a normal wet season.

(16) "Subcanopy" means the plant stratum composed of all woody plants and palms, exclusive of the canopy, with a trunk or main stem with a DBH between one and four inches, except vines.

(17) "Upland plants" means those plant species, not listed as Obligate, Facultative Wet, or Facultative by this rule, excluding vines, aquatic plants, and any plant species not introduced into the State of Florida as of the effective date of this rule.

(18) "U.S.D.A.-S.C.S." means the United States Department of Agriculture, Soil Conservation Service.

(19) "Wetlands," as defined in subsection 373.019 (17), F.S., means those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands

generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto.

Specific Authority: 373.421, F.S.
Law Implemented: 373.019, 373.421, F.S.
History: New 7-1-94, Formerly 17-340.200.

62-340.300 Delineation of Wetlands. The landward extent (i.e., the boundary) of wetlands as defined in subsection 62-340.200 (19), F.A.C., shall be determined by applying reasonable scientific judgment to evaluate the dominance of plant species, soils, and other hydrologic evidence of regular and periodic inundation and saturation as set forth below. In applying reasonable scientific judgment, all reliable information shall be evaluated in determining whether the area is a wetland as defined in subsection 62-340.200 (19), F.A.C.

(1) Before using the wetland delineation methodology described below, the regulating agency shall attempt to identify and delineate the landward extent of wetlands by direct application of the definition of wetlands in subsection 62-340.200 (19), F.A.C., with particular attention to the vegetative communities which the definition lists as wetlands and non-wetlands. If the boundary cannot be located easily by use of the definition in subsection 62-340.200 (19), F.A.C., the provisions of this rule shall be used to locate the landward extent of a wetland. In applying the provisions of this rule, the regulating agency shall attempt to locate the landward extent of wetlands visually by on site inspection, or aerial photointerpretation in combination with ground truthing.

(2) The landward extent of a wetland as defined in subsection 62-340.200 (19), F.A.C., shall include any of the following areas:

(a) Those areas where the areal extent of obligate plants in the appropriate vegetative stratum is greater than the areal extent of all upland plants in that stratum, as identified using the method in section 62-340.400, F.A.C., and either:

1. the substrate is composed of hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a nonhydrologic mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance;

2. the substrate is nonsoil, rock outcrop-soil complex, or the substrate is located within an artificially created wetland area; or

3. one or more of the hydrologic indicators listed in section 62-340.500, F.A.C., are present and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland definition of subsection 62-340.200 (19), F.A.C.

(b) Those areas where the areal extent of obligate or facultative wet plants, or combinations thereof, in the appropriate stratum is equal to or greater than 80% of all the plants in that stratum, excluding facultative plants, and either:

1. the substrate is composed of hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a nonhydrologic mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance;

2. the substrate is nonsoil, rock outcrop-soil complex, or the substrate is located within an artificially created wetland area; or

3. one or more of the hydrologic indicators listed in section 62-340.500, F.A.C., are present and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland definition of subsection 62-340.200 (19), F.A.C.

(c) Those areas, other than pine flatwoods and improved pastures, with undrained hydric soils which meet, in situ, at least one of the criteria listed below. A hydric soil is considered undrained unless reasonable scientific judgment indicates permanent artificial alterations to the on site hydrology have resulted in conditions which would not support the formation of hydric soils.

1. Soils classified according to United States Department of Agriculture's Keys to Soil Taxonomy (4th ed. 1990) as Umbraqualfs, Sulfaquents, Hydraquents, Humaquepts, Histosols (except Folists), Argiaquolls, or Umbraquults.

2. Saline sands (salt flats-tidal flats).

3. Soil within a hydric mapping unit designated by the U.S.D.A.-S.C.S. as frequently flooded or depressional, when the hydric nature of the soil has been field verified using the U.S.D.A.-S.C.S. approved hydric soil indicators for Florida. If a permit applicant, or a person petitioning for a formal determination pursuant to subsection 373.421 (2), F.S., disputes the boundary of a frequently flooded or depressional mapping unit, the applicant or petitioner may request that the regulating agency, in cooperation with the U.S.D.A.-S.C.S., confirm the boundary. For the purposes of subsection 120.60 (2), F.S., a request for a boundary confirmation pursuant to this subparagraph shall have the same effect as a timely request for additional information by the regulating agency. The regulating agency's receipt of the final response provided by the U.S.D.A.-S.C.S. to the request for boundary confirmation shall have the same effect as a receipt of timely requested additional information.

4. For the purposes of this paragraph only, "pine flatwoods" means a plant community type in Florida occurring on flat terrain with soils which may experience a seasonal high water table near the surface. The canopy species consist of a monotypic or mixed forest of long leaf pine or slash pine. The subcanopy is typically sparse or absent. The ground cover is dominated by saw palmetto with areas of wire grass, gallberry, and other shrubs, grasses, and forbs, which are not obligate or facultative wet species. Pine flatwoods do not include those wetland communities as listed in the wetland definition contained in subsection 62-340.200 (19), which may occur in the broader landscape setting of pine flatwoods and which may contain slash pine. Also for the purposes of this paragraph only, "improved pasture" means areas where the dominant native plant community has been replaced with planted or natural recruitment of herbaceous species which are not obligate or facultative wet species and which have been actively maintained for livestock through mechanical means or grazing.

(d) Those areas where one or more of the hydrologic indicators listed in section 62-340.500, F.A.C., are present, and which have hydric soils, as identified using the U.S.D.A.-S.C.S. approved hydric soil indicators for Florida, and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland

definition of subsection 62-340.200 (19), F.A.C. These areas shall not extend beyond the seasonal high water elevation.

(3) (a) If the vegetation or soils of an upland or wetland area have been altered by natural or man-induced factors such that the boundary between wetlands and uplands cannot be delineated reliably by use of the methodology in subsection 62-340.300 (2), F.A.C., as determined by the regulating agency, and the area has hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a non hydrologic mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance, then the most reliable available information shall be used with reasonable scientific judgement to determine where the methodology in subsection 62-340.300 (2), F.A.C., would have delineated the boundary between wetlands and uplands. Reliable available information may include, but is not limited to, aerial photographs, remaining vegetation, authoritative site-specific documents, or topographical consistencies.

(b) This subsection shall not apply to any area where regional or site-specific permitted activity, or activities which did not require a permit, under sections 253.123 and 253.124, F.S. (1957), as subsequently amended, the provisions of Chapter 403, F.S. (1983), relating to dredging and filling activities, Chapter 84-79, Laws of Florida, and Part IV of Chapter 373, F.S., have altered the hydrology of the area to the extent that reasonable scientific judgment, or application of the provisions of section 62-340.550, F.A.C., indicate that under normal circumstances the area no longer inundates or saturates at a frequency and duration sufficient to meet the wetland definition in subsection 62-340.200 (19), F.A.C.

(c) This subsection shall not be construed to limit the type of evidence which may be used to delineate the landward extent of a wetland under this chapter when an activity violating the regulatory requirements of sections 253.123 and 253.124, F.S. (1957), as subsequently amended, the provisions of Chapter 403, F.S. (1983), relating to dredging and filling activities, Chapter 84-79, Laws of Florida, and Part IV of Chapter 373, F.S., has disturbed the vegetation or soils of an area.

(4) The regulating agency shall maintain sufficient soil scientists on staff to provide evaluation or consultation regarding soil determinations in applying the methodologies set forth in subsections 62-340.300 (2) or (3), F.A.C. Services provided by the U.S.D.A.-S.C.S., or other competent soil scientists, under contract or agreement with the regulating agency, may be used in lieu of, or to augment, agency staff.

Specific Authority: 373.421, F.S.

Law Implemented: 373.019, 373.421, F.S.

History: New 7-1-94, Formerly 17-340.300.

62-340.400 Selection of Appropriate Vegetative Stratum. Dominance of plant species, as described in paragraphs 62-340.300 (2) (a) and 62-340.300 (2) (b), shall be determined in a plant stratum (canopy, subcanopy, or ground cover). The top stratum shall be used to determine dominance unless the top stratum, exclusive of facultative plants, constitutes less than 10 percent areal extent, or unless reasonable scientific judgment establishes that the indicator status of the top stratum is not indicative of the hydrologic conditions on site. In such cases, the stratum most indicative of on site hydrologic conditions, considering the seasonal variability in the amount and

distribution of rainfall, shall be used. The evidence concerning the presence or absence of regular and periodic inundation or saturation shall be based on in situ data. All facts and factors relating to the presence or absence of regular and periodic inundation or saturation shall be weighed in deciding whether the evidence supports shifting to a lower stratum. The presence of obligate, facultative wet, or upland plants in a lower stratum does not by itself constitute sufficient evidence to shift strata, but can be considered along with other physical data in establishing the weight of evidence necessary to shift to a lower stratum. The burden of proof shall be with the party asserting that a stratum other than the top stratum should be used to determine dominance. Facultative plants shall not be considered for purposes of determining appropriate strata or dominance.

Specific Authority: 373.421, F.S.
Law Implemented: 373.019, 373.421, F.S.
History: New 7-1-94, Formerly 17-340.400.

62-340.450 Vegetative Index.

(1) Obligate Species (**See Appendix B**)

(2) Facultative Wet Species (**See Appendix B**)

(3) Facultative Species (**See Appendix B**)

(4) Nomenclature. Use of plants in this rule is based solely on the scientific names. Common names are included in the above lists for information purposes only. The following references shall be used by the regulating agency to resolve any uncertainty about the nomenclature or taxonomy of any plant listed by a given scientific name in this section: R. Godfrey, Trees, Shrubs and Woody Vines of Northern Florida and Adjacent Georgia & Alabama (Univ. Ga. Press, Athens 1988) and D. Lellinger, Ferns & Fern-Allies of the United States & Canada (Smithsonian Institution Press, Washington D.C. 1985) for all species covered by these references. For all other listed scientific names the following references will be followed unless the species list in this section designates a different authority next to an individual species name: R. Godfrey & J. Wooten, Aquatic and Wetland Plants of Southeastern United States: Monocotyledons (Univ. Ga. Press, Athens 1979); R. Godfrey & J. Wooten, Aquatic and Wetland Plants of Southeastern United States: Dicotyledons (Univ. Ga. Press, Athens 1979); D. & H. Correll, Flora of the Bahama Archipelago (A.R. Gantner, Germany 1982). When the species list in this section designates a different authority next to an individual species name, the regulating agency shall resolve any ambiguity in nomenclature by using the name identified in D. Hall, The Grasses of Florida (Doctoral Dissertation, Univ. of Fla., Gainesville 1978); or C. Campbell, Systematics of the Andropogon Virginicus Complex (GRAMINEAE), 64 Journal of the Arnold Arboretum 171-254 (1983).

Specific Authority: 373.421, F.S.
Law Implemented: 373.019, 373.421, F.S.
History: New 7-1-94, Formerly 17-340.450.

62-340.500 Hydrologic Indicators. The indicators below may be used as evidence of inundation or saturation when used as provided in section 62-340.300, F.A.C. Several of the indicators reflect a specific water elevation. These specific water elevation indicators are intended to be evaluated with meteorological information, surrounding topography and reliable hydrologic data or analyses when provided, to ensure that such indicators reflect inundation or saturation of a frequency and duration sufficient to meet

the wetland definition in subsection 62-340.200 (19), F.A.C., and not rare or aberrant events. These specific water elevation indicators are not intended to be extended from the site of the indicator into surrounding areas when reasonable scientific judgment indicates that the surrounding areas are not wetlands as defined in subsection 62-340.200 (19), F.A.C.

(1) Algal mats. The presence or remains of nonvascular plant material which develops during periods of inundation and persists after the surface water has receded.

(2) Aquatic mosses or liverworts on trees or substrates. The presence of those species of mosses or liverworts tolerant of or dependent on surface water inundation.

(3) Aquatic plants. Defined in subsection 62-340.200 (1), F.A.C.

(4) Aufwuchs. The presence or remains of the assemblage of sessile, attached or free-living, nonvascular plants and invertebrate animals (including protozoans) which develop a community on inundated surfaces.

(5) Drift lines and rafted debris. Vegetation, litter, and other natural or manmade material deposited in discrete lines or locations on the ground or against fixed objects, or entangled above the ground within or on fixed objects in a form and manner which indicates that the material was waterborne. This indicator should be used with caution to ensure that the drift lines or rafted debris represent usual and recurring events typical of inundation or saturation at a frequency and duration sufficient to meet the wetland definition of subsection 62-340.200 (19), F.A.C.

(6) Elevated lichen lines. A distinct line, typically on trees, formed by the water-induced limitation on the growth of lichens.

(7) Evidence of aquatic fauna. The presence or indications of the presence of animals which spend all or portions of their life cycle in water. Only those life stages which depend on being in or on water for daily survival are included in this indicator.

(8) Hydrologic data. Reports, measurements, or direct observation of inundation or saturation which support the presence of water to an extent consistent with the provisions of the definition of wetlands and the criteria within this rule, including evidence of a seasonal high water table at or above the surface according to methodologies set forth in Soil and Water Relationships of Florida's Ecological Communities (Florida Soil Conservation Staff 1992).

(9) Morphological plant adaptations. Specialized structures or tissues produced by certain plants in response to inundation or saturation which normally are not observed when the plant has not been subject to conditions of inundation or saturation.

(10) Secondary flow channels. Discrete and obvious natural pathways of water flow landward of the primary bank of a stream watercourse and typically parallel to the main channel.

(11) Sediment deposition. Mineral or organic matter deposited in or shifted to positions indicating water transport.

(12) Vegetated tussocks or hummocks. Areas where vegetation is elevated above the natural grade on a mound built up of plant debris, roots, and soils so that the growing vegetation is not subject to the prolonged effects of soil anoxia.

(13) Water marks. A distinct line created on fixed objects, including vegetation, by a sustained water elevation.

Specific Authority: 373.421, F.S.

Law Implemented: 373.019, 373.421, F.S.

History: New 7-1-94, Formerly 17-340.500.

62-340.550 Wetland Hydrology. A wetland delineation using the methodology described above, can be refuted by either reliable hydrologic records or site specific hydrologic data which indicate that neither inundation for at least seven consecutive days, nor saturation for at least twenty consecutive days, occurs during conditions which represent long-term hydrologic conditions. Hydrologic records or site specific hydrologic data must be of such a duration, frequency, and accuracy to demonstrate that the records or data are representative of the long-term hydrologic conditions, including the variability in quantity and seasonality of rainfall. When sufficient amounts of either reliable hydrologic records or site specific hydrologic data are not available to prove that the wetland area of concern does not inundate or saturate as described above, a site-specific field-verified analytic or numerical model may be used to demonstrate that the wetland area no longer inundates or saturates regularly or periodically under typical long-term hydrologic conditions. Before initiating the use of a model to evaluate if a wetland delineation should be refuted based on hydrologic conditions, the applicant or petitioner shall first meet with the appropriate regulating agency and reach an agreement on the terms of study, including data collection, the specific model, model development and calibration, and model verification. If the data, analyses, or models are deemed inadequate based on the hydrologic conditions being addressed, the regulating agency shall provide a case-by-case review of the applicability of any data, analyses, or models and shall provide specific reasons, based on generally accepted scientific and engineering practices, why they are inadequate.

Specific Authority: 373.421, F.S.

Law Implemented: 373.019, 373.421, F.S.

History: New 7-1-94, Formerly 17-340.550.

62-340.600 Surface Waters.

(1) For the purposes of section 373.421, F.S., surface waters are waters on the surface of the earth, contained in bounds created naturally or artificially, including, the Atlantic Ocean, the Gulf of Mexico, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses. However, state water quality standards apply only to those waters defined in subsection 403.031 (13), F.S.

(2) The landward extent of a surface water in the State for the purposes of implementing Section 373.414, F.S., shall be the more landward of the following:

(a) wetlands as located by section 62-340.300, F.A.C., of this chapter;

(b) the mean high water line elevation for tidal water bodies;

(c) the ordinary high water line for non-tidal natural water bodies;

(d) the top of the bank for artificial lakes, borrow pits, canals, ditches and other artificial water bodies with side slopes of 1 foot vertical to 4 feet horizontal or steeper, excluding spoil banks when the canals and ditches have resulted from excavation into the ground; or

(e) the seasonal high water line for artificial lakes, borrow pits, canals, ditches, and other artificial water bodies with side slopes flatter than 1 foot vertical to 4 feet horizontal along with any artificial water body created by diking or impoundment above the ground.

(3) Determinations made pursuant to paragraphs (2) (b) and (2) (c) shall be for regulatory purposes and are not intended to be a delineation of the boundaries of lands for the purposes of title.

Specific Authority: 373.421, F.S.
Law Implemented: 373.019, 373.421, 403.031 (13), F.S.
History: New 7-1-94, Formerly 17-340.600.

62-340.700 Exemptions for Treatment or Disposal Systems.

(1) Alteration and maintenance of the following shall be exempt from the rules adopted by the department and the water management districts to implement subsections 373.414 (1) through 373.414 (6), 373.414 (8) and 373.414 (10), F.S.; and subsection 373.414 (7), F.S., regarding any authority to apply state water quality standards within any works, impoundments, reservoirs, and other watercourses described in this subsection and any authority granted pursuant to section 373.414, F.S. (1991):

(a) Works, impoundments, reservoirs, and other watercourses constructed and operated solely for wastewater treatment or disposal in accordance with a valid permit reviewed or issued under sections 62-28.700, 62-302.520, F.A.C., Chapters 62-17, 62-600, 62-610, 62-640, 62-650, 62-660, 62-670, 62-671, 62-673, or 62-701, F.A.C., or section 403.0885, F.S., or rules implementing section 403.0885, F.S., except for treatment wetlands or receiving wetlands permitted to receive wastewater pursuant to Chapter 62-611, F.A.C., or section 403.0885, F.S., or its implementing rules;

(b) Works, impoundments, reservoirs, and other watercourses constructed solely for wastewater treatment or disposal before a construction permit was required under Chapter 403, F.S., and operated solely for wastewater treatment or disposal in accordance with a valid permit reviewed or issued under sections 62-28.700, 62-302.520, F.A.C., Chapters 62-17, 62-600, 62-610, 62-640, 62-650, 62-660, 62-670, 62-671, 62-673, or 62-701, F.A.C., or section 403.0885, F.S., or rules implementing section 403.0885, F.S., except for treatment wetlands or receiving wetlands permitted to receive wastewater pursuant to Chapter 62-611, F.A.C., or section 403.0885, F.S., or its implementing rules;

(c) Works, impoundments, reservoirs, and other watercourses of less than 0.5 acres in combined area on a project-wide basis, constructed and operated solely for stormwater treatment in accordance with a noticed exemption under chapter 62-25, F.A.C., or a valid permit issued under chapters 62-25 (excluding rule 62-25.042), 62-330, 40B-4, 40C-4, 40C-42 (excluding rule 40C-42.0265), 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C., except those permitted as wetland stormwater treatment systems; or

(d) Works, impoundments, reservoirs, and other watercourses of less than 0.5 acres in combined area on a project-wide basis, constructed and operated solely for stormwater treatment before a permit was required under chapters 62-25, 40B-4, 40C-4, 40C-42, 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C.

(2) Alteration and maintenance of the following shall be exempt from the rules adopted by the department and the water management districts to implement subsections 373.414 (1), 373.414 (2) (a), 373.414 (8), and 373.414 (10), F.S.; and subsections 373.414 (3) through 373.414 (6), F.S.; and subsection 373.414 (7), F.S., regarding any authority to apply state water quality standards within any works, impoundments, reservoirs, and other watercourses described in this subsection and any authority granted pursuant to section 373.414, F.S. (1991), except for authority to protect threatened and endangered species in isolated wetlands:

(a) Works, impoundments, reservoirs, and other watercourses of 0.5 acre or greater in combined area on a project-wide basis, constructed and operated solely for stormwater treatment in accordance with a noticed exemption under chapter 62-25,

F.A.C., or a valid permit issued under chapters 62-25 (excluding rule 62-25.042), 62-330, 40B-4, 40C-4, 40C-42 (excluding rule 40C-42.0265), 40C-44, 40D-4, 40D-40, 40D-45, 40E-4, except those permitted as wetland stormwater treatment systems; or

(b) Works, impoundments, reservoirs, and other watercourses of 0.5 acres or greater in combined area on a project-wide basis, constructed and operated solely for stormwater treatment before a permit was required under chapters 62-25, 40B-4, 40C-4, 40C-42, 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C.

(3) The exemptions in subsections 62-340.700 (1) and (2) shall not apply to works, impoundments, reservoirs or other watercourses that

(a) are currently wetlands which existed before construction of the stormwater treatment system and were incorporated in it;

(b) are proposed to be altered through expansion into wetlands or other surface waters; or

(c) are wetlands created, enhanced, or restored as mitigation for wetland or surface water impacts under a permit issued by the Department or a water management district.

(4) Alterations and maintenance of works, impoundments, reservoirs, and other watercourses exempt under this subsection shall not be considered in determining whether any wetland permitting threshold is met or exceeded under part IV of chapter 373, F.S.

(5) Works, impoundments, reservoirs, and other watercourses exempt under this subsection, other than isolated wetlands in systems described in subsection 62-340.700 (2) above, shall not be delineated under section 373.421, F.S.

(6) This exemption shall not affect the application of state water quality standards, including those applicable to Outstanding Florida Waters, at the point of discharge to waters as defined in subsection 403.031 (13), F.S.

(7) As used in this subsection, "solely for " means the reason for which a work, impoundment, reservoir, or other watercourse is constructed and operated; and such construction and operation would not have occurred but for the purposes identified in subsections 62-340.700 (1) or subsection 62-340.700 (2), F.A.C. Furthermore, the phrase does not refer to a work, impoundment, reservoir, or other watercourse constructed or operated for multiple purposes. Incidental uses, such as occasional recreational uses, will not render the exemption inapplicable, so long as the incidental uses are not part of the original planned purpose of the work, impoundment, reservoir, or other watercourse.

However, for those works, impoundments, reservoirs, or other watercourses described in paragraphs 62-340.700 (1) (c) and 62-340.700 (2) (a), F.A.C., use of the system for flood attenuation, whether originally planned or unplanned, shall be considered an incidental use, so long as the works, impoundments, reservoirs, and other watercourses are no more than 2 acres larger than the minimum area required to comply with the stormwater treatment requirements of the district or department. For the purposes of this subsection, reuse from a work, impoundment, reservoir, or other watercourse is part of treatment or disposal.

Specific Authority: 373.414 (9), F.S.

Law Implemented: 373.414 (9), F.S.

History: New 7-1-94, Formerly 17-340.700.

62-340.750 Exemption for Surface Waters or Wetlands Created By Mosquito Control Activities.

Construction, alteration, operation, maintenance, removal, and abandonment of stormwater management systems, dams, impoundments, reservoirs, appurtenant works, or works, in, on or over lands that have become surface waters or wetlands solely because of mosquito control activities undertaken as part of a governmental mosquito control program, and which lands were neither surface waters nor wetlands before such activities, shall be exempt from the rules adopted by the department and water management districts to implement subsections 373.414 (1) through 373.414 (6), 373.414 (8), and 373.414 (10), F.S.; and subsection 373.414 (7), F.S., regarding any authority granted pursuant to section 373.414, F.S. (1991).

Activities exempted under this section shall not be considered in determining whether any wetland permitting threshold is met or exceeded under part IV of chapter 373, F.S. This exemption shall not affect the regulation of impacts on other surface waters or wetlands, or the application of state water quality standards to waters as defined in subsection 403.031 (13), F.S. including standards applicable to Outstanding Florida Waters.

Specific Authority: 373.414 (9), F.S.

Law Implemented: 373.414 (9), F.S.

History: New 7-1-94, Formerly 17-340.750.

The Vegetative Index

Botanical Name	Common Name	Wetland Status
Abildgaardia ovata	rush, flat-spike	FACW
Acacia auriculiformis	ear-leaved acacia	FAC
Acer negundo	box-elder	FACW
Acer rubrum	maple, red	FACW
Acer saccharinum	maple, silver	OBL
Acoelorraphe wrightii	palm, paurotis	OBL
Acrostichum spp.	leather fern	OBL
Aeschynomene indica	joint-vetch, India	FACW
Aeschynomene pratensis	joint-vetch, meadow	OBL
Agalinis aphylla	false-foxglove, scale-leaf	FACW
Agalinis linifolia	false-foxglove, flax-leaf	OBL
Agalinis maritima	false-foxglove, saltmarsh	OBL
Agalinis pinetorum (*A. pulchella*)	false-foxglove	FACW
Agalinis purpurea	false-foxglove, large purple	FACW
Agarista populifolia	hobble-bush	FACW
Agrostis stolonifera	redtop	FACW
Aletris spp.	colic-root	FAC
Alisma subcordatum	water-plantain, subcordate	OBL
Alnus serrulata	alder, hazel	OBL
Alopecurus carolinianus	foxtail, tufted	FAC
Alternanthera maritima	beach alternanthera	FACW - Keys only
Alternanthera paronychioides	smooth chaff-flower	FAC - Keys only
Alternanthera philoxeroides	alligator-weed	OBL
Alternanthera sessilis	alligator-weed, sessile	OBL
Amaranthus australis	amaranth, southern	OBL
Amaranthus cannabinus	amaranth, tidemarsh	OBL
Amaranthus floridanus	amaranth, Florida	OBL
Ammannia spp.	toothcup	OBL
Amorpha fruticosa	indigo-bush	FACW
Amphicarpum muhlenbergianum	blue maidencane	FACW
Amsonia rigida	slimpod, stiff	FACW
Amsonia tabernaemontana	slimpod, eastern	FACW
Anagallis pumila	pimpernel, Florida	FAC
Andropogon arctatus (Campbell)	bluestem, savannah	FAC
Andropogon brachystachys (Campbell)	bluestem, short-spike	FAC
Andropogon gerardii (Campbell)	bluestem, big	FAC
Andropogon glomeratus (Campbell)	bluestem, bushy	FACW
Andropogon liebmanii var. *pungensis* (Campbell) (*A. mohrii*)	bluestem, Mohr's	FACW
Andropogon perangustatus (Campbell)	bluestem, slim	FAC
Andropogon virginicus (Campbell)	broom-sedge	FAC

Botanical Name	Common Name	Wetland Status
Annona glabra	pond apple	OBL
Anthaenantia rufa	silky-scale, purple	FACW
Apteria aphylla	nodding nixie	FACW
Ardisia spp.	marlberry	FAC
Arenaria godfreyi	stitchwort, Godfrey's	FACW
Arisaema spp.	jack-in-the-pulpit; green-dragon	FACW
Aristida affinis	three-awn grass, long-leaf	OBL
Aristida purpurascens (s.l.)	three-awn grass, wand-like	FACW
Aristida rhizomophora	three-awn grass, rhizomatous	FAC
Aristida spiciformis	bottlebrush, three-awn	FAC
Aristida stricta	three-awn grass, pineland	FAC
Armoracia aquatica	lakecress	OBL
Arnoglossum diversifolium	indian-plantain, variable-leaf	FACW
Arnoglossum ovatum	indian-plantain, egg-leaf	FACW
Arnoglossum sulcatum	indian-plantain, Georgia	OBL
Aronia arbutifolia	red chokeberry	FACW
Arundinaria gigantea	giant cane	FACW
Arundo donax	reed, giant	FAC
Asclepias connivens	milkweed, large-flower	FACW
Asclepias incarnata	milkweed, swamp	OBL
Asclepias lanceolata	milkweed, fen-flower	OBL
Asclepias longifolia	milkweed, long-leaf	FACW
Asclepias pedicellata	milkweed, savannah	FACW
Asclepias perennis	milkweed, aquatic	OBL
Asclepias rubra	milkweed, red	OBL
Asclepias viridula	milkweed, southern	FACW
Aster carolinianus	aster, climbing	OBL
Aster chapmanii	aster, savannah	FACW
Aster dumosus	aster, bushy	FAC
Aster elliottii	aster, Elliott's	OBL
Aster eryngiifolius	aster, coyote-thistle	FACW
Aster lateriflorus	aster, calico	FACW
Aster spinulosus	aster, bog	FACW
Aster subulatus	aster, saltmarsh	OBL
Aster tenuifolius	aster, saltmarsh	OBL
Aster umbellatus	aster, flat-top white	FAC
Aster vimineus	aster, small white	FACW
Athyrium filix-femina	fern, subarctic lady	FACW
Atriplex patula	saltbush, halberd-leaf	FACW
Avicennia germinans	mangrove, black	OBL
Axonopus spp.	carpet grass	FAC
Baccharis angustifolia	false-willow	OBL
Baccharis dioica	false-willow, broom-bush	FAC
Baccharis glomeruliflora	groundsel tree	FAC
Baccharis halimifolia	false-willow, eastern	FAC
Bacopa spp.	water-hyssop	OBL
Balduina atropurpurea	honeycomb-head, purple	FACW

Botanical Name	**Common Name**	**Wetland Status**
Balduina uniflora	honeycomb-head, one-flower	FACW
Bartonia spp.	screwstem	FACW
Batis maritima	saltwort	OBL
Betula nigra	birch, river	OBL
Bidens bipinnata	Spanish needles	U
Bidens pilosa	beggar-ticks, white	FAC
Bidens spp.	beggar-ticks	OBL
Bigelowia nudata	golden-rod, rayless	FACW
Blechnum serrulatum	swamp fern	FACW
Boehmeria cylindrica	false-nettle, small-spike	OBL
Boltonia spp.	boltonia	FACW
Borrichia spp.	sea oxeye	OBL
Brachiaria purpurascens	paragrass	FACW
Bucida buceras	gregory wood	FAC
Bumelia celastrina	bumelia, coastal	FAC
Bumelia lycioides	bumelia, buckthorn	FAC
Bumelia reclinata	bumelia	FAC
Burmannia spp.	burmannia	OBL
Byrsonima lucida	locust-berry	FAC - Keys only
Cacalia suaveolens	indian-plantain, sweet-scent	FACW
Calamovilfa curtissii	Curtiss' reed grass	FACW
Callitriche spp.	water-starwort	OBL
Calopogon spp.	grass-pinks	FACW
Calycocarpum lyonii	cupseed	FACW
Campanula americana	bellflower, American	FAC
Campanula floridana	bellflower	OBL
Canna spp.	canna	OBL
Canna x generalis	canna, common	FAC
Caperonia spp.	caperonia	FACW
Capparis flexuosa	caper-tree	FACW
Cardamine bulbosa	bitter-cress	OBL
Cardamine pensylvanica	spring-cress	OBL
Carex atlantica	sedge, prickly bog	OBL
Carex comosa	sedge, bearded	OBL
Carex crinita	sedge, fringed	OBL
Carex crus-corvi	sedge, raven-foot	OBL
Carex decomposita	sedge, cypress-knee	OBL
Carex elliottii	sedge, Elliott's	OBL
Carex folliculata	sedge, long	OBL
Carex gigantea	sedge, large	OBL
Carex howei	sedge, Howe's	OBL
Carex hyalinolepis	sedge, shoreline	OBL
Carex leptalea	sedge, bristly-stalk	OBL
Carex louisianica	sedge, Louisiana	OBL
Carex lupulina	sedge, hop	OBL
Carex lurida	sedge, shallow	OBL
Carex spp.	sedges	FACW

Botanical Name	Common Name	Wetland Status
Carex stipata	sedge, stalk-grain	OBL
Carex walteriana	sedge, Walter's	OBL
Carphephorus carnosus	chaffhead, pineland	FACW
Carphephorus odoratissimus	vanilla plant	FAC
Carphephorus paniculatus	deer-tongue	FAC
Carphephorus pseudoliatris	chaffhead, bristle-leaf	FACW
Carpinus caroliniana	hornbeam, American	FACW
Carya aquatica	hickory, water	OBL
Casuarina spp.	casuarina	FAC
Cayaponia quinqueloba	cayaponia, five-lobe	FAC
Celtis laevigata	sugar-berry; hackberry	FACW
Centella asiatica	coinwort	FACW
Cephalanthus occidentalis	buttonbush	OBL
Cestrum diurnum	day jessamine	FAC
Chamaecyparis thyoides	cedar, Atlantic white	OBL
Chaptalia tomentosa	sunbonnet; pineland daisy	FACW
Chasmanthium latifolium	spanglegrass	FAC
Chasmanthium sessiliflorum	long-leaf Chasmanthium	FAC
Chasmanthium spp.	spanglegrass	FACW
Chiococca spp.	snowberry	FAC
Chrysobalanus icaco	cocoplum	FACW
Cicuta spp.	water-hemlock	OBL
Cirsium lecontei	thistle, Leconte's	FACW
Cirsium muticum	thistle, swamp	OBL
Cirsium nuttallii	thistle, Nuttall's	FACW
Cladium spp.	sawgrass	OBL
Cleistes divaricata	rosebud	OBL
Clethra alnifolia	sweet pepper bush	FACW
Cliftonia monophylla	buckwheat-tree	FACW
Colocasia esculenta	elephant's ear	OBL
Colubrina asiatica	snakewood, Asian	FAC
Commelina erecta	dayflower, sandhill	U
Commelina spp.	dayflower	FACW
Conocarpus erectus	buttonwood	FACW
Conoclinium coelestinum	mistflower	FAC
Coreopsis falcata	tickseed, sickle	FACW
Coreopsis floridana	tickseed, Florida	FACW
Coreopsis gladiata	tickseed, southeastern	FACW
Coreopsis integrifolia	tickseed, ciliate-leaf	FACW
Coreopsis leavenworthii	tickseed, Leavenworth's	FACW
Coreopsis linifolia	tickseed, Texas	FACW
Coreopsis nudata	tickseed, Georgia	OBL
Coreopsis tripteris	tickseed, tall	FAC
Cornus amomum	dogwood, silky	OBL
Cornus foemina	dogwood, swamp	FACW
Crataegus aestivalis	mayhaw	OBL
Crataegus marshallii	haw, parsley	FACW

Botanical Name	Common Name	Wetland Status
Crataegus viridis	haw, green	FACW
Crinum americanum	swamp-lily, southern	OBL
Croton elliottii	croton, Elliott's	FACW
Ctenitis submarginalis	fern, brown-hair comb	FACW
Ctenium spp.	toothache grass	FACW
Cupaniopsis anacardioides	carrotwood	FAC
Cuphea aspera	common waxweed	FACW
Cuphea carthagenensis	waxweed, Columbia	FAC
Cyperus alternifolius	flatsedge, alternate-leaf	OBL
Cyperus articulatus	flatsedge, jointed	OBL
Cyperus cuspidatus	flatsedge, coastal-plain	FAC
Cyperus difformis	flatsedge, variable	OBL
Cyperus distinctus	flatsedge, marshland	OBL
Cyperus drummondii	flatsedge	OBL
Cyperus entrerianus	flatsedge	OBL
Cyperus erythrorhizos	flatsedge, red-root	OBL
Cyperus esculentus	flatsedge	FAC
Cyperus filiculmis	flatsedge, sandhill	U
Cyperus giganteus	flatsedge	FAC
Cyperus globulosus	flatsedge, baldwin	FAC
Cyperus haspan	flatsedge, sheathed	OBL
Cyperus huarmensis	flatsedge, black knotty-root	FAC
Cyperus lanceolatus	flatsedge, epiphytic	OBL
Cyperus metzii	flatsedge	FAC
Cyperus ovularis	flatsedge	U
Cyperus papyrus	flatsedge, papyrus	OBL
Cyperus reflexus	flatsedge	U
Cyperus refractus	flatsedge	U
Cyperus retrofractus	flatsedge	U
Cyperus retrorsus	flatsedge	FAC
Cyperus rotundus	flatsedge, purple	FAC
Cyperus spp.	flatsedge	FACW
Cyperus tetragonus	flatsedge	U
Cypselea humifusa	panal	FAC
Cyrilla racemiflora	cyrilla, swamp	FAC
Decodon verticillatus	swamp-loosestrife	OBL
Dichondra caroliniensis	pony-foot	FAC
Dichromena colorata	white-top sedge, starbrush	FACW
Dichromena floridensis	white-top sedge, Everglades	FACW
Dichromena latifolia	white-top sedge, giant	OBL
Dicliptera brachiata	mudwort, wild	FACW
Digitaria pauciflora	everglades grass	FACW
Digitaria serotina	crabgrass, dwarf	FAC
Diodia virginiana	button-weed	FACW
Dionaea muscipula	Venus' flytrap	FACW
Diospyros virginiana	persimmon, common	FAC
Distichlis spicata	saltgrass, seashore	OBL

Botanical Name	Common Name	Wetland Status
Drosera brevifolia	sundew, dwarf	FACW
Drosera capillaris	sundew, pink	FACW
Drosera filiformis	sundew, thread-leaf	OBL
Drosera intermedia	sundew, spoon-leaf	OBL
Drosera tracyi	sundew, Gulf coast	OBL
Drymaria cordata	West Indian chickweed	FAC
Dryopteris ludoviciana	shield-fern, southern	FACW
Dulichium arundinaceum	sedge, three-way	OBL
Dyschoriste humistrata	dyschoriste, swamp	FACW
Echinochloa spp.	jungle-rice; cockspur grass	FACW
Echinodorus spp.	burhead	OBL
Eclipta alba	yerba de Tajo	FACW
Eleocharis spp.	spikerush	OBL
Elyonurus tripsacoides	balsam-scale, Pan-American	FACW
Elytraria caroliniensis	scaly-stem, Carolina	FAC
Equisetum hyemale	horsetail	FACW
Eragrostis spp.	lovegrass	FAC
Erechtites hieraciifolia	fireweed	FAC
Erianthus brevibarbis	plumegrass, short-beard	FACW
Erianthus giganteus	plumegrass, sugarcane	OBL
Erianthus strictus	plumegrass, narrow	OBL
Erigeron quercifolius	fleabane	FAC
Erigeron vernus	fleabane, early whitetop	FACW
Eriocaulon spp.	pipewort	OBL
Eriochloa spp.	cupgrass	FACW
Erithralis fruticosa	black torchwood	FAC
Ernodea littoralis	golden-creeper	FAC - Keys only
Eryngium aquaticum	corn snakeroot	OBL
Eryngium baldwinii	coyote-thistle, Baldwin's	FAC
Eryngium integrifolium	coyote-thistle, blue-flower	FACW
Eryngium prostratum	coyote-thistle, creeping	FACW
Eryngium yuccifolium	rattlesnake master	FACW
Erythrodes querceticola	erythrodes, low	FACW
Eulophia alta	coco, wild	FACW
Eupatoriadelphus fistulosus	joe-pye-weed	FACW
Eupatorium leptophyllum	marsh thoroughwort	OBL
Eupatorium leucolepis	thoroughwort, white-bract	FACW
Eupatorium mikanioides	thoroughwort, semaphore	FACW
Eupatorium perfoliatum	boneset	FACW
Eupatorium spp.	thoroughworts	FAC
Euphorbia humistrata (*Chamaesyce humistrata*)	broomspurge, spreading	FACW
Euphorbia inundata	spurge, Florida	FACW
Euphorbia polyphylla	spurge, many-leaved	FACW
Eustachys glauca (*Chloris glauca*)	fingergrass, saltmarch	FACW
Eustachys petracea	fingergrass	FAC
Eustoma exaltatum	prairie-gentian	FACW

Botanical Name	**Common Name**	**Wetland Status**
Euthamia spp.	bushy goldenrod	FAC
Evolvulus convolvuloides	evolvulus	FACW
Evolvulus sericeus	silky bindweed	FACW
Ficus aurea	fig, Florida strangler	FAC
Fimbristylis annua	fringe-rush, annual	FACW
Fimbristylis puberula	fringe-rush, Vahl's hairy	FACW
Fimbristylis spathacea	hurricane-grass	FAC
Fimbristylis spp.	fringe-rush	OBL
Flaveria bidentis	yellowtop	FAC
Flaveria floridana	yellowtop	FACW
Flaveria linearis	yellowtop	FACW
Flaveria trinervia	yellowtop	FAC
Forestiera acuminata	privet, swamp	FACW
Forestiera segregata	privet, Florida	FAC
Fothergilla gardenii	witch-alder, dwarf	FACW
Fraxinus americana	ash, white	U
Fraxinus spp.	ash	OBL
Fuirena spp.	umbrella-sedge	OBL
Galium tinctorium	bedstraw, stiff marsh	FACW
Gaylussacia dumosa	dwarf huckleberry	FAC
Gaylussacia frondosa	dangleberry	FAC
Gaylussacia mosieri	woolly-berry	FACW
Gentiana spp.	gentian	FACW
Gleditsia aquatica	water-locust	OBL
Gleditsia triacanthos	honey-locust	FACW
Glyceria striata	fowl mannagrass	OBL
Gordonia lasianthus	bay, loblolly	FACW
Gratiola hispida	hyssop, hispid	FAC
Gratiola spp.	hedgehyssop	FACW
Guapira discolor	blolly	FAC - Keys only
Habenaria spp	rein orchid	FACW
Halesia diptera	silver-bell	FACW
Harperocallis flava	Harper's beauty	FACW
Hartwrightia floridana	hartwrightia, Florida	FACW
Hedychium coronarium	ginger	FACW
Helenium amarum	sneezeweed, pasture	FAC
Helenium spp.	sneezeweed	FACW
Helianthus agrestis	sunflower, southeastern	FACW
Helianthus angustifolius	sunflower, swamp	FACW
Helianthus carnosus	sunflower, lakeside	FACW
Helianthus floridanus	sunflower, Florida	FAC
Helianthus heterophyllus	sunflower, wetland	FACW
Helianthus simulans	sunflower, muck	FACW
Heliotropium curassavicum	heliotrope, seaside	FAC
Heliotropium polyphyllum	heliotrope	FAC
Heliotropium procumbens	heliotrope, four-spike	FACW
Hemicarpha spp.	dwarf-bullrush	FACW

Botanical Name	Common Name	Wetland Status
Heteranthera reniformis	mud-plantain, kidney-leaf	OBL
Hibiscus aculeatus	rosemallow	FACW
Hibiscus coccineus	rosemallow, scarlet	OBL
Hibiscus grandiflorus	rosemallow, swamp	OBL
Hibiscus laevis	rosemallow, halberd-leaf	OBL
Hibiscus moscheutos	rosemallow, swamp	OBL
Hibiscus tiliaceus	rosemallow, sea	FAC
Hydrochloa caroliniensis	watergrass	OBL
Hydrocleis nymphoides	water-poppy	OBL
Hydrocotyle ranunculoides	pennywort, floating	OBL
Hydrocotyle spp.	pennywort	FACW
Hydrolea spp.	false-fiddle-leaf	OBL
Hygrophila spp.	hygrophila	OBL
Hymenachne amplexicaulis	trompetilla	OBL
Hymenocallis spp.	spider-lily	OBL
Hypericum chapmanii	St. John's-wort, Chapman's	OBL
Hypericum cumulicola	St. John's-wort, scrub	U
Hypericum drummondii	St. John's-wort, Drummond's	U
Hypericum edisonianum	St. John's-wort, Edison's	OBL
Hypericum fasciculatum	St. John's-wort, marsh	OBL
Hypericum gentianoides	pineweed	U
Hypericum hypericoides	St. Andrew's cross	FAC
Hypericum lissophloeus	St. John's-wort, smooth-bark	OBL
Hypericum microsepalum	St. John's-wort, small-sepal	U
Hypericum nitidum	St. John's-wort, Carolina	OBL
Hypericum prolificum	St. John's-wort, shrubby	U
Hypericum punctatum	St. John's-wort, dotted	U
Hypericum reductum	St. John's-wort, Atlantic	U
Hypericum spp.	St. John's-wort	FACW
Hypericum tetrapetalum	St. John's-wort, four-petal	FAC
Hypolepis repens	fern, bead	FACW
Hypoxis spp.	stargrasses, yellow	FACW
Hyptis alata	musky mint	FACW
Ilex amelanchier	holly, sarvis	OBL
Ilex cassine	holly, dahoon	OBL
Ilex coriacea	holly, bay-gall	FACW
Ilex decidua	holly, deciduous	FACW
Ilex myrtifolia	holly, myrtle	OBL
Ilex opaca var. *opaca*	American holly	FAC
Ilex verticillata	winterberry	OBL
Ilex vomitoria	yaupon holly	FAC
Illicium floridanum	anise, Florida	OBL
Illicium parviflorum	star anise	FACW
Impatiens capensis	touch-me-not, spotted	OBL
Iris spp.	iris	OBL
Iris verna	dwarf iris	U
Isoetes spp.	quillwort	OBL

Botanical Name	Common Name	Wetland Status
Itea virginica	virginia willow	OBL
Iva frutescens	marsh elder	OBL
Iva microcephala	little marsh elder	FACW
Jacquinia keyensis	joewood	FAC
Juncus marginatus	rush	FACW
Juncus spp.	rush	OBL
Juncus tenuis	rush	FAC
Justicia brandegeana	shrimp plant	U
Justicia spp.	water-willow	OBL
Kalmia latifolia	laurel, mountain	FACW
Kosteletzkya pentasperma	mallow, coastal	FAC
Kosteletzkya virginica	mallow, seashore	OBL
Lachnanthes caroliniana	redroot	FAC
Lachnocaulon anceps	bogbutton, white-head	FACW
Lachnocaulon beyrichianum	bogbutton, southern	FACW
Lachnocaulon digynum	bogbutton, pineland	OBL
Lachnocaulon engleri	bogbutton, Engler's	OBL
Lachnocaulon minus	bogbutton, Small's	OBL
Laguncularia racemosa	mangrove, white	OBL
Laportea canadensis	wood-nettle, Canada	FACW
Leersia spp.	cutgrass	OBL
Leitneria floridana	corkwood	OBL
Leptochloa spp.	sprangle-top	FACW
Leptochloa virgata	sprangle-top, tropic	FAC
Leucothoe spp.	dog-hobble	FACW
Liatris garberi	gayfeather, garber's	FACW
Liatris gracilis	blazing star	FAC
Liatris spicata	gayfeather, spiked	FAC
Lilaeopsis spp.	lilaeopsis	OBL
Lilium catesbaei	lily, southern red	FAC
Lilium iridollae	lily, panhandle	OBL
Limnobium spongia	frogbit	OBL
Limnophila spp.	marshweed	OBL
Limonium carolinianum	sea-lavender	OBL
Lindera benzoin	spicebush, northern	FACW
Lindera melissaefolia	spicebush, southern	OBL
Lindernia crustacea	false-pimpernel, Malayan	FAC
Lindernia spp.	false-pimpernel	FACW
Linum carteri	flax, Carter's	FACW
Linum floridanum	flax, Florida yellow	FAC
Linum medium	flax, stiff yellow	FAC
Linum striatum	flax, ridged yellow	FACW
Linum westii	flax, West's	OBL
Liparis elata (*L. nervosa*)	liparis, tall	OBL
Lipocarpha spp.	lipocarpha	FACW
Liquidambar styraciflua	sweetgum	FACW
Liriodendron tulipifera	tulip tree	FACW

Botanical Name	Common Name	Wetland Status
Listera spp.	twayblade	FACW
Litsea aestivalis	pondspice	OBL
Lobelia cardinalis	flower, cardinal	OBL
Lobelia floridana	lobelia, Florida	OBL
Lobelia spp.	lobelia	FACW
Lophiola americana	golden-crest	FACW
Ludwigia hirtella	seedbox, hairy	FACW
Ludwigia maritima	seedbox, seaside	FACW
Ludwigia spp.	ludwigia; water-primrose	OBL
Ludwigia suffruticosa	seedbox, headed	FACW
Ludwigia virgata	seedbox, savanna	FACW
Lycium carolinianum	Christmas berry	OBL
Lycopodium spp.	clubmoss	FACW
Lycopus spp.	bugleweed	OBL
Lyonia ligustrina	maleberry	FAC
Lyonia lucida	fetter-bush	FACW
Lyonia mariana	fetter-bush	FACW
Lysimachia spp.	loosestrife	OBL
Lythrum spp.	marsh loosestrife	OBL
Macbridea spp.	birds-in-a-nest	FACW
Macranthera flammea	flameflower	OBL
Magnolia virginiana var. *australis*	magnolia, sweetbay	OBL
Malaxis spicata	adder's-mouth, Florida	OBL
Manilkara bahamensis	wild dilly	FAC - Keys only
Manisuris cylindrica	jointgrass, pitted	FAC
Manisuris spp.	jointgrass	FACW
Marshallia graminifolia	barbara's-buttons, grass-leaf	FACW
Marshallia tenuifolia	barbara's-buttons, slim-leaf	FACW
Maxillaria crassifolia	orchid, hidden	OBL
Maytenus phyllanthoides	Florida mayten	FAC
Mecardonia spp.	mecardonia	FACW
Melaleuca quinquenervia	punk tree	FAC
Melanthera nivea	squarestem	FACW
Melanthium virginicum	bunchflower, Virginia	OBL
Melochia corchorifolia	chocolate-weed	FAC
Metopium toxiferum	poison wood	FAC
Micranthemum spp.	baby tears	OBL
Micromeria brownei (*Satureja brownei*)	savory, Brown's	OBL
Mimosa pigra	mimosa, black	FAC
Mimulus alatus	monkey-flower	OBL
Mitreola spp.	hornpod	FACW
Monanthochloe littoralis	keygrass	OBL
Morinda royoc	Keys rhubarb	FACW - Keys only
Morus rubra	mulberry, red	FAC
Muhlenbergia capillaris	muhly grass	OBL
Muhlenbergia expansa	cutover muhly	FAC

Botanical Name	**Common Name**	**Wetland Status**
Muhlenbergia schreberi	nimblewill	FACW
Murdannia spp.	dewflower	FAC
Myosurus minimus	mouse-tail, tiny	FAC
Myrica cerifera	bayberry, southern	FAC
Myrica heterophylla	bayberry, evergreen	FACW
Myrica inodora	bayberry, odorless	FACW
Myrsine guianensis	myrsine, guiana	FAC
Nasturtium spp.	water-cress	OBL
Nelumbo spp.	water-lotus	OBL
Nemastylis floridana	pleatleaf, fall-flowering	FACW
Nemophila aphylla	baby-blue-eyes, small-flower	FACW
Nephrolepis spp.	sword ferns	FAC
Neyraudia reynaudiana	reed, silk	FAC
Nuphar luteum	cow-lily, yellow	OBL
Nymphaea spp.	water-lily	OBL
Nymphoides spp.	floating-hearts	OBL
Nyssa aquatica	tupelo, water	OBL
Nyssa ogeche	tupelo, ogeechee	OBL
Nyssa sylvatica var. *biflora*	tupelo, swamp	OBL
Oldenlandia spp.	bluets, water	FACW
Onoclea sensibilis	fern, sensitive	FACW
Oplismenus setarius	grass, woods	FAC
Orontium aquaticum	golden club	OBL
Oryza sativa	rice, cultivated	FAC
Osmunda cinnamomea	fern, cinnamon	FACW
Osmunda regalis	fern, royal	OBL
Oxypolis spp.	water drop-wort	OBL
Panicum abscissum (Hall)	cut-throat grass	FACW
Panicum anceps	panicum, beaked	FAC
Panicum commutatum (Hall)	panicum	FAC
Panicum dichotomiflorum	panicum, fall	FACW
Panicum dichotomum	panicum	FACW
Panicum ensifolium	panic grass	OBL
Panicum erectifolium	witchgrass, erect-leaf	OBL
Panicum gymnocarpon	panicum, savannah	OBL
Panicum hemitomon	maiden-cane	OBL
Panicum hians	panicum, gaping	FAC
Panicum longifolium	panicum, tall thin	OBL
Panicum pinetorum	panicum	FACW
Panicum repens	grass, torpedo	FACW
Panicum rigidulum	panicum, red-top	FACW
Panicum scabriusculum	panicum, woolly	OBL
Panicum scoparium	panicum	FACW
Panicum spretum	panicum	FACW
Panicum strigosum	panicum	FAC
Panicum tenerum	panicum, bluejoint	OBL
Panicum tenue	panicum	FAC

Botanical Name	Common Name	Wetland Status
Panicum verrucosum	panicum, warty	FACW
Panicum virgatum	switchgrass	FACW
Parietaria spp.	pellitory	FAC
Parnassia spp.	grass-of-parnassus	OBL
Paspalidium geminatum	water panicum	OBL
Paspalum acuminatum	paspalum, brook	FACW
Paspalum boscianum	paspalum, bull	FACW
Paspalum conjugatum	paspalum, sour	FAC
Paspalum dilatatum	dallisgrass	FAC
Paspalum dissectum	paspalum, mudbank	OBL
Paspalum distichum	paspalum, joint	OBL
Paspalum fimbriatum	paspalum, Panama	FAC
Paspalum floridanum	paspalum, Florida	FACW
Paspalum laeve	paspalum, field	FACW
Paspalum monostachyum	paspalum, gulf	OBL
Paspalum plicatulum	paspalum, brown-seed	FAC
Paspalum praecox	paspalum, early	OBL
Paspalum pubiflorum	paspalum, hairy-seed	FACW
Paspalum repens	paspalum, water	OBL
Paspalum setaceum	paspalum, thin	FAC
Paspalum urvillei	grass, vasey	FAC
Pavonia spicata	mangrove mallow	FACW
Peltandra spp.	arum; spoon flower	OBL
Pennisetum purpureum	elephant ear grass	FAC
Penthorum sedoides	ditch stonecrop	OBL
Pentodon pentandrus	pentodon, Hall's	OBL
Persea palustris	bay, swamp	OBL
Phalaris spp.	grass, canary	FAC
Philoxerus vermicularis	silverhead	FACW
Phragmites australis	reed, common	OBL
Phyla spp.	frog-fruit	FAC
Phyllanthus caroliniensis	leaf-flower, Carolina	FACW
Phyllanthus liebmannianus	leaf-flower, Florida	FACW
Phyllanthus urinaria	leaf-flower, water	FAC
Physostegia godfreyi	dragon-head, Godfrey's	OBL
Physostegia leptophylla	dragon-head, slender-leaf	OBL
Physostegia purpurea	dragon-head, purple	FACW
Physostegia virginiana	dragon-head, false	FACW
Pieris phillyreifolia	fetter-bush, climbing	FACW
Pilea spp.	clearweed	FACW
Pinckneya bracteata (*P. pubens*)	fever-tree	OBL
Pinguicula spp.	butterwort	OBL
Pinus glabra	pine, spruce	FACW
Pinus serotina	pine, pond	FACW
Piriqueta caroliniana	piriqueta	FAC
Pisonia rotundata	pisonia	FAC - Keys only
Pithecellobium keyense	blackbead	FAC - Keys only

Botanical Name	Common Name	Wetland Status
Pithecellobium unguis-cati	catclaw	FAC - Keys only
Planera aquatica	planer tree	OBL
Platanthera spp.	orchid, fringed	OBL
Platanus occidentalis	sycamore	FACW
Pleea tenuifolia	rush-featherling	OBL
Pluchea spp.	camphor-weed	FACW
Pogonia ophioglossoides	pogonia, rose	OBL
Polygala cymosa	milkwort, tall	OBL
Polygala leptostachys	milkwort, sandhill	U
Polygala lewtonii	milkwort, scrub	U
Polygala polygama	milkwort, racemed	U
Polygala spp.	milkwort	FACW
Polygala verticillata	milkwort, whorled	U
Polygonum argyrocoleon	smartweed, silversheath	U
Polygonum spp.	smartweed	OBL
Polygonum virginianum	jumpseed	FACW
Polypogon spp.	grass, rabbit-foot	FAC
Polypremum procumbens	rustweed	FAC
Pontederia cordata	pickerelweed	OBL
Ponthieva racemosa	shadow-witch	FACW
Populus deltoides	cottonwood, eastern	FACW
Populus heterophylla	cottonwood, swamp	OBL
Proserpinaca spp.	mermaid-weed	OBL
Psidium cattleianun	guava, strawberry	FAC
Psilocarya spp.	baldrush	OBL
Psychotria spp.	wild coffee	FAC
Pteris tripartita	brake, giant	FACW
Ptilimnium capillaceum	mock bishop-weed	FACW
Pycnanthemum nudum	mountain-mint, coastal-plain	FACW
Quercus laurifolia	oak, laurel	FACW
Quercus lyrata	oak, overcup	OBL
Quercus michauxii	oak, swamp chestnut	FACW
Quercus nigra	oak, water	FACW
Quercus pagoda	oak, cherry-bark	FACW
Quercus phellos	oak, willow	FACW
Randia aculeata	box briar	FAC - Keys only
Ranunculus spp.	butter-cup	FACW
Reimarochloa oligostachya	grass, Florida reimar	FACW
Reynosia septentrionalis	darling plum	FAC - Keys only
Rhapidophyllum hystrix	palm, needle	FACW
Rhexia parviflora	meadow-beauty, white	OBL
Rhexia salicifolia	meadow-beauty, panhandle	OBL
Rhexia spp.	meadow-beauty	FACW
Rhizophora mangle	mangrove, red	OBL
Rhododendron viscosum	azalea, swamp	FACW
Rhodomyrtus tomentosus	downy rose myrtle	FAC
Rhynchospora cephalantha	beakrush, clustered	OBL

Botanical Name	Common Name	Wetland Status
Rhynchospora chapmanii	beakrush, Chapman's	OBL
Rhynchospora corniculata	beakrush, short-bristle	OBL
Rhynchospora decurrens	beakrush, swamp-forest	OBL
Rhynchospora divergens	beakrush, spreading	OBL
Rhynchospora grayi	beakrush, Gray's	U
Rhynchospora harperi	beakrush, Harper's	OBL
Rhynchospora intermedia	beakrush, pinebarren	U
Rhynchospora inundata	beakrush, horned	OBL
Rhynchospora macra	beakrush, large	OBL
Rhynchospora megalocarpa	beakrush, giant-fruited	U
Rhynchospora microcarpa	beakrush, southern	OBL
Rhynchospora miliacea	beakrush, millet	OBL
Rhynchospora mixta	beakrush, mingled	OBL
Rhynchospora oligantha	beakrush, few-flower	OBL
Rhynchospora spp.	beakrush	FACW
Rhynchospora stenophylla	beakrush, Chapman's	OBL
Rhynchospora tracyi	beakrush, Tracy's	OBL
Rorippa spp.	yellow-cress	OBL
Rosa palustris	rose, swamp	OBL
Rotala ramosior	toothcup	OBL
Roystonea spp.	palm, royal	FACW
Rubus spp.	blackberries	FAC
Rudbeckia fulgida	coneflower, orange	FACW
Rudbeckia graminifolia	coneflower, grass-leaf	FACW
Rudbeckia laciniata	coneflower, cut-leaf	FACW
Rudbeckia mohrii	coneflower, Mohr's	OBL
Rudbeckia nitida	coneflower, shiny	FACW
Ruellia brittoniana	wild-petunia, Britton's	FAC
Ruellia caroliniensis	wild-petunia	FAC
Ruellia noctiflora	wild-petunia, night-flowering	FACW
Rumex spp.	dock	FACW
Sabal minor	palmetto, dwarf	FACW
Sabal palmetto	palm, cabbage	FAC
Sabatia bartramii	rose-gentian, Bartram's	OBL
Sabatia calycina	rose-gentian, coast	OBL
Sabatia dodecandra	rose-gentian, large	OBL
Sabatia spp.	rose-gentian	FACW
Sacciolepis indica	grass, glenwood	FAC
Sacciolepis striata	cupscale, American	OBL
Sachsia polycephala	sachsia	FACW
Sagittaria spp.	arrowhead	OBL
Salicornia spp.	glasswort	OBL
Salix spp.	willow	OBL
Sambucus canadensis	elderberry	FAC
Samolus spp.	pimpernel, water	OBL
Sapium sebiferum	tallow-tree, Chinese	FAC
Sarracenia minor	pitcher-plant, hooded	FACW

Botanical Name	**Common Name**	**Wetland Status**
Sarracenia spp.	pitcher-plant	OBL
Saururus cernuus	lizard's tail	OBL
Schinus terebinthifolius	pepper-tree, Brazilian	FAC
Schizachyrium spp.	bluestem	FAC
Schoenolirion croceum	sunny bells	FACW
Schoenolirion elliottii	sunny bells	FACW
Schoenus nigricans	black-sedge	FACW
Scirpus spp.	bulrush	OBL
Scleria spp.	nutrush	FACW
Sclerolepis uniflora	hardscale, one-flower	FACW
Scoparia dulcis	sweet broom	FAC
Scutellaria floridana	skullcap	FAC
Scutellaria integrifolia	skullcap, rough	FAC
Scutellaria lateriflora	skullcap, blue	OBL
Scutellaria racemosa	skullcap	OBL
Sebastiana fruticosa	sebastian-bush, gulf	FAC
Selaginella apoda	spike-moss, meadow	FACW
Senecio aureus	ragwort, golden	OBL
Senecio glabellus	butterweed	OBL
Sesbania spp.	rattle-bush	FAC
Sesuvium spp.	sea-purslane	FACW
Setaria geniculata	grass, bristle	FAC
Setaria magna	foxtail	OBL
Seymeria cassioides	black senna	FAC
Sisyrinchium atlanticum	blue-eye-grass, eastern	FACW
Sisyrinchium capillare	blue-eye-grass	FACW
Sisyrinchium mucronatum	blue-eye-grass, Michaux's	FACW
Sium suave	water-parsnip	OBL
Solanum bahamense	canker-berry	FACW
Solanum erianthum	nightshade, shrub	FACW
Solidago elliottii	golden-rod, Elliott's	OBL
Solidago fistulosa	golden-rod, marsh	FACW
Solidago leavenworthii	golden-rod, leavenworth's	FACW
Solidago patula	golden-rod, rough-leaf	OBL
Solidago rugosa	golden-rod, wrinkled	FAC
Solidago sempervirens	golden-rod, seaside	FACW
Solidago stricta	golden-rod, willow-leaf	FACW
Sophora tomentosa	coast sophora	FACW
Sparganium americanum	burreed	OBL
Spartina alterniflora	cordgrass, saltmarsh	OBL
Spartina bakeri	cordgrass, sand	FACW
Spartina cynosuroides	cordgrass, big	OBL
Spartina patens	cordgrass, saltmeadow	FACW
Spartina spartinae	cordgrass, gulf	OBL
Spergularia marina	sandspurry, saltmarsh	OBL
Spermacoce glabra	button-plant, smooth	FACW
Sphagnum spp.	sphagnum moss	OBL

Botanical Name	Common Name	Wetland Status
Sphenoclea zeylandica	chicken-spike	FACW
Sphenopholis pennsylvanica	wedgescale, swamp	OBL
Sphenostigma coelestinum	ixia, Bartram's	FACW
Spigelia loganioides	pink-root	FACW
Spilanthes americana	spotflower, creeping	FACW
Spiranthes spp.	ladies'-tresses	FACW
Sporobolus floridanus	dropseed, Florida	FACW
Sporobolus virginicus	dropseed, seashore	OBL
Stachys lythroides	hedgenettle	OBL
Staphylea trifolia	bladdernut, American	FACW
Stenandrium floridanum	stenandrium	FACW
Stenanthium gramineum	feather-bells, eastern	FACW
Stillingia aquatica	corkwood	OBL
Stillingia sylvatica var. *tenuis*	queen's-delight, marsh	FAC
Stipa avenacioides	grass, Florida needle	FACW
Stokesia laevis	stokesia	FACW
Strumpfia maritima	strumpfia	FACW - Keys only
Styrax americana	snowbell; storax	OBL
Suaeda spp.	sea-blite	OBL
Suriana maritima	bay-cedar	FAC
Syngonanthus flavidulus	bantam-buttons	FACW
Syzygium spp.	Java plum	FAC
Taxodium ascendens	cypress, pond	OBL
Taxodium distichum	cypress, bald	OBL
Teucrium canadense	germander, American	FACW
Thalia geniculata	thalia; fire flag	OBL
Thalictrum spp.	meadow-rue	FACW
Thelypteris spp.	shield fern	FACW
Thespesia populnea	seaside mahoe	FAC
Thrinax radiata	Florida thatch palm	FAC - Keys only
Tilia americana	American basswood	FACW
Tofieldia racemosa	false-asphodel, coastal	OBL
Toxicodendron vernix	poison sumac	FACW
Trachelospermum difforme	climbing-dogbane	FACW
Tradescantia fluminensis	trailing spiderwort	FAC
Trema spp.	trema	FAC
Trepocarpus aethusae	trepocarpus, aethusa-like	FACW
Triadenum spp.	St. John's-wort, marsh	OBL
Trianthema portulacastrum	horse-purslane	FACW
Tridens ambiguus	tridens, savannah	FACW
Tridens strictus	tridens, long-spike	FACW
Triglochin striata	arrow-grass	OBL
Triphora spp.	pogonias, nodding	FACW
Tripsacum dactyloides	grass, eastern gama	FAC
Typha spp.	cattail	OBL
Ulmus rubra	elm, slippery	U
Ulmus spp.	elm	FACW

Botanical Name	**Common Name**	**Wetland Status**
Urechites lutea	allamanda, wild	FACW
Utricularia spp.	bladderwort	OBL
Uvularia floridana	bellwort, Florida	FACW
Vaccinium corymbosum	blueberry, highbush	FACW
Vaccinium elliottii	blueberry, Elliott	FAC
Verbena scabra	vervain, sandpaper	FACW
Verbesina chapmanii	crownbeard, Chapman's	FACW
Verbesina heterophylla	crownbeard, diverse-leaf	FACW
Verbesina virginica	crownbeard, white	FAC
Vernonia angustifolia	ironweed, narrow-leaf	U
Vernonia spp.	ironweed	FACW
Veronica anagallis-aquatica	speedwell, water	OBL
Veronicastrum virginicum	culver's-root	FACW
Viburnum dentatum	arrow-wood	FACW
Viburnum nudum	viburnum, possum-haw	FACW
Viburnum obovatum	viburnum, walter	FACW
Vicia acutifolia	vetch, four-leaf	FACW
Vicia floridana	vetch, Florida	FACW
Vicia ocalensis	vetch, Ocala	OBL
Viola affinis	violet, Leconte's	FACW
Viola esculenta	violet, edible	FACW
Viola lanceolata	violet, lance-leaf	OBL
Viola primulifolia	violet, primrose-leaf	FACW
Websteria confervoides	water-meal	OBL
Wedelia trilobata	creeping ox-eye	FAC
Woodwardia aereolata	chainfern	OBL
Woodwardia virginica	chainfern	FACW
Xanthorhiza simplicissima	yellow-root, shrubby	FACW
Xanthosoma sagittifolium	elephant ear	FACW
Xyris caroliniana	yellow-eyed grass, Carolina	FACW
Xyris jupicai	yellow-eyed grass, tropical	FACW
Xyris spp.	yellow-eyed grass	OBL
Yeatesia viridiflora	yeatesia, green-flower	FACW
Zephyranthes atamasco	lily, atamasco	FACW
Zigadenus densus	crow poison	FACW
Zigadenus glaberrimus	deathcamas, atlantic	FACW
Zizania aquatica	wildrice	OBL
Zizaniopsis miliacea	wildrice, southern	OBL

Agency Addresses

State of Florida

FDEP

Florida Department of Environmental Protection
Wetland Evaluation and Delineation Section
Division of Environmental Resource Permitting
2600 Blair Stone Rd
Tallahassee, FL 32399-2400
(904) 921-2992

STATE PARKS

Jonathan Dickinson State Park
16450 Southeast Federal Highway
Hobe Sound, FL 33455
(407) 744-9814

St. George Island State Park
H.C.R. Box 62
St. George Island, FL 32328
(904) 927-2111

Talbot Islands GEOpark
11435 Ft. George Road East
Fort George, FL 32226
(904) 251-2323

WILDLIFE MANAGEMENT AREA

Cecil Webb Wildlife Management Area
c/o Florida Game and Fresh Water Fish Commission
3900 Drane Field Road
Lakeland, FL 33811
(941) 638-1531 Cecil Webb Wildlife Management Area office
(941) 648-3205 Lakeland office

Water Management Districts

Northwest Florida Water Management District
Route 1 Box 3100
Havana, FL 32333
(904) 539-5999

St. Johns River Water Management District
P. O. Box 1429
Palatka, FL 32178-1429
(904) 329-4500

South Florida Water Management District
Natural Resource Management Division
P. O. Box 24680
3301 Gun Club Road
West Palm Beach, FL 33416
(407) 686-8800

Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609-6899
(904) 796-7211

Suwannee River Water Management District
US 90 & Hwy 49
Route 3 Box 64
Live Oak, FL 32060
(904) 362-1001

National Parks - Refuge

National Key Deer Refuge
P. O. Box 430510
Big Pine Key, FL 33043-0510
(305) 872-2239

Naval Live Oaks Area
National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, FL 32561
(904) 934-2600

St. Marks National Wildlife Refuge
P. O. Box 68
St. Marks, FL 22355
(904) 925-6121

Index

A

"A" Test 31, 32
aerobic respiration 22, 23
algal mats 16, 17, 60, 132, 169
altered sites 1, 34, 35, 97
anaerobic soil conditions 2, 10, 14, 36, 60, 164, 165
anoxia 23, 25, 169
aquatic
  fauna 21, 169
  mosses 17, 169
  plants 9, 12, 13, 18, 19, 31, 163, 164, 169
areal extent 28, 107, 165, 167
Argiaquolls 33, 166
artificial lakes 170
artificial water bodies 170
  artificial lakes 170
  borrow pits 170
  canals 170
  ditches 170
aufwuchs 16, 19, 132, 169

B

"B" Test 31, 32
bayheads 2, 36, 125, 126, 128, 138, 165
bogs 2, 36, 53, 165
borrow pits 170
bryophytes 17, 18
buttressing of tree bases 23, 24, 26, 156

C

"C" Test 32, 33
canals 170
crayfish 21, 22, 47, 48
created wetlands 165, 166, 170, 172
cypress domes 2, 36, 53, 54, 57, 138, 165
cypress knees 23

D

"D" Test 34
definitions of
  canopy 164
  diameter breast height (DBH) 164
  facultative plants 164
  facultative wet plants 164
  ground cover 164
  ground truthing 164
  hydric soil 164
  hydric soil indicators 164
  hydrologic data 169. *See also* hydrologic data
  improved pasture 32
  inundation 164. *See also* inundation
  morphological plant adaptations 169. *See also* morphological plant adaptations
  obligate plants 164
  pine flatwoods 32
  regulating agency 164
  riverwash 164
  saturation 164
  seasonal high water 164
  secondary flow channels 169
  sediment deposition 169
  subcanopy 164
  upland plants 164
  vegetated tussocks or hummocks 169
  water marks 169
  wetlands 1-2, 164
depressional mapping unit 3, 33, 34, 47, 79, 83, 132, 166
depressional marsh 77, 78, 83
ditches 112, 170
drift line 19, 20, 169

E

edaphic 5
emergent aquatics 10
exemptions 39, 40, 171, 172, 173

F

Folists 33, 112, 115, 166
frequently flooded 3, 72, 166

G

ground water 1, 36, 48, 53, 126, 138, 156, 164

H

Histosols 33, 166
Humaquepts 33, 166
hummocks 21, 25, 26, 156
Hydraquents 33, 166
hydric adventitious roots 22, 23, 83, 138, 156
hydric hammock 2, 6, 25, 26, 66, 77
hydrologic data 22, 34, 35, 37, 168, 170
hydropattern 5, 6, 37
hypertrophied lenticels 22, 23

I

impoundments 171-173
improved pasture 32, 96, 166
introduced plants 12, 13, 120
inundation 3, 5, 6, 9, 10, 13, 14, 16, 17, 19, 20-22, 23, 26, 35, 47, 48, 66, 79, 80, 85, 99, 107, 156, 163, 165, 166, 168-170
isolated wetlands 171, 172

L

lenticels 23
lichens 20, 21, 26, 96, 97, 169
  lines 20, 21, 26, 138, 169
littoral 10
liverworts 17, 18, 26, 169

M

mangrove swamp 2, 36, 112, 117, 120, 122, 123, 165
mapping units 33, 34
  depressional 33, 47, 79, 83, 166. *See also* depressional mapping unit
  frequently flooded 33, 72. *See also* frequently flooded mapping unit
  hydric 3, 166
  very wet 3
marl 15, 16, 112, 114, 115
mean high water line (MHWL) 36, 37, 148, 170
mitigation 59, 172
morphological plant adaptations 22, 23, 169
  buttressing of tree bases 23, 24, 26, 156
  cypress knees 23
  hydric adventitious roots 22, 23, 83, 138, 156
  hypertrophied lenticels 22, 23
  prop-roots 24
mosquito control 40, 173

N

non-wetland 21, 36-38, 165
nonsoil 165, 166

O

ordinary high water line (OHWL) 36-38, 99, 170
Outstanding Florida Waters 172, 173

P

prop-roots 24
plant taxonomy 168

R

rafted debris 19, 20, 156, 169
reasonable scientific judgement, application of 2, 12
reservoirs 171-173
reticulated communities 32, 79, 80, 83
riverine swamps 2, 17, 21, 36, 95, 165
riverwash 10, 31
rock outcrop-soil complex 165, 166

S

saline sands 33, 166
salt flats 166
salt marsh 20, 65, 66, 105, 145-148
sediment deposition 23, 25, 26
seepage slopes 71, 72, 73, 132, 153, 156, 165
sloughs 9, 14, 17, 36, 45, 46, 48, 59, 60, 117, 125, 126, 165, 170
soil classification 33
soil taxonomy 33, 166
  family 33
  great group 33
  order 33
  series 33

subgroup 33
suborder 33
stormwater treatment 39, 171, 172
Sulfaquents 33, 166
sulfidic odor 14, 34, 150
surface waters 1, 5, 8, 9, 10, 13, 16, 19, 36-38, 39, 48, 72, 99, 145, 148, 156, 163, 164, 169, 170, 172, 173
surface water bodies
Atlantic Ocean 170
Gulf of Mexico 170
bays 170
bayous 170
branches 170
creeks 170
estuaries 170
impoundments 170
lagoons 170
lakes 170
ponds 170
rivers 170
sloughs 170
sounds 170
springs 170
streams 170
tributaries 170

T

taxonomy
plant 168
soil 33, 166
tidal flats 166

U

Umbraqualfs 33, 166
Umbraquults 33, 166
undrained conditions 3, 5

V

vegetated hummocks 25
vegetated tussocks 21, 25, 169
vegetative index 12, 13, 14, 96. *See also* Appendix B: The Vegetative Index 175
vines 9, 12, 13, 31, 164

W

wastewater treatment 39, 171
appurtenant works 173
impoundments 171-173
reservoirs 171-173
works 171-173
water marks 16, 23, 26, 156
water stain 26
wet prairies 2, 32, 36, 60
wetland permitting 39, 172, 173
wetlands
created 165, 166, 170, 172
definition 1-2, 164
isolated 171, 172
non-wetland 21, 36-38, 165
works, wastewater treatment 171-173



DEPARTMENT OF ENVIRONMENTAL PROTECTION
FLORIDA

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
EST 1973

ST. JOHNS RIVER
SJR

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
PROTECTOR OF THE EVERGLADES SINCE 1949

SOUTHWEST FLORIDA
WATER MANAGEMENT DISTRICT

SUWANNEE
RIVER
WATER MANAGEMENT DISTRICT

APPENDIX E
Aviation Activity Forecast Tables

Introduction

Sebastian Municipal Airport (X26) exclusively supports general aviation operations, thus the following forecasts were developed:

- Aircraft Annual Operational Demand by Type
- Local and Itinerant Operational Demand
- Based Aircraft Demand
- Based Aircraft Fleet Mix
- On-Demand Air Taxi Enplanement Forecasts
- Total Aircraft Fleet Mix, and
- Critical Aircraft Demand.

Some historical information was available from 2016, but was limited. Therefore, as recommended by FAA in the forecasting guidance, on-site inventory was performed to determine FY 2017 operations and based aircraft needs. Onsite inventories were performed in mid-January 2017 and again in mid-April, 2017. According to the Sponsor and airport tenants/users, April is historically the peak month for aircraft operations. On-site survey data for the weeks January 16-22 and April 10-16 are provided in **Table E-1**.

TABLE E-1
2017 ON-SITE SURVEY OF ACTIVITY

Month and Day	Total Operations	Touch and Go Operations	Notes
Monday January 16	178	126	
Tuesday January 17	184	142	
Wednesday January 18*	114	86	
Thursday, January 19	118	84	
Friday, January 20	139	72	Smoke in the Area - Heavy at Times AM-PM (Noticed Reduced Traffic)
Saturday, January 21	81	21	Heavy Fog (early Morning till around 9am) in the Area
Sunday, January 22	0	0	No Touch and Go Allowed;

TABLE E-1 2017 ON-SITE SURVEY OF ACTIVITY			
Month and Day	**Total Operations**	**Touch and Go Operations**	**Notes**
			High Wind (20-30mph), cloudy and T-Storms - No Activity
Week Total	814	531	**65%** average touch and go traffic to total operations
Monday, April 10	111	58	
Tuesday, April 11	216	108	
Wednesday, April 12*	230	115	
Thursday, April 13	195	97	
Friday, April 14	152	76	
Saturday, April 15	101	51	
Sunday, April 16	0	0	Storms in the area
Week Total	1005	505	**59.7%** average touch and go traffic to total operations
**Wednesday, January 18 and April 12, team stayed into the evening hours to inventory any night operations.* *Source: On-site survey of actual operations, December and April 2017*			

From this information as well as other data, a baseline of aircraft operations and local aircraft was determined. **Table E-2** outlines the baseline by month. Note, touch and go operations identified were part of flight training operations. Partial operational data for the month of May was obtained from the Sponsor who worked with the consultant on developing an initial tracking system. Operational data for the months of June through September were based upon historical data and current activity trends

TABLE E-2 FY 2017 BASELINE OPERATIONAL DATA						
Month	**Total Operations**	**Flight Training**	**Touch and Go Flight Training**	**Skydiving**	**Air Taxi**	**GA-Other**
October 2016	4028	2,981	2,739	161	153	733
November 2016	3898	2,962	2,246	156	175	605
December 2016	3605	2,704	1,616	376	178	347
January 2017*	3605	2,560	2,352	372	177	496
February 2017	3256	2,426	2,229	326	153	352
March 2017	4028	3,061	2,321	161	141	665
April 2017*	4307	3,380	2,020	168	129	630
May 2017	3898	2,729	1,631	78	140	951
June 2017	3898	2,729	2,069	78	153	938
July 2017	4028	2,860	2,168	209	150	810
Est. August 2017	4028	2,860	2,168	81	140	948
Est. September 2017	3898	2,807	2,579	203	90	799
Est. October 2017	4028	2,981	2,739	161	153	733
Est. November 2017	3898	2,962	2,246	156	175	605
Est. December 2017	3605	2,704	1,616	376	178	347
Total 2017	46,477	34,057	26,137	2,368	1,779	8,273
% of Total		73%	56%	5%	4%	18%
** Months where actual on-site inventory occurred*						
Sources: City of Sebastian, On-site inventory, user information, and management data						

Based aircraft at X26 was provided by airport management during their Spring quarterly lease inventory, the active number and type (i.e. Single engine, multi engine, etc.) for FY 2017 was established. **Table F-3** illustrates the current based aircraft demand.

TABLE E-3 FY 2017 BASED AIRCRAFT	
Type of Aircraft	**Based Aircraft**
Single Engine Piston (SEP)	42
Multi-Engine Piston (MEP)	4
Turboprop (TP)	3
Jet	0
Rotorcraft (Helicopter)	0
Experimental	0
Light Sport	3
Other*	5
Total Based Aircraft	**59**
Source: Airport Management On-site inventory and updated 5010, June 2017	

A recent system wide forecast for the State of Florida (FDOT State Aviation System Plan, 2015-2034) predicted an average annual growth rate of 1.85 percent over the twenty year planning period. The average annual growth rate predicted using the averages of other predictive forecasts averaged 1.33 percent. Based upon discussions with existing users and regulatory agencies along trends and additional demand, the 1.85 average annual percent provides a more realistic forecast of likely demand at X26 through the 10+ planning period.

This growth is further supported based upon the updated Airport CIP, discussions with the sponsor, tenant plans and users, as well as current demand by interested parties, experimental based aircraft are expected to increase annually by a minimum of 3 and light sport by 2 aircraft annually. This data is based specifically on existing airport tenant short and long-term business plans, and is further supported by FAA Aviation Aerospace Forecasts associated with anticipated light sport and experimental aircraft demand. Opportunities for experimental type aircraft are anticipated to explode due to new technology and demand. Therefore, the City and the Airport management are in the process of developing an aggressive marketing plan to attract this type of demand to X26.

Detailed historical and forecast data associated with annual aircraft operations, based aircraft, fleet mix, air taxi, local and itinerant operations, etc. are provided in the following tables. This appendix provides additional support for data summarized in **Chapter 3**, *Aviation Activity Forecasts.*

Based Aircraft Forecast

TABLE E-4 DETAILED BASED AIRCRAFT FORECAST									
Year	2017 TAF	Historical Trend	FASP	AMP 2000	FAD Growth	Trend VRB	Florida TAF Based AC Exponential	Share of Treasure Coast	Suggested Based Aircraft Forecast
2007	52	52	66	51	52	52	52	52	52
2008	52	52	66	53	52	52	52	52	52
2009	41	41	66	54	41	41	41	41	41
2010	39	39	66	56	39	39	39	39	39
2011	40	40	66	57	40	40	40	40	40
2012	42	42	66	59	42	42	42	42	42
2013	42	42	40	61	42	42	42	42	42
2014	40	40	36	63	40	40	40	40	40
2015	40	38	37	64	38	38	38	38	38
2016	40	62	38	66	62	62	62	62	62
2017	**40**	78	**38**	**68**	**59**	**59**	**59**	**59**	**59**
Forecast									
2018	40	57	39	70	60	60	60	45	73
2019	40	58	40	72	62	61	61	46	76
2020	40	60	41	75	63	62	61	46	77
2021	40	61	42	77	64	63	62	47	78
2022	**40**	**63**	**43**	**79**	**66**	**64**	**63**	**48**	**80**
2023	40	64	44	81	67	65	64	49	81
2024	40	66	45	84	69	65	65	49	82
2025	40	67	46	86	70	66	66	50	84
2026	40	69	47	89	72	67	66	51	85
2027	**40**	**70**	**48**	**91**	**73**	**68**	**67**	**52**	**86**

TABLE E-4 DETAILED BASED AIRCRAFT FORECAST									
Year	2017 TAF	Historical Trend	FASP	AMP 2000	FAD Growth	Trend VRB	Florida TAF Based AC Exponential	Share of Treasure Coast	Suggested Based Aircraft Forecast
2028	40	72	49	94	75	69	68	53	88
2029	40	73	50	97	77	71	69	53	89
2030	40	75	51	100	78	72	70	54	90
2031	40	76	53	103	80	73	71	55	92
2032	**40**	**78**	**54**	**106**	**82**	**74**	**72**	**56**	**93**
2033	40	79	55	109	84	75	73	57	95
2034	40	81	56	112	85	76	74	58	96
2035	40	82	57	115	87	77	75	58	98
2036	40	84	59	119	89	78	76	59	99
2037	**40**	**85**	**60**	**122**	**91**	**79**	**77**	**60**	**101**
AACR 2017-37	0.00%	0.43%	2.20%	2.96%	2.20%	1.50%	1.33%	0.11%	2.72%*

*Notes: *Considers average annual growth of 1.33% as well as average increase per year of 5 experimental and light sport aircraft.*
Sources: 2017 X26 and Florida Terminal Area Forecasts, 2016/17 Sponsor Survey, User and Tenant meetings and survey, Florida Department of Transportation Aviation System Plan and Aviation Database, 2000 Master Plan Update, and TKDA

Based aircraft are expected to expand exponentially with additional hangar facilities since the airport's fees are one of the lowest in the region.

Based Aircraft Fleet Mix

The based aircraft fleet mix is critical in determining apron spacing and hangar sizing requirements in addition to other airfield needs including runway length and width, taxiway and taxilane widths, and aircraft fuel needs. The based aircraft fleet mix was developed using historical data as well as applying FAA Aerospace Forecasts of aircraft demand through 2036 (Table 28, Active GA and Air Taxi Aircraft). Growth of both light sport aircraft and turbojet aircraft are expected to become a larger part of the national fleet. However, due to Sebastian Airport's physical

location as well as its role within the Treasure Coast Region, based jet aircraft is not anticipated until far into the future. The addition of potential jet aircraft in the late years of the forecast is based upon the hope that new noise and aircraft avionic technology combined with very light jets may allow ultimately allow the use of jet aircraft at X26.

Table E-5
BASED AIRCRAFT FLEET MIX

Year	SEP	%	MEP	%	TP	%	Jet	%	Helicopter	%	Light Sport	%	Other	%	Total	Total W/O Other*
2015	31	82%	2	5%	2	5%	1	2.6%	0	0%	0	0%	2	5%	38	36
2016	31	82%	2	5%	2	5%	1	2.6%	0	0.0%	0	0%	2	5%	38	36
2017	42	71%	4	7%	3	5%	0	0.0%	0	0.0%	3	5%	7	12%	59	49
2018	53	72%	4	5%	3	4%	0	0.0%	1	1.4%	5	7%	7	10%	73	61
2019	55	73%	4	5%	3	4%	0	0.0%	1	1.3%	5	7%	7	9%	76	64
2020	54	70%	4	5%	3	4%	0	0.0%	1	1.4%	8	10%	7	9%	77	63
2021	**55**	**70%**	**3**	**4%**	**3**	**4%**	**1**	**1.3%**	**1**	**1.4%**	**8**	**10%**	**7**	**9%**	**78**	**63**
2022	56	70%	3	4%	3	4%	1	1.3%	1	1.4%	8	10%	7	9%	80	64
2023	57	70%	3	4%	3	4%	1	1.2%	1	1.4%	9	11%	7	9%	81	65
2024	58	70%	3	4%	3	4%	1	1.2%	1	1.4%	9	11%	7	9%	82	66
2025	58	70%	3	4%	4	4%	1	1.2%	1	1.4%	9	11%	7	8%	84	67
2026	57	67%	3	4%	4	4%	1	1.2%	1	1.4%	12	14%	7	8%	85	66
2027	**59**	**68%**	**2**	**2%**	**4**	**4%**	**1**	**1.2%**	**1**	**1.4%**	**12**	**14%**	**7**	**8%**	**86**	**67**
2028	60	68%	2	2%	4	4%	1	1.1%	1	1.4%	13	15%	7	8%	88	68
2029	62	70%	0	0%	4	4%	1	1.1%	1	1.4%	14	15%	7	8%	89	68
2030	63	70%	0	0%	4	4%	1	1.1%	1	1.4%	14	16%	7	8%	90	69
2031	63	69%	0	0%	4	4%	1	1.1%	1	1.4%	16	17%	7	8%	92	69
2032	**63**	**68%**	**0**	**0%**	**4**	**4%**	**1**	**1.1%**	**1**	**1.5%**	**17**	**18%**	**7**	**8%**	**93**	**70**
2033	63	66%	0	0%	4	4%	1	1.1%	1	1.5%	18	19%	7	7%	95	70

Table E-5 BASED AIRCRAFT FLEET MIX																
Year	SEP	%	MEP	%	TP	%	Jet	%	Helicopter	%	Light Sport	%	Other	%	Total	Total W/O Other*
2034	63	65%	0	0%	4	4%	1	1.0%	1	1.5%	20	21%	7	7%	96	69
2035	63	64%	0	0%	4	4%	1	1.0%	1	1.5%	21	21%	7	7%	98	70
2036	63	63%	0	0%	4	4%	1	1.0%	1	1.5%	23	23%	7	7%	99	69
2037	**63**	**62%**	**0**	**0%**	**4**	**4%**	**1**	**1.0%**	**2**	**1.5%**	**24**	**24%**	**7**	**7%**	**101**	**70**

Operational Demand

Operations consist of both local and itinerant operations. Local operations primarily are associated with aircraft that stay within the immediate airspace or vicinity of the airport, such as touch and go operations. Itinerant operations operate beyond the airport 20 nm airspace radius. Operational demand drives both airfield and landside airport needs as well as airspace and airfield capacity. Airports with a high percentage of training operations may lower an airport's overall capacity, thus causing potential delays. Airport capacity and facility needs based upon forecast operations and critical aircraft demand is discussed in detail in **Chapter 4**, *Airport Demand Capacity and Facility Needs*.

As noted in Chapter 3, Aviation Activity Forecasts, a variety of forecast methodologies as well as existing forecasts were used to determine likely demand. These forecasts as well as the preferred operational demand forecast for X26 is provided in **Table E-6**.

According to FAA and interviews with on-site tenants, the airport supports limited on-demand air taxi operations. Recently, there was an uptick in sight-seeing operations in and around the Sebastian area due to its location near the Atlantic Ocean and several nature preserves. Sight-seeing operations could include a combination of gliders, small piston aircraft, as well as helicopters. Forecasts of on-demand air taxi operations and anticipated passenger demand is provided in **Table E-7**.

TABLE E-6
OPERATIONAL FORECAST

Items in red were extrapolated from key years

Year	2000 AMP	2017 TAF	FASP Forecast	FAD Forecast	2016/2017 Historical Trend Data	Growth rate based upon FASP	Share Analysis	Comparison Airports	FAA Trend Forecast	OPBA	Composite	Preferred Forecast
Historical												
2015	40,285	37,240	37929	40,815	40,815	37,929	40,815	40,815	40,815	37,240		40,815
2016	41,453	37,240	38,631	41,570	41,570	41,570	41,570	41,570	41,570	41,570		41,570
2017	**42,655**	**37,240**	**39,345**	**42,339**	**44,403**	**44,403**	**44,403**	**44,403**	**44,403**	**44,403**		**44,403**
Forecast												
2018	43,893	37,240	40,073	43,122	45,224	45,224	42,808	42,615	44,828	64,638	45,031	45,313
2019	45,165	37,240	40,815	43,920	46,061	46,061	43,441	43,148	45,257	67,295	45,906	46,242
2020	46,475	37,240	41,570	44,732	44,732	46,913	44,084	43,687	45,689	68,366	46,415	47,190
2021	47,823	37,240	42,339	45,560	45,560	47,781	44,737	44,234	46,127	69,455	47,150	48,157
2022	49,210	37,240	43,122	46,403	46,403	48,665	45,400	44,786	46,568	70,560	47,898	48,983
2023	50,637	37,240	43,920	47,261	47,261	49,565	46,073	45,346	47,013	71,684	48,658	49,823
2024	52,106	37,240	44,732	48,135	48,135	50,482	46,757	45,913	47,463	72,825	49,430	50,677
2025	53,617	37,240	45,560	49,026	49,026	51,416	47,451	46,487	47,917	73,984	50,216	51,546
2026	55,172	37,240	46,403	49,933	49,933	52,367	48,155	47,068	48,475	75,162	51,026	52,430
2027	56,772	37,240	47,261	50,857	50,857	53,336	48,871	47,657	49,040	76,359	51,849	53,316
2028	58,418	37,240	48,135	51,798	51,798	54,323	49,598	48,252	49,611	77,575	52,686	54,217
2029	60,112	37,240	49,026	52,756	52,756	55,328	50,336	48,855	50,189	78,810	53,537	55,133
2030	61,856	37,240	49,933	53,732	53,732	56,351	51,085	49,466	50,773	80,064	54,404	56,065
2031	63,649	37,240	50,857	54,473	54,473	57,394	51,846	50,084	51,364	81,339	55,260	57,013
2032	65,495	37,240	51,797	55,224	55,224	58,456	52,619	50,710	51,963	82,634	56,130	57,959
2033	67,395	37,240	52,756	55,985	55,985	59,537	53,404	51,344	52,568	83,950	57,016	58,921
2034	69,349	37,240	53,732	56,757	56,757	60,638	54,200	51,986	53,180	85,286	57,916	59,899

2035	71,360	37,240	54,726	57,540	57,540	61,760	55,010	52,636	53,800	86,644	58,832	60,893
2036	73,430	37,240	55,738	58,333	58,333	62,903	55,832	53,294	54,426	88,023	59,764	61,903
2037	75,559	37,240	56,770	59,138	59,138	64,066	56,666	53,960	55,060	89,425	60,712	62,930
Sources: FAA TAF 2017, FDOT FASP and FAD, FAA Aerospace Forecasts 2016-36, Sponsor and on-site historical data, Treasure Coast Airport operational forecasts, and TKDA												

As noted, local operational activity at X26 consists of pilot training, skydiving, and aircraft manufacturer flight testing. Itinerant operations are primarily on-demand air taxi, business and personal/recreational use. A breakdown of aircraft fleet mix is provided in **Table E-7** and local and itinerant operations breakdown is provided in **Table E-8**.

TABLE E-7
AIR TAXI OPERATIONS AND PASSENGER ENPLANEMENTS

Note: On average, on-demand air taxi operations statewide represent 7% of total Statewide operations.
Note: Air Taxi Aircraft seat capacity ranged from 2 to 6

Fiscal Year	Total Operations	Air Taxi Ops*	% of Total Ops	Estimated Enplanements	Enplanements Per Operation	Avg. Estimated Seats
2015	40,815	1,000	2.45%	No data	No data	No data
2016	41,570	1,000	2.41%	No data	No data	No data
2017	**44,403**	1,779	4.01%	3,598	2	3
2018	45,313	1,852	4.09%	3,822	2	3
2019	46,242	1,929	4.17%	4,059	2	3
2020	47,190	2,009	4.26%	4,310	2	3
2021	48,157	2,092	4.34%	4,578	2	3
2022	48,983	2,171	4.43%	4,846	2	3
2023	49,823	2,253	4.52%	5,130	2	3
2024	50,677	2,339	4.61%	5,430	2	3
2025	51,546	2,427	4.71%	5,748	2	3
2026	52,430	2,519	4.80%	6,085	2	3
2027	53,316	2,614	4.90%	6,439	2	3
2028	54,217	2,712	5.00%	6,815	3	5
2029	55,133	2,815	5.11%	7,212	3	5
2030	56,065	2,921	5.21%	7,632	3	5
2031	57,013	3,030	5.32%	8,077	3	5
2032	57,959	3,144	5.42%	8,546	3	5
2033	58,921	3,261	5.53%	9,041	3	5
2034	59,899	3,383	5.65%	9,565	3	5
2035	60,893	3,509	5.76%	10,120	3	6
2036	61,903	4,333	7.00%	15,401	3	6
2037	62,930	3,776	6.00%	13,443	3	6

Sources: [1]2017 FAA TAF; [2]TKDA Survey; Sponsor data; FAA Aerospace Forecasts and 2017 FAA TAF Air Taxi estimates

TABLE E-8 TOTAL AIRCRAFT FLEET MIX FORECAST															
Fiscal Year	SEP	%	MEP	%	TP	%	Jet	%	Rotor	%	Light Sport	%	Other	%	Total
2017	**33,737**	**75.98%**	**2,348**	**5.29%**	**3,234**	**7.28%**	**0.00**	**0.00%**	**26**	**0.06%**	**4,638**	**10.45%**	**420**	**0.95%**	**44,403**
2018	34,308	75.71%	2,372	5.24%	3,366	7.43%	0.00	0.00%	27	0.06%	4,820	10.64%	420	0.94%	45,313
2019	34,885	75.44%	2,397	5.18%	3,504	7.58%	0.00	0.00%	29	0.06%	5,007	10.83%	420	0.94%	46,242
2020	35,472	75.17%	2,421	5.13%	3,647	7.73%	0.00	0.00%	30	0.06%	5,200	11.02%	420	0.94%	47,190
2021	36,051	74.86%	2,446	5.08%	3,796	7.88%	14.00	0.03%	32	0.07%	5,398	11.21%	420	0.94%	48,157
2022	**36,673**	**74.87%**	**2,463**	**5.03%**	**3,939**	**8.04%**	**14.43**	**0.03%**	**33**	**0.07%**	**5,441**	**11.11%**	**420**	**0.94%**	**48,983**
2023	37,304	74.87%	2,480	4.98%	4,086	8.20%	14.87	0.03%	35	0.07%	5,483	11.00%	420	0.94%	49,823
2024	37,943	74.87%	2,498	4.93%	4,239	8.37%	15.33	0.03%	36	0.07%	5,525	10.90%	420	0.93%	50,677
2025	38,593	74.87%	2,515	4.88%	4,398	8.53%	15.80	0.03%	38	0.07%	5,566	10.80%	420	0.93%	51,546
2026	39,251	74.86%	2,533	4.83%	4,563	8.70%	16.28	0.03%	40	0.08%	5,607	10.69%	420	0.93%	52,430
2027	**39,919**	**74.87%**	**2,550**	**4.78%**	**4,733**	**8.88%**	**16.78**	**0.03%**	**42**	**0.08%**	**5,635**	**10.57%**	**420**	**0.93%**	**53,316**
2028	40,597	74.88%	2,567	4.73%	4,909	9.05%	17.29	0.03%	44	0.08%	5,662	10.44%	420	0.93%	54,217
2029	41,286	74.88%	2,584	4.69%	5,092	9.24%	17.82	0.03%	46	0.08%	5,687	10.32%	420	0.93%	55,133
2030	41,983	74.88%	2,602	4.64%	5,282	9.42%	18.36	0.03%	48	0.09%	5,712	10.19%	420	0.92%	56,065
2031	42,691	74.88%	2,619	4.59%	5,478	9.61%	18.92	0.03%	50	0.09%	5,736	10.06%	420	0.92%	57,013
2032	**43,408**	**74.89%**	**2,636**	**4.55%**	**5,680**	**9.80%**	**19.49**	**0.03%**	**53**	**0.09%**	**5,742**	**9.91%**	**420**	**0.92%**	**57,959**
2033	44,138	74.91%	2,653	4.50%	5,890	10.00%	20.08	0.03%	55	0.09%	5,745	9.75%	420	0.92%	58,921
2034	44,876	74.92%	2,670	4.46%	6,108	10.20%	20.68	0.03%	58	0.10%	5,747	9.59%	420	0.92%	59,899
2035	45,624	74.92%	2,687	4.41%	6,333	10.40%	21.30	0.03%	61	0.10%	5,747	9.44%	420	0.92%	60,893
2036	46,382	74.93%	2,704	4.37%	6,567	10.61%	21.95	0.04%	64	0.10%	5,745	9.28%	420	0.91%	61,903
2037	**47,149**	**74.92%**	**2722**	**4.33%**	**6,809**	**10.82%**	**22.61**	**0.04%**	**67**	**0.11%**	**5,740**	**9.12%**	**420**	**0.91%**	**62,930**
Sources: FAA Aerospace Forecasts 2016-36, Sponsor and On-site survey and historical data, and TKDA															

Fleet mix breakdown was based upon a combination of historical and current operational data, regional traffic demand and 2016-36 FAA Forecasts of GA and Air Taxi Hourly Demand (Table 29).

The FAA TAF does not record operational and based aircraft activity associated with "Other" (i.e. experimental, light sport, gliders, ultralights, etc.) type of aircraft operations. Therefore, as part of this analysis, operational demand was shown both with and without "Other" aircraft operations. Although not included in the TAF, these operations due impact an airport's infrastructure needs and airspace/airfield capacity. Therefore, "Other" aircraft activity will be included throughout the rest of the master plan process.

TABLE E-9
LOCAL AND ITINERANT OPERATIONAL FORECAST

	Itinerant				Local					
Year	On-Demand Air Taxi	GA	Military	Total	Civil	Military	Total	Total Operations	Other Operations*	Total w/o Other*
2016	1,000	24,000	-	25,000	16,570	-	16,570	41,570	2,939	38,631
2017	**1,779**	**14,650**	**-**	**16,429**	**27,974**	**-**	**27,974**	**44,403**	**5,058**	**39,345**
2018	1,852	14,702	-	16,555	28,758	-	28,758	45,313	5,240	40,073
2019	1,929	14,748	-	16,677	29,565	-	29,565	46,242	5,427	40,815
2020	2,009	14,787	-	16,796	30,394	-	30,394	47,190	5,620	41,570
2021	2,092	14,819	-	16,911	31,246	-	31,246	48,157	5,818	42,339
2022	**2,171**	**14,795**	**-**	**16,966**	**32,017**	**-**	**32,017**	**48,983**	**5,861**	**43,122**
2023	2,253	14,763	-	17,016	32,807	-	32,807	49,823	5,903	43,920
2024	2,339	14,722	-	17,061	33,616	-	33,616	50,677	5,945	44,732
2025	2,427	14,674	-	17,101	34,445	-	34,445	51,546	5,986	45,560
2026	2,519	14,616	-	17,135	35,295	-	35,295	52,430	6,027	46,403
2027	**2,614**	**14,545**	**-**	**17,159**	**36,157**	**-**	**36,157**	**53,316**	**6,055**	**47,261**
2028	2,712	14,465	-	17,177	37,040	-	37,040	54,217	6,082	48,135
2029	2,815	14,375	-	17,189	37,944	-	37,944	55,133	6,107	49,026
2030	2,921	14,274	-	17,194	38,871	-	38,871	56,065	6,132	49,933
2031	3,030	14,162	-	17,193	39,820	-	39,820	57,013	6,156	50,857
2032	**3,144**	**14,035**	**-**	**17,179**	**40,780**	**-**	**40,780**	**57,959**	**6,162**	**51,797**

2033	3,261	13,897	-	17,158	41,763	-	41,763	58,921	6,165	52,756
2034	3,383	13,746	-	17,128	42,771	-	42,771	59,899	6,167	53,732
2035	3,509	13,582	-	17,091	43,802	-	43,802	60,893	6,167	54,726
2036	4,333	12,712	-	17,045	44,858	-	44,858	61,903	6,165	55,738
2037*	**3,776**	**13,215**	**-**	**16,991**	**45,939**	**-**	**45,939**	**62,930**	**6,160**	**56,770**

*Note: *Decrease in Air Taxi operations associated with larger aircraft and load factors*
Sources: Airport historical data, 2017 X26 TAF, Regional Airport information, FDOT SASP, and TKDA

Derivative Forecasts

Once preferred forecasts were selected for total operations and based aircraft, several derivative forecasts may be developed including peak period demand, instrument/visual operations, day and night operations, fuel flowage demand, auto parking, and touch and go operations. Each of these forecasts plays an important role in determining airport facility requirements during the 20-year planning period.

Peak Period Demand

Peak period data is used to determine monthly, daily and hourly peak operations in order to determine aircraft parking needs, fuel flowage demand, potential user terminal demand, auto parking requirements, etc. This information is also used to identify some direct and indirect economic impacts that the Airport provides to the local community. Discussions with tenants and the sponsor noted that the heaviest peak month for aircraft operations was April. **Table E-10** illustrates existing and forecast peak period demand at X26.

TABLE E-10
PEAK PERIOD DEMAND

		10.50%		18%		
Year	Total Operations	Peak Month	Average Day Peak Month	Peak Hour	Peak Hour Itinerant	Peak Hour Local
2016	41,570	3,828	128	15	9	6
2017	**44,403**	**4,089**	**136**	**16**	**6**	**10**
2018	45,313	4,173	139	16	6	10
2019	46,242	4,258	142	17	6	11
2020	47,190	4,345	145	17	6	11
2021	48,157	4,434	148	17	6	11
2022	**48,983**	**4,511**	**150**	**18**	**6**	**12**
2023	49,823	4,588	153	18	6	12
2024	50,677	4,667	156	18	6	12
2025	51,546	4,747	158	19	6	13
2026	52,430	4,828	161	19	6	13
2027	**53,316**	**4,910**	**164**	**19**	**6**	**13**
2028	54,217	4,992	166	20	6	14
2029	55,133	5,077	169	20	6	14
2030	56,065	5,163	172	20	6	14
2031	57,013	5,250	175	21	6	15
2032	**57,959**	**5,337**	**178**	**21**	**6**	**15**
2033	58,921	5,426	181	21	6	15
2034	59,899	5,516	184	22	6	16
2035	60,893	5,607	187	22	6	16
2036	61,903	5,700	190	22	6	16
2037	**62,930**	**5,795**	**193**	**23**	**6**	**17**

Sources: On-site survey, airport historical data, and TKDA 2017

Instrument/Visual Operations and Day/Night Forecasts

According to FAA's Instrument Flying Handbook, instrument flight rules are defined as "Rules and regulations established by the FAA to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments …, and navigation is accomplished by reference to electronic signals." Sebastian Airport's Runways 5 and 23 are equipped with RNAV/GPS instrument approach procedures which allow aircraft to utilize the runways if visibility is equal to or greater than 1-statute mile. Further, only Runways 5 and 23 are equipped with low intensity edge lights and 2-light PAPIs which are available at night.

During our first on-site survey, the team noticed that the airport was not used during low light or poor weather conditions. Based upon these observations as well as weather data and the fact that there are other airports in the vicinity with both Air Traffic Control Towers (ATCT) and lower instrument approach minimums, instrument operations at X26 would likely remain extremely limited. It was estimated from our data that at most 1.55% of total operations would be filed under IFR flight conditions as illustrated in **Table E-11**.

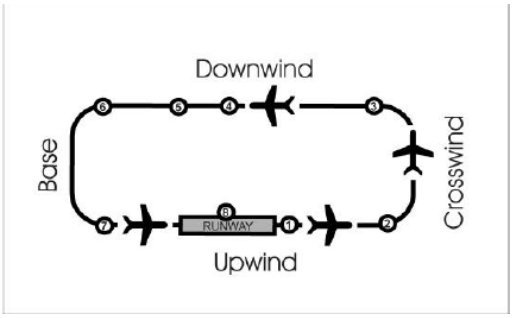
Also based upon our observations and discussions with users, the majority of operations primarily occur during the daytime hours between 0700 to 1900 or 2000 depending upon the time of year. Skydive Sebastian stated that they periodically do night jumps especially during special events, so it was assumed that most of the evening operational traffic would be associated with their operations. A breakdown of anticipated day and night operations is also provided in **Table E-11.**

TABLE E-11 INSTRUMENT AND DAY/NIGHT OPERATIONS						
Year	Total Ops	IFR Conditions (1.55%)	Day Ops	Percent Day	Night Ops	Percent Night
2015	40,815	633	40,743	99.82%	72	0.18%
2016	41,570	644	41,500	99.83%	70	0.17%
2017	**44,403**	**688**	**44,325**	**99.82%**	**78**	**0.16%**
2018	**45,313**	**702**	**45,239**	**99.84%**	**74**	**0.16%**
2019	46,242	717	46,166	99.84%	76	0.16%
2020	47,190	731	47,112	99.84%	78	0.16%
2021	48,157	746	48,078	99.84%	79	0.16%
2022	**48,983**	**759**	**48,902**	**99.83%**	**81**	**0.17%**
2023	49,823	772	49,740	99.83%	83	0.17%
2024	50,677	785	50,592	99.83%	85	0.17%
2025	51,546	799	51,460	99.83%	86	0.17%
2026	52,430	813	52,342	99.83%	88	0.17%
2027	**53,316**	**826**	**53,226**	**99.83%**	**90**	**0.17%**
2028	54,217	840	54,125	99.83%	92	0.17%
2029	55,133	855	55,039	99.83%	94	0.17%
2030	56,065	869	55,969	99.83%	96	0.17%
2031	57,013	884	56,915	99.83%	98	0.17%
2032	**57,959**	**898**	**57,859**	**99.83%**	**100**	**0.17%**
2033	58,921	913	58,819	99.83%	102	0.17%
2034	59,899	928	59,795	99.83%	104	0.17%
2035	60,893	944	60,787	99.83%	106	0.17%
2036	61,903	959	61,794	99.82%	109	0.18%
2037	**62,930**	**975**	**62,819**	**99.82%**	**111**	**0.18%**
Sources: Airport historical data, on-site survey January and April 2017, VRB and MLB ASOS data, and TKDA						

Touch and Go Aircraft Operations

Touch and Go aircraft operations consist of two operations, a landing then immediate takeoff, performed consecutively on a runway. Touch and Go operations are associated with fixed wing aircraft training. Aircraft fly in a circuit flying crosswind, then downwind, then base until final. All of these maneuvers are done with the local airspace and are completed repetitively.

FIGURE E-1
TOUCH AND GO PROCEDURES



Source: Touch and Go Tutorial, http://www.flightadventures.com/misc/fa_pattern_tutorial.pdf

X26 supports extensive flight training operations. During the recent weeklong observations, touch and go procedures performed by Flight Safety International, Paris Air and to a more limited extent by Florida Institute of Technology and Embry-Riddle Aeronautical University represented on average 65 percent of total aircraft operations.

According to numerous industry forecasts, new pilot demand is likely to continue for the next 20+ years. The impetus for this demand, even with the increase in the pilot retirement age of 60 to 65, according to a variety of sources[1] include: fleet growth, pilot retirement, pilot attrition, and pilot loss as a result of career progression. Forecasts of demand predict over 39,000 pilot retirements will likely occur between 2014 and 2024 and approximately 88,500 pilot retirements are anticipated between the periods 2014-2034. Aircraft manufacturers, such as Boeing and Airbus, predict high demand as a result of expanded fleets worldwide. As recently as June 2016, Boeing updated its previous 2015-2035 forecast to show a 10.5 percent increase in pilot demand for the North America and European market. It also predicted over a 12 percent increase over previous levels worldwide.

In addition to manufacturers and industry analysts, Aviation Universities, such as University of North Dakota, Embry-Riddle Aeronautical University, Purdue University, University of Illinois, etc. all predict that demand for new pilots will continue for the next twenty years and have, as a result, all forecast a significant increase in professional pilot training enrollment. Demand for a bachelor's degree in aviation or professional flight is also driven by regulations instituted by the FAA and ICAO regarding pilot training requirements, which initially allow less flight hours to obtain a flight position at a regional airline than without a bachelor's degree.

[1] Boeing 2016-2036 Forecast; Airbus 2015-2035 Forecast; *An Investigation of Pilot Labor Supply, Higgins, Lovelace et al, 2013; United States Bureau Of Labor Statistics, 2015; Aircraft Transport Pilot Association Pilot Outlook, 2013 and the Rand Corporation Forecast of Pilot Demand, 2013.*

Therefore, based upon this demand both nationally and internationally, flight training activity will likely remain a major component of Sebastian Airport's operations. Applying historical and forecast training demand to total forecast operations, resulted in the following estimate of future touch and go operations at X26 during the 20-year planning period.

TABLE E-12
FORECAST TOUCH AND GO OPERATIONS

Year	Total Operations	Percent of Total Operations	Touch and Go Operations
2015	40,815	56%	22,856
2016	41,570	56%	23,279
2017	**44,403**	**59%**	**26,137**
2018	45,313	59%	26,757
2019	46,242	59%	27,393
2020	47,190	59%	28,043
2021	48,157	60%	28,709
2022	**48,983**	**60%**	**29,294**
2023	49,823	60%	29,891
2024	50,677	60%	30,500
2025	51,546	60%	31,121
2026	52,430	61%	31,755
2027	**53,316**	**61%**	**32,395**
2028	54,217	61%	33,047
2029	55,133	61%	33,712
2030	56,065	61%	34,391
2031	57,013	62%	35,083
2032	**57,959**	**62%**	**35,779**
2033	58,921	62%	36,488
2034	59,899	62%	37,212
2035	60,893	62%	37,949
2036	61,903	63%	38,701
2037	62,930	63%	39,468
VRB Pilot Growth Rate		0.32%	

Sources: Airport historical data, on-site survey of operations, discussions with Flight Safety and Paris Air Management, VRB pilot training forecasts, and TKDA 2017

Skydiving Operations

According to the United States Parachute Association, the Southeast United States is the fastest growing skydiving region. Florida is ranked as one of the top skydiving destinations currently supporting 23 drop zones around the state. The most popular skydiving locations in no particular order include: Deland, Panama City, Sebastian and Zephyrhills. Sebastian Skydiving has seen continual growth in their

operations and is looking to expand their facilities to support both national and international demand. The City's construction of a Swoop Pond on the airport in 2016 has been a noticeable attractant. Forecasts were based upon historical growth at the airport and likely demand based upon Skydive Sebastian's business plan. Forecasts of likely skydiving operational demand is provided in **Table E-13**.

TABLE E-13
FORECAST SKYDIVING OPERATIONS

Year	Total Ops	% of Total Operations	Skydiving Ops
2016	41,570	5%	2,000
2017	44,403	5%	2,368
2018	45,313	5%	2,524
2019	46,242	6%	2,690
2020	47,190	6%	2,867
2021	48,157	6%	3,056
2022	48,983	6%	3,247
2023	49,823	7%	3,450
2024	50,677	7%	3,665
2025	51,546	7%	3,893
2026	52,430	8%	4,136
2027	53,316	8%	4,393
2028	54,217	8%	4,666
2029	55,133	9%	4,956
2030	56,065	9%	5,264
2031	57,013	9%	5,591
2032	57,959	10%	5,937
2033	58,921	10%	6,304
2034	59,899	11%	6,694
2035	60,893	11%	7,108
2036	61,903	12%	7,547
2037	62,930	12%	7,552
US Parachute Association Anticipated Average Annual Growth, 2017		4%	

Sources: US Parachute Association, Sebastian Skydiving, and TKDA, 2017

Fuel Flowage Demand

The City of Sebastian and Pilot's Paradise (local Fixed Based Operator (FBO)) provide full service 100 LL service. The City also provides a 100LL self-service station which uses a credit card on the Airport's terminal ramp. Jet A fuel is not sold at the Airport, but is currently only used by Sebastian Skydiving to fuel their DH-6 "Twin Otter" aircraft. Skydive Sebastian has a Jet Fuel tank located on their lease site and do not provide Jet A to any other users or visitors to the airfield.

Fuel storage requirements are typically based upon maintaining at least a two-week supply of fuel during the peak month. However, more frequent deliveries can reduce the fuel storage requirements. Thus, using historical fuel revenue information (**Table E-14**) supplemented with fleet mix and peak monthly demand, the following fuel demand for both 100LL and Jet A were determined as illustrated in **Table E-16**. Currently, 92 percent of all operations at X26 are associated with 100LL, whereas Jet A is approximately 8 percent of total operations. Since the Airport does not sell Jet A fuel, an estimate based upon the type of aircraft operating at the airport was used to estimate gallons per operation. Therefore, 50 gallons per turbine aircraft peak month operations was used to estimate likely Jet A demand.

This is a best guess based upon current conditions; however, there have been concerns regarding the impacts of lead in 100LL on the environment. As a result, alternative fuels are being tested for use in existing and future piston engines. The burn rates of biofuels in piston engines are not yet available, so it cannot be currently calculated what a two week supply may be required. For this reason, we estimated that the gallons forecast for 100LL would equal the replacement biofuel storage needs.

TABLE E-14
HISTORICAL 100LL FUEL DEMAND

Fiscal Year	100LL Fuel Revenues	Gallons	Historical Piston Ops	Est. Ops per Gallon
2014	$49,504.00	11,786.67	18,433.78	1.56
2015	$71,366.00	16,991.90	18,774.77	1.10
2016	$72,000.00	17,142.86	19,122.07	1.12
2017	$75,000.00	17,857.14	21,379.42	1.20
			Average	**1.25**

Sources: City of Sebastian Financial Data, recorded historical fuel and operational data and TKDA, 2017

TABLE E-15
PEAK HOUR DEMAND BY AIRCRAFT TYPE

Year	Peak Month Ops	SEP	MEP	TP	Jet	Helicopter	Experimental	Light Sport	Other
2017	4,089	3,107	216	298	0	2	0	427	39
2018	4,173	3,159	218	310	0	3	0	444	39
2022	4,511	3,377	227	363	1	3	0	501	42
2027	4,910	3,676	235	436	2	4	0	519	46
2032	5,337	3,997	243	523	2	5	0	529	49
2037	5,795	4,342	251	627	2	6	0	529	53

Sources: FAA, FDOT and historical data, user/tenant interviews and TKDA, 2017

TABLE E-16 TWO WEEK AVIATION FUEL FORECAST								
Year	Avgas Sold (Gal per Ops)	Peak Month Ops	Peak Month Fuel	14 Day Peak Fuel	Jet A (Gal per Ops)	Peak Month Ops	Peak Month Fuel	14 Day Fuel
2017	1.25	3,789	4,736	2,431	43	300	12,909	6,627
2018	1.24	3,861	4,773	2,450	44	313	13,605	6,984
2022	1.18	4,148	4,903	2,517	46	367	16,788	8,618
2027	1.12	4,476	5,004	2,569	49	441	21,460	11,016
2032	1.06	4,818	5,094	2,615	52	530	27,396	14,063
2037	1.00	5,174	5,174	2,656	55	635	34,938	17,935

**May not add up due to rounding*
Sources: City of Sebastian, Pilot's Paradise, and Skydive Sebastian fuel usage, aircraft manufacturer data, historical and forecast operational demand, and TKDA 2017

Auto Parking Needs

General aviation automobile parking demand is based upon existing use, city requirements and current industry standards. The parking facilities adjacent to the terminal building include approximately 40 parking spaces including handicapped parking. Several parking lots with at least 30+ parking spaces are available adjacent to each business off of Airport Drive west. There was also automobile parking constructed adjacent to Hangars A and B.

Although some based aircraft owners prefer parking their automobiles in their hangars when flying, FAA and FDOT requires that parking be established adjacent to these facilities to limit potential conflicts within the aircraft movement areas. In addition, on-demand charter and air taxi operators as well as Skydive Sebastian must have surface parking available for both pilots and passengers. Using peak day and hour activity as well as based aircraft demand, **Table E-18** denotes anticipated auto parking needs during the twenty-year planning period. Additional detail and recommendations related to service parking and access is provided throughout the remainder of this document.

TABLE E-17 PEAK HOUR PASSENGER DEMAND FORECAST				
Year	Air Taxi	Itinerant GA[1]	Skydiving[2]	Local GA[3]
2017	2	4	12	-
2018	2	4	12	-
2022	2	4	15	-
2027	2	4	15	1
2032	3	4	18	1
2037	3	4	21	1
Notes: *[1] 1.5 average enplanements* *[2] 6 average enplanements* *[3] 1 average enplanement*				
Sources: User meetings and information, aircraft type and inventory, and TKDA 2017				

TABLE E-18 PEAK AUTO PARKING DEMAND						
Fiscal Year	Employees to peak hour passenger	Peak Tenant Demand	Peak hour Passenger Demand	Peak Hour Parking Space Demand	Handicap Spaces Needed	Peak Hour Parking Area Demand
2017	3.1	55.0	18.0	73.0	3.0	2,920.0
2018	2.9	52.0	18.0	70.0	3.0	2,800.0
2022	2.9	61.0	21.0	82.0	4.0	3,280.0
2027	2.9	64.0	22.0	86.0	4.0	3,440.0
2032	2.9	75.0	26.0	101.0	5.0	4,040.0
2037	2.9	84.0	29.0	113.0	5.0	4,520.0
Sources: City of Sebastian, On-site inventory, forecasts of demand, and TKDA 2017						

Terminal Area Forecast Comparison

Table E-19 presents the comparison of Sebastian Airport forecast data to published data in the 2017 Terminal Area Forecasts. Since the base year (2016) within the TAF differed from the existing conditions by approximately 11 percent and 70%, respectively, an adjusted TAF was also shown. The adjusted TAF represents forecast growth as shown in the 2017 TAF but applied to historical 2016 data.

Again, it is important to note for comparison purposes that the TAF does not publish "Other," experimental, ultralights, gliders, and light sport aircraft, operational or based aircraft data. Therefore, this data was removed from our established forecasts to accurately compare data.

TABLE E-19 TERMINAL AREA OPERATIONAL AND BASED AIRCRAFT COMPARISON DOESN'T INCLUDE LIGHT SPORT AND "OTHER" AIRCRAFT						
	Years	Forecast Activity*	2017 TAF	Percent Difference	Adjusted 2017 TAF	Percent Difference
AIRCRAFT OPERATIONS						
Base Year	2017	39,345	37,240	5.65%	39,345	0.00%
Base yr. +1 yrs.	2018	40,073	37,240	7.61%	39,345	1.85%
Base yr. + 5yrs.	2022	43,122	37,240	15.79%	39,345	9.60%
Base yr. + 10yrs.	2027	47,261	37,240	26.91%	39,345	20.12%
Base yr. + 15yrs.	2032	51,797	37,240	39.09%	39,345	31.65%
Base yr. + 20yrs.	2037	56,770	37,240	52.44%	39,345	44.29%
BASED AIRCRAFT						
Base Year	2017	49	40	23%	49	0%
Base yr. +1 yrs.	2018	61	40	52%	49	24%
Base yr. + 5yrs.	2022	64	40	61%	49	31%
Base yr. + 10yrs.	2027	67	40	67%	49	36%
Base yr. + 15yrs.	2032	70	40	74%	49	42%
Base yr. + 20yrs.	2037	70	40	75%	49	43%
**Does not include Light Sport and "Other" Aircraft* *Sources: 2017 FAA X26 TAF, Airport historical data records, 2017 Airport Inventory and TKDA, June 2017*						

TABLE E-20 FORECAST "OTHER" BASED AIRCRAFT					
Fiscal Year	Light Sport	"Other "Aircraft	Total	% of Total Ops	Total Operations
Operations					
2017	1,517	3,541	5,058	11%	44,403
2018	2,217	3,023	5,240	12%	45,313
2022	3,182	2,679	5,861	12%	48,983
2027	3,877	2,178	6,055	11%	53,316
2032	4,344	1,818	6,162	11%	57,959
2037	4,769	1,391	6,160	10%	62,930
Based Aircraft					
2017	3	7	10	17%	59
2018	5	7	12	17%	73
2022	8	7	15	19%	80
2027	12	7	19	23%	86
2032	17	7	24	25%	93
2037	24	7	31	31%	101
Note: "Other" aircraft include: experimental, ultralights, gliders, powered parachute, UAVs, etc.					
Sources: Airport historical data, Tenant Business Plans, Airport Sponsor and TKDA 2017					

The negative percent difference and fluctuations in forecast based aircraft are the direct result of estimated decreases in single engine and multi-engine piston aircraft demand as well as slower growth in experimental and light sport operations.

Critical Aircraft Forecasts

Critical aircraft operations represent the most demanding aircraft in terms of approach speed, wingspan and tail height that regularly, approximately 500 annual operations, use an airport. The critical aircraft may be a single aircraft or a combination/family of aircraft. These aircraft operational requirements direct airfield and facility needs at an airport. As discussed in more detail in Chapters 3 and 4, a design aircraft may differ for different on-airport facilities. For example, the most demanding aircraft for a t-hangar storage area, associated apron and taxi lanes may be designed to accommodate an A-I and B-I aircraft, such as the Cessna 182 or Cessna Mustang, respectively; whereas the primary runway, taxiways and terminal apron may be designed to accommodate B-II aircraft, such as the King Air 350i.

The 2010 Airport Layout Plan shows that the current critical aircraft for Runway 5-23 is an A-II (DH-6-300 "Twin Otter"), and should be upgraded to support a B-II aircraft such as the Cessna 560 XL. The secondary runway, 10-28, currently lists the King Air B-100 (B-I Small Aircraft Only) as the current critical aircraft, and upgrading it to support a King Air C-90B (B-I) aircraft.

Skydive Sebastian uses the DH-6-30 and the Cessna 208 Caravan as their jump planes. At one point, Skydive Sebastian had two DH-6-300 aircraft on the field, but one was irreparably damaged during an accident.

As noted, the previous Airport Layout Plan suggested that the Cessna Citation Jet XL would regularly operate at Sebastian Airport. Although based upon manufacturer operating criteria the aircraft can safely operate on Runway 5-23, there has been no user interest in operating such an aircraft at X26. Further, since the Airport is noise sensitive and has implemented noise abatement procedures, the introduction of a jet aircraft may not "sit well" with the local community. Existing and anticipated critical aircraft (i.e. perform 500 or more annual operations) is provided in **Table E-21**.

TABLE E-21 CRITICAL AIRCRAFT DEMAND				
	2017 Airport Critical Aircraft			
	2037 Airport Critical Aircraft			
Aircraft Type	**ARC Code**	**Engine Type**	**2017 Operations**	**2037 Operations**
Beech B-23	A-I	SEP	120	168
Beech P-35	A-I	SEP	104	145
Beech V35	A-I	SEP	250	349
Cessna 152	A-I	SEP	108	151
Cessna 172	A-I	SEP	303	423
Cessna 182	A-I	SEP	110	154
Cessna Skyhawk	A-I	SEP	62	87
Piper 28 Cherokee	A-I	SEP	24,689	34,504
Piper Arrow	A-I	SEP	5,578	7,795
Piper 32 Cherokee	A-I	SEP	216	302
Piper Cub	A-I	SEP	100	140
Cirrus SR22	A-I	SEP	100	140
Maule M-7-235	A-I	SEP	1,897	2,651
Piper Warrior	A-I	SEP	**100**	140
		Subtotal SEP	**33,737**	**47,149**
Piper 31 Navajo	B-I	MEP	1,514	1,651
Piper 30 Twin Comanche	A-I	MEP	792	918
Piper 34 Seneca	A-I	MEP	132	153
		Subtotal MEP	**2,438**	**2,722**
Cessna 320D	A-I	TP	964	230
Cessna 208 Caravan	B-I	TP	495	1,042
DH6-300-600	A-II	TP	867	1,825
Beech 200D	B-II	TP	908	1,912
Beech King Air 350I	B-II	TP	0	1,800
		Subtotal TP	**3,234**	**6,809**
Embraer Phenom 100	B-I	Turbofan	0	15
Embraer Phenom 300	B-II	Turbofan	0	10
		Subtotal Jet	**0**	**23**
Glider		**NA**	**420**	**420**
Helicopter - Small		**Unknown**	**26**	**67**
Light Sport		**A-I/B-I**	**4,638**	**5,740**
		TOTAL	**44,403**	**62,930**

Note due to rounding may not add up.
Sources: Airport surveys, airport data, on-site survey – TKDA 2017

Currently, the critical design aircraft is the **Beech 200D** which is used by Skydive Sebastian as well as other tenants/users. The aircraft fleet mix forecast, supported by aircraft manufacturer and FAA data, forecast that multi-engine piston aircraft are being replaced by quieter and efficient turboprop aircraft. Turboprop operations at X26 based upon historical and current data consist of a mix of ARC A-II and B-II aircraft. Assuming that turboprop demand will remain strong throughout the forecast period, it is anticipated that B-II turboprop aircraft will remain the airport design group for the foreseeable future.

In addition, the sponsor is developing larger hangar facilities adjacent to the terminal apron. Since the King Air family is still heavily used at GA airports for business or on-demand air taxi operations, it is likely that the **King Air 350i, ARC B-II**, as well as similarly sized aircraft can be accommodated in the southeast quadrant of the airport.

This Page was Intentionally Left Blank



APPENDIX F – TAXIWAY C, D and E PLANNING SUPPORT

Introduction

In conjunction with the Airport Master Plan update at Sebastian Municipal Airport, design requirements for new Taxiways C, D and E were evaluated. Construction for the new taxiway development to support existing and forecast demand is planned for Fiscal Years 2018 and 2019. Taxiway C would provide full parallel access to the primary runway, 5-23. Taxiway D would support continued development in the South Quadrant of the Airport associated with corporate and light aircraft manufacturing operations. Taxiway E will support continued growth adjacent to the Terminal facilities as well as allow for access to the ultimate planned development along the east and north quadrants of the Airport property.

The Airport supports a variety of operations including aircraft training, aircraft manufacturing, air taxi and business operations. Recommendations outlined in this document along with the proposed taxiway design is incorporated into the Airport Master Plan narrative report and airport layout plan.

Critical Aircraft

The 2010 conditionally approved Airport Layout Plan (ALP) for Sebastian Municipal Airport identified the following existing and future critical aircraft associated with Runways 5-23 and 10-28.

TABLE A
2010 CRITICAL AIRCRAFT DEMAND

	Runways 5-23		Runways 10-28	
Item	**Existing**	**Future**	**Existing**	**Future**
Critical Aircraft	DHC-6-300 Twin Otter	Cessna 560 Excel	King Air B-100	King Air C90B
Aircraft Reference Code	A-II	B-II	B-I (Small Aircraft Only)	B-II

Source: Sebastian Airport Layout Plan, 2010, The LPA Group

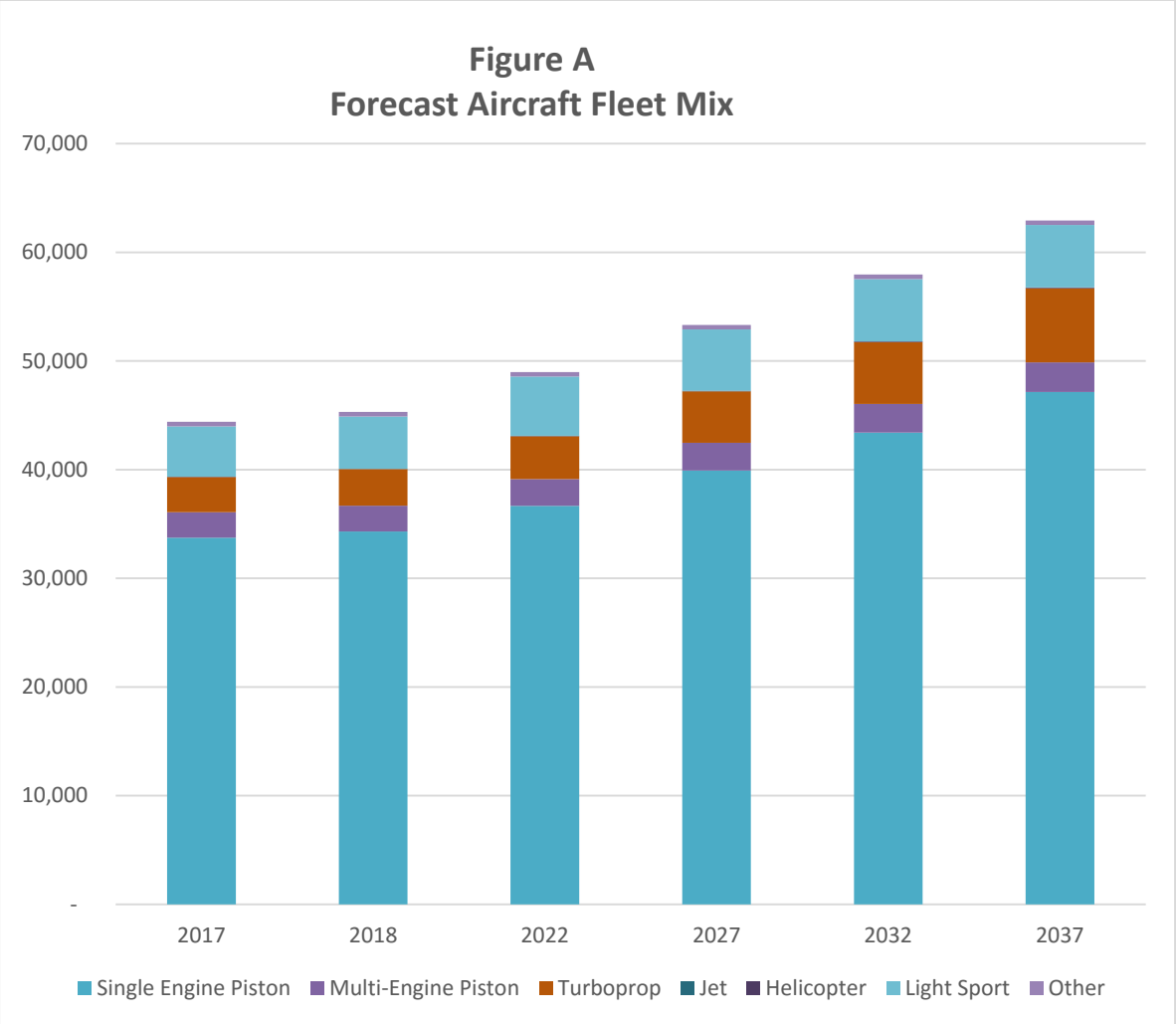
Discussions with the Sponsor and Airport Management highlighted their disinterest in encouraging corporate jet traffic at Sebastian Municipal Airport given the fact that the airport is surrounded by environmentally sensitive land and residential properties. Instead airport management is focusing on constructing larger box and corporate style hangars near the existing terminal building based upon demand for larger multi-engine turboprop storage space.

As a result, existing and future operations were reevaluated as part of the 2018 Master Plan Update. Forecast demand resulted in the following breakdown of existing and forecast operations by type.

TABLE B
EXISTING AND FORECAST DEMAND

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Light Sport	Other	Total
2017	33,737	2,348	3,234	-	26	4,638	420	44,403
2018	34,308	2,372	3,366	-	27	4,820	420	45,313
2022	36,673	2,463	3,939	14	33	5,441	420	48,983
2027	39,919	2,550	4,733	17	42	5,635	420	53,316
2032	43,408	2,636	5,680	19	53	5,742	420	57,959
2037	47,149	2,722	6,809	23	67	5,740	420	62,930

Sources: Airport Management historical data, FAA and FDOT historical data, on-site observations, discussions with tenants and TKDA, 2017



Breaking this information down further to determine operations by specific aircraft in order to determine the most critical aircraft in each class type based upon approved forecast methodologies resulted in the following.

TABLE C
EXISTING AND FUTURE AIRCRAFT DEMAND

Aircraft	ARC Code	Engine Type	2017 Operations	2037 Operations
Beech B-23	A-I	SEP	120	168
Beech P-35	A-I	SEP	104	145
Beech V35	A-I	SEP	250	349
Cessna 152	A-I	SEP	108	151
Cessna 172	A-I	SEP	303	423
Cessna 182	A-I	SEP	110	154
Cessna Skyhawk	A-I	SEP	62	87
Piper 28 Cherokee	A-I	SEP	24,689	34,504
Piper Arrow	A-I	SEP	5,578	7,795
Piper 32 Cherokee	A-I	SEP	216	302
Piper Cub	A-I	SEP	100	140
Cirrus SR22	A-I	SEP	100	140
Maule M-7-235	A-I	SEP	1,897	2,651
Piper Warrior	A-I	SEP	100	140
		Subtotal SEP	**33,737**	**47,149**
Piper 31 Navajo	B-I	MEP	1,514	1,651
Piper 30 Twin Comanche	A-I	MEP	792	918
Piper 34 Seneca	A-I	MEP	132	153
		Subtotal MEP	**2,438**	**2,722**
Cessna 320D	A-I	TP	964	230
Cessna 208 Caravan	B-I	TP	495	1,042
DH6-300-600	A-II	TP	867	1,825
Beech 200D	B-II	TP	908	1,912
Beech King Air 350I	B-II	TP	0	1,800
		Subtotal TP	**3,234**	**6,809**
Embraer Phenom 100	B-I	Turbofan	0	15
Embraer Phenom 300	B-II	Turbofan	0	10
		Subtotal Jet	**0**	**23**
Light Sport Aircraft *	A-I	SEP/Other	4638	5740
Glider/Other		NA	420	420
Helicopter		Piston/Turbine	26	67
		TOTAL	**44,403**	**62,930**

Sources: Airport surveys, airport data, on-site survey – TKDA 2017

Based upon the forecast data, the following critical aircraft were identified for each category as illustrated in **Table D**. Ultimately, the most demanding aircraft at Sebastian Municipal Airport that is anticipated to drive airfield design is the Beech King Air 350i or similarly sized aircraft.

Table D
Critical Aircraft Demand

2016 Critical Aircraft	**Piper P28A**	**Piper PA-30**	**Beech King Air 200**	**Robinson R-44 Raven**
Gross Taxi weight	2400 lbs.	3600 lbs.	10,100 lbs.	1450 lbs.
Engine Type	SEP	MEP	TP	Piston
Gear Designation	S	S	S	Skids
Taxiway Design Group	TDG 1A	TDG 1A	TDG 2	NA
2037 Critical Aircraft	**Piper P28A**	**Piper Seneca V**	**Beech King Air 350I**	**Airbus EC 145 (Typical Police, Air Ambulance, etc.)**
Gross Taxi weight	2400 lbs.	4750 lbs.	15100 lbs.	7,903 lbs.
Engine Type	SEP	MEP	TP	Twin Engine Turbine
Gear Designation	S	S	S	Skids
Taxiway Design Group	TDG 1A	TDG 1A	TDG 2	NA

Sources: Airport surveys, airport data, on-site survey – TKDA 2017

Analyzing existing and likely future use of Runways 5-23 and 10-28 given the Sponsor vision and operating needs, it was determined that the King Air 350i would regularly use Runway 5-23. It was anticipated that the most critical aircraft likely to regularly use Runway 10-28 considering wind and weather conditions will be the Beech King Air F90 or similarly sized aircraft primarily with maximum takeoff weights of less than 12,500 lbs.

Table E outlines the aircraft design specifications for identified existing and future critical aircraft associated with Runways 5-23 and 10-28.

Table E
Aircraft Design Specifications

	Runway 5-23		**Runway 10-28**	
	Existing Critical Aircraft	***Future Critical Aircraft***	***Existing Critical Aircraft***	***Future Critical Aircraft***
Aircraft Type	Beech King Air B-200D	Super King Air 350I	Beech King Air B-100	Beech King Air F90 and C90A
ADG	II	II	I	II
TDG	2	2	1(A)	1(A)
Approach Category	B	B	B	B (Small) <10,000 lbs. MTOW
Aircraft Length (Ft)	43.83 (43’10”)	46.67 (46’8”)	39.9	35.5
Wingspan (Ft)	54.50 (54’6”)	57.92 (57’ 11”)	45.92	50.3
Tail Height (Ft)	14.75 (14’9”)	14.33 (14’ 4”)	15.42	14.3
Wheelbase (Ft)*	14.92 (14’11”)	16.25 (16’ 3”)	15	13
Wheel Track (Ft)	17.17 (17’2”)	17.17 (17’ 2”)	NA	NA
MTOW (lbs.)	12,500	15,000	11,795	10,100

*Note: * Because of the type of aircraft, CMG and Wheelbase dimensions are the same based upon manufacturer data.*
Sources: Beechcraft-Textron and FAA 150-5300-13A, Appendix 1

Airfield Design Criteria

Since Runway 5-23 is the primary runway, and Taxiways C, D and E will support operations using that runway as well as provide access to larger hangar and apron facilities near the terminal building, it is recommended that the taxiways be designed to a Taxiway Group Design standard of 2. Taxiway design criteria for TDG 2 aircraft is provided in **Table F**.

Table F
Taxiway Design Group Design Requirements

ITEMS	EXISTING		FUTURE	
	Runway 5/23	**Runway 10/28**	**Runway 5/23**	**Runway 10/28**
Critical Aircraft	Beech King Air 200D	Beech King Air B-100	Beech Super King Air 350I	Beech King Air F90 and C90A
Aircraft Approach Code	B	B	B	B (Small) <12,000 lbs. MTOW
Aircraft Design Group	II	I	II	II
Taxiway Design Group	2	1(A)	2	1(A)
Approach Minima	Not Lower than 1 mile	Visual	Not Lower than 1 mile	Visual
Taxiway Width (Table 4-2)	35 ft.	25 ft.	35 ft.	25 ft.
Taxiway Edge Safety Margin (Table 4-2)	7.5 ft.	5 ft.	7.5 ft.	5 ft.
Taxiway Shoulder Width (Table 4-2)	15 ft.	10 ft.	15 ft.	10 ft.
Taxiway/Taxilane Safety Area* (Based upon ADG) – See Table 4-1	79 ft.	49 ft.	79 ft.	49 ft.
Taxiway OFA based upon ADG	131 ft.	89 ft.	131 ft.	89 ft.
Taxilane OFA based upon ADG (See Table 4-1)	115 ft.	79 ft.	115 ft.	79 ft.
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline with 180 turn	See Table 4-14 in FAA AC 150/5300-13A, Change 1	See Table 4-14 in FAA AC 150/5300-13A, Change 1	See Table 4-14 in FAA AC 150/5300-13A, Change 1	See Table 4-14 in FAA AC 150/5300-13A, Change 1
Taxiway Fillet Dimensions (based upon angle of intersection)	See Table 4-3, FAA AC 150/5300-13A	See Table 4-3, FAA AC 150/5300-13A	See Table 4-5, FAA AC 150/5300-13A	See Table 4-3, FAA AC 150/5300-13A
Runway to Taxiway Separation (Table 3-7)	≥240 ft.	≥225 ft.	≥240 ft.	≥225 ft.
Taxiway to Parallel Taxiway or Taxilane based upon ADG (see Table 4-1)	105 ft.	70 ft.	105 ft.	70 ft.

Sources: FAA Advisory Circular 150/5300-13A Change 2 and TKDA 2017

*Note: The width of the TSA must be increased at intersections and turns where curved taxiway or taxilane centerline pavement markings, reflectors, or lighting are provided. Taxiway Safety Area (TSA) standards must be met for a distance of [(0.5 × WS) – (0.5 × W)] feet from the taxiway/taxilane edge, based on standard fillet

design, where WS is the maximum wingspan of the ADG and W is the taxiway width. (Paragraph 404(c) on page 128, FAA AC 150/5300-13A Change 1

Recommendations and Coordination with Agencies

FAA and FDOT conditionally approved the forecasts of demand including critical aircraft demand. Meetings with the community, users, aircraft user groups, the Sponsor, and tenants resulted in maintaining the current lengths of both Runways 5-23 and 10-28.

At the request of user groups, an evaluation of lowering the visibility minima from 1 mile to 7/8 or 3/4- mile visibility was evaluated for Runway 5-23. However, the impacts associated with decreasing the runway visibility minima were not offset by anticipated gains. Further, the non-precision approach is currently impacted by tree obstructions which is limiting the approach minima to Runway 23 to 520 feet threshold crossing height and 1-mile or greater visibility minima.

Based upon long-term plans and input from the community, the following design criteria was recommended and is illustrated in the Airport Layout Plan and narrative report.

Table G
Recommended Airfield Dimensional Criteria

Item	Runway 5-23	Runway 10-28
Critical Aircraft	King Air 350I	King Air F90/B-100
Aircraft Design Code	B-II	B-II (Small)
Runway Length	4,023	3,199
Runway Visibility Minimum	Not Lower than 1 mile	Visual
Dimensional Requirements		
Runway Width	75 ft.	75 ft.
Shoulder Width	10 ft.	10 ft.
Blast Pad Width	95 ft.	95 ft.
Blast Pad Length	150 ft.	150 ft.
Crosswind Component	13 knots	10 knots
Runway Protection Criteria		
Runway Safety Area (RSA)		
Length beyond departure end	300 ft.	300 ft.
Length prior to threshold	300 ft.	300 ft.
Width	150 ft.	150 ft.
Runway Object Free Area (ROFA)		
Length beyond runway end	300 ft.	300 ft.
Length prior to threshold	300 ft.	300 ft.
Width	500 ft.	500 ft.
Runway Obstacle Free Zone (ROFZ)		
Length (*Refer to paragraph 308)*	200 ft. beyond end of runway	200 ft. beyond end of runway
Width (*Refer to paragraph 308)*	400 ft.	250 ft.
Precision Obstacle Free Zone (POFZ)		
Length	N/A	N/A

Table G
Recommended Airfield Dimensional Criteria

Item	Runway 5-23	Runway 10-28
Width	N/A	N/A
Approach Runway Protection Zone (ARPZ)		
Length	1,000 ft.	1,000 ft.
Inner Width	500 ft.	250 ft.
Outer width	700 ft.	450 ft.
Acres	13.770	8.035
Departure Runway Protection Zone (DRPZ)		
Length	1,000 ft.	1,000 ft.
Inner Width	500 ft.	250 ft.
Outer Width	700 ft.	450 ft.
Acres	13.770	8.035
RUNWAY SEPARATION		
Runway centerline to:		
Parallel runway centerline (*Refer to paragraph 316)*	700 ft.	700 ft.
Holding Position	200 ft.	125 ft.
Parallel taxiway/taxilane centerline	240 ft.	240 ft.
Aircraft parking area	250 ft.	250 ft.
Helicopter Touchdown Pad (*Refer to AC 150/5390-2)*	NA	NA
Sources: FAA Advisory Circular 150/5300-13A Change 2 and TKDA 2017		



APPENDIX G – FAA STANDARD OPERATING PROCEDURES

AIRPORT LAYOUT PLAN AND PROPERTY MAP CHECKLISTS

FAA SOP 2.0 and 3.0

This Page was Intentionally Left Blank

FAA
Airports

ARP SOP 2.00

Effective Date:
October 1, 2013

Standard Operating Procedure (SOP)

Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)

1. PURPOSE

This SOP establishes uniform procedures for reviewing and approving Airport Layout Plans (ALPs). ALPs are drawings used to graphically depict current and future airport facilities. Standards for ALPs can be found in Advisory Circular 150/5070-6B, Airport Master Plans. The term Airport Layout Plan typically refers to a single document or drawing covering the entire airport. It also refers to the set of drawings which typically consists of:

- **a.** Cover Sheet
- **b.** ALP Drawing
- **c.** Data Sheet
- **d.** Facilities Layout Plan
- **e.** Terminal Area Plan (as needed)
- **f.** Airport Airspace Drawing
- **g.** Inner Portion of the Approach Surface Drawing
- **h.** Airport Land Use Drawing
- **i.** Off-Airport Land Use Drawing (as needed)
- **j.** Airport Property Map / Exhibit A
- **k.** Runway Departure Surface Drawing
- **l.** Utility Drawing
- **m.** Airport Access Plans
- **n.** Other Plan

2. SCOPE

The scope of this SOP is limited to ALP review and approval. This SOP is not intended to discuss or describe every action related to ALPs. The primary content of this SOP is an instructive review checklist (Appendix A), standard ALP approval letters (Appendix B), and a General ALP Process Chart (Appendix C). This SOP does not address electronic or eALPs.

3. CANCELLATION

This SOP does not cancel a previous version.

4. APPLICABLE REGULATIONS, POLICY, AND GUIDANCE

Requirements identified within this SOP originate in or are further described in various FAA directives including Orders, regulations, and Advisory Circulars. See the latest editions.

a. FAA Advisory Circular 150/5070-6, Airport Master Plans

b. FAA Advisory Circular 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports

c. FAA Advisory Circular 150/5200-33, Hazardous Wildlife Attractants on or Near Airports

d. FAA Advisory Circular 150/5300-13A, Airport Design

e. FAA Advisory Circular 150/5300-16, General Guidance and Specifications for Aeronautical Surveys

f. FAA Advisory Circular 150/5300-18, General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards

g. FAA Advisory Circular 150/5320-6, Airport Pavement Design and Evaluation

h. FAA Advisory Circular 150/5325-4, Runway Length Requirements for Airport Design

i. FAA Advisory Circular 150/5335-5, Standardized Method of Reporting Airport Pavement Strength - PCN

j. FAA Advisory Circular 150/5340-1, Standards for Airport Markings

k. FAA Advisory Circular 150/5340-30, Design and Installation Details for Airport Visual Aids

l. FAA Order 1100.5C, FAA Organization – Field

m. FAA Order 1100.154A, Delegations of Authority

n. SW FAA Order 1100.53F, Delegation of Authority – Airports Division – Regional Components

o. FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions

p. FAA Order 5100.38C, Airport Improvement Program Handbook

q. FAA Order 5200.8, Runway Safety Area Program

r. FAA Order 5200.11, FAA Airports (ARP) Safety Management System

s. FAA Order 5300.1, Modifications to Agency Airport Design, Construction, and Equipment Standards

t. FAA Order 5500.1, Passenger Facility Charge

u. FAA Order 5750.16, Siting Criteria for Instrument Landing Systems

v. FAA Order 6480.4, Airport Traffic Control Tower Siting Criteria

w. FAA Joint Order JO 7400.2, Procedures for Handling Airspace Matters

x. FAA Order 8260.3, United States for Terminal Instrument Procedures (TERPS)

y. FAA Order 8260.19, Flight Procedures and Airspace

z. 14 CFR 77, Safe, Efficient Use, And Preservation of the Navigable Airspace

5. ALP REQUIREMENTS AND OBJECTIVES

An ALP is required by statute to be up-to-date. This derives directly from Title 49 U.S.C. 47107(a)(16). Grant Assurance No. 29 obligates an airport sponsor to "keep up to date at all times a layout plan of the airport," and also to receive FAA approval of any ALP update, revision, or modification. Further, any proposed AIP or PFC funded projects must be on an approved ALP. The AIP Handbook (FAA Order 5100.38C, Paragraph 300.c.) states, "A current airport layout plan (ALP) that depicts the proposed project and which has FAA approval from the standpoint of safety, utility, and efficiency of the airport shall be required before a development project is approved."

6. DISTRIBUTION

This SOP is distributed to the Federal Aviation Administration (FAA) Airports Organization (ARP) and all interested parties. The SOP will be available electronically on the Airports section of the FAA website.

7. CHANGE TABLE

Date of Change	SOP Version	Page Changed	Reason for Change



Benito DeLeon
Director, Airport Planning and Programming



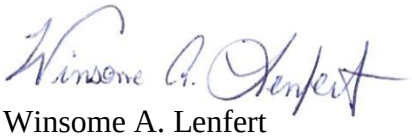
Byron K. Huffman
Manager, Alaskan Region Airports Division



Sarah P. Dalton
Manager, Northwest Mountain Region Airports Division



Jim A. Johnson
Manager, Central Region Airports Division



Winsome A. Lenfert
Manager, Southern Region Airports Division



Debbie Roth
Manager, Eastern Region Airports Division



Kelvin L. Solco
Manager, Southwest Region Airports Division



Susan Mowery-Schalk
Manager, Great Lakes Region Airports Division



Mark A. McClardy
Manager, Western-Pacific Region Airports Division



Mary T. Walsh
Manager, New England Region Airports Division

Table of Contents

1. Roles and Responsibilities **1**
2. Procedures and Process **2**
2.1. Approval **3**
2.1.1. Approval Authority 3
2.2. Distribution **3**
Appendix A. ALP REVIEW CHECKLIST **A-1**
A.1. Narrative Report **A-3**
A.2. Title Sheet **A-9**
A.3. Airport Data Sheet **A-10**
A.4. Airport Layout Plan Drawing **A-20**
A.5. Airport Airspace Drawing **A-28**
A.6. Inner Portion of the Approach Surface Drawing **A-31**
A.7. Runway Departure Surface Drawing **A-37**
A.8. Terminal Area Drawing **A-40**
A.9. Land Use Drawing **A-43**
A.10. Airport Property Map / Exhibit A **A-45**
Appendix B. ALP Approval Types and Approval Letters **B-1**
B.1. FAA Order 5050.4B Provisions **B-1**
B.2. FAA Order 7400.2J Provisions **B-5**
B.3. Example 1: Conditional ALP Approval **B-6**
B.4. Example 2: Conditional ALP Approval with Stipulation **B-7**
B.5. Example 3: "Mixed" ALP Approval with Specifically Approved Items **B-8**
B.6. Example 4: Conditional ALP Approval with Exception **B-10**
Appendix C. General ALP Process Chart **C-1**

This page intentionally left blank

1. ROLES AND RESPONSIBILITIES

The responsibilities of the FAA Office of Airports (ARP) staff in approving ALPs may begin long before an ALP is started. The idea to create or update an ALP may come from the Airport Sponsor, the FAA, or the State Aviation Agency. Once a decision has been made to update the ALP, Airport Sponsors typically hire a consultant for this effort. After a consultant has been engaged, a scope of services is normally prepared that outlines the project scope, anticipated deliverables, schedule, etc.

During the preparation of the project scope for the ALP the informational review checklist (Appendix A) may be used as a guiding source; however, the extensive size of the informational checklist should not indicate a lengthier or more extensive ALP. The informational checklist was developed for airports of every size and complexity. Where the airport is smaller and with less complex facilities, the ALP should be scoped to only include those drawings needed to document those facilities. The other pages of the ALP Review Checklist should be marked 'not applicable', with the project scope coordinated in advance with the FAA to seek concurrence. In short, don't be scared by the length or size of the ALP Review Checklist. It may look menacing, but it actually reduces workload by providing specific criteria to bring numerous requirements into one laundry list.

When the ALP is prepared, it should be reviewed in detail by the Airport Sponsor. When the ALP meets the requirements of the consultant, the Sponsor, and FAA standards, including environmental requirements for ALP approval as detailed in FAA Order 5050.4B (see Appendix B), it can be submitted to FAA for internal coordination and approval. Note that new and updated ALPs are subject to FAA's Safety Management System (SMS); see FAA Order 5200.11.

The following have responsibilities for ALPs:

a. Airport Sponsor (for our purpose here) is an entity that owns or controls an airport. They initiate consultant services, develop scopes of work, and review ALPs.

b. Consultant (for our purpose here) is a private or public company providing technical expertise and assistance to the Airport Sponsor such as preparing ALPs. A consultant is typically employed to develop the ALP.

c. State Agency (for our purpose here) is an organization of state government dealing with transportation or aviation. They may also be the Airport Sponsor in some states. They initiate consultant services, develop scopes of work, and review ALPs. States within the State Block Grant Program (SBGP) may also approve ALPs on behalf of the FAA.

d. The Office of Airports or the Airports District Office (ADO) is responsible for implementing the overall Airport Improvement Program (AIP). In reference to ALPs, ARP reviews; initiates coordination of airspace studies of airport proposals; conducts the necessary internal circularization; consolidates and resolves comments; develops and forwards the FAA determination to the Airport Sponsor/proponent. The Airports Division has approval authority for ALPs.

e. The applicable Air Traffic Service Area office is responsible for evaluating the ALP proposal from the standpoint of safe and efficient use of airspace by aircraft.

f. The applicable Flight Procedures Team office is responsible for evaluating the ALP proposals to determine impacts on instrument procedures and whether aircraft instrument operations can be conducted safely.

g. The applicable Flight Standards Division is responsible for reviewing ALP proposals to determine the safety of aeronautical operations, and of persons and property on the ground. The local Flight Standards District Office (FSDO) is responsible for reviewing part 157 proposals for seaplane bases and heliports.

h. The applicable Technical Operations Service Area Office is responsible for reviewing ALP proposals including:

(1) Reviewing engineering studies on airport proposals to evaluate their effects upon commissioned and/or proposed NAVAIDs.

(2) Conducting electromagnetic studies to evaluate the effect existing and/or proposed objects will have upon air navigation and communications facilities.

(3) Reviewing and evaluating line-of-sight (shadow) studies on existing and/or proposed objects to determine impact on control tower visibility as provided by the airport sponsor.

(4) Highlighting frequency management problems and reserving frequencies.

2. PROCEDURES AND PROCESS

A graphic depiction of the ALP process can be found in Appendix C. During the preparation of an ALP, the FAA Airport Planner or Project Manager is expected to answer questions and provide guidance. A review of a draft ALP provides a time-saving opportunity to resolve any issues identified by the Office of Airports prior to the document being circulated for FAA review.

Once an ALP arrives at the FAA, it should include (1) any required narrative report, and (2) a completed review checklist (Appendix A) with indication that it has already been reviewed by the preparer of the drawings and the Airport Sponsor. Only then will FAA initiate review of the document. The document shall then be circulated for review via the Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) system. Electronic drawings and documents in PDF format can be uploaded to the OE/AAA system by the Airport Sponsor when directed to do so by the FAA. In general, unless there is a change in location of a structure, ALP changes solely to document as-built conditions do not need an airspace review or a narrative report. New ALPs or ALP updates requires airspace review and a narrative report.

Other FAA lines of business comment on the ALP within the OE/AAA system. Every comment shall be reviewed by the FAA Airport Planner or Program Manager in detail. Each comment should be determined valid and appropriate. Internal FAA comments frequently need to be rewritten in plain language. Only then should comments be forwarded to the airport sponsor in the form of a final FAA comment letter, which includes the airspace determination. A separate airspace approval letter like the one issued by the OE/AAA system is not required. Once corrections to the ALP are made, the document should be ready for approval.

2.1. Approval

The ALP Drawing must be stamped and signed indicating conditional, unconditional, or mixed approval. Approval types are described in Appendix B. Conditional approval is given for ALPs that have not yet completed an environmental analysis under the National Environmental Policy Act (NEPA). Unconditional approval is given only when NEPA has been completed. Mixed approval is given when some elements of the ALP have had a completed NEPA review while others haven't. Those elements are approved and can be implemented. Other elements not covered by the NEPA document are conditionally approved and cannot be unconditionally approved until the NEPA process is completed.

The aeronautical study number (ASN) and date of approval letter should also be noted. ALP approval must be done in a manner that satisfies both FAA and Airport Sponsor needs. For example, if a Sponsor requires an FAA Approval on every page of the ALP set, we should comply with that requirement. At least two sets of the ALP need original signatures: one for the FAA and one for the airport sponsor. The sponsor should contact their FAA Airport Planner or Program Manager for the required number of original signed and electronic ALPs.

Copies of the ALP approval letter should be uploaded and used to close the aeronautical case in the OE/AAA system. The ARP PM/Planner is responsible for keeping the OE/AAA database current at all times with any proposed runway data changes such as for new runways or extensions.

2.1.1. Approval Authority

The authority to approve ALPs has been delegated to the field offices. ADO Managers can retain approval authority or may delegate.

2.2. Distribution

Once the ALP is signed, copies can be distributed pursuant to local procedures with an emphasis on distributing electronic documents.

This page intentionally left blank.

APPENDIX A. ALP REVIEW CHECKLIST

The following checklist shall be used in lieu of FAA AC 150/5070-6B, Appendix F, Airport Layout Plan Drawing set. This checklist is intended for use when submitting a new or updated ALP to the FAA for review and approval. Consultants and/or sponsors should indicate "Yes," "No" or "N/A" (not applicable) for every item on the checklist. The same checklist shall be provided to FAA for review and verification. For all reviewers: It is important that each item listed be shown on the respective plan.

Airport Identification (to be completed by Sponsor or Consultant)			
Airport			
City and State		Location Identifier	
Airport Owner			

ALP Submission Information (to be completed by Sponsor or Consultant)		
ALP Prepared by		
	Name of Consulting Firm	
	Name of Individual	Date
	Telephone	
	Email address	
Consulting QA/QC Review		
	Name and Title of Individual	Date
Sponsor Review		
	Name and Title of Individual	Date

FAA Review (to be completed by FAA)		
	Name and Title of Individual	Date

Critical Design Aircraft or Family of Aircraft:

	Make	Model	Annual Itinerant Operations
Existing			
Future			

Forecasted Year: _____

Airport Reference Code (ARC): _____

Runway Design Code (RDC) & Runway Reference (RRC):

Runway	RDC	RRC

Approach Minimums:

Rwy End	Minimum	Rwy End	Minimum

Runways (Existing and Future):

Runway	Existing		Future		Departure Surface (Y or N/A)
	Length (ft)	Width (ft)	Length (ft)	Width (ft)	

For the balance of the checklist, enter a mark (✔ or X) to confirm inclusion.

A.1. Narrative Report

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Executive Summary – A concise summary of the findings/ recommendations of the master planning effort or changes to the ALP. This should include a description of planned projects, an implementation plan/timeline, and identification of benchmarks or actions that will be conducted to either verify the original planning assumptions or proceed with project implementation.	From AC 150/5070-6, Section 202: An accompanying ALP Narrative Report should explain and document those changes and contain at least the following elements: – Basic aeronautical forecasts. – Basis for the proposed items of development. – Rationale for unusual design features and/or modifications to FAA Airport Design Standards. – Summary of the various stages of airport development and layout sketches of the major items of development in each stage. – An environmental overview to document environmental conditions that should be considered in the identification and analysis of airport development alternatives and proposed projects.				
1. Identify Projects along with description					
2. Create a Timeline for each Project					
3. Identify and List:					
a. Proposed Projects (e.g., Hangar development)					
b. Milestones/ Triggering Events (e.g., 1. All hangars are full, 2. There is a waiting list long enough to fill a new development, 3. Hangars have reached their useful life, etc.)					
c. Action items/Next Steps (e.g., 1. Maintain log and gather data, 2. Discuss plan with ADO, 3. Coordinate with ADO regarding potential for inclusion in FAA ACIP (Airports Capital Improvement Program), 4. Identify funding sources.)					
d. Funding Plan	Capital Improvement Plan for the forecast horizons. See AC 150/5070-6, Chapter 11. Only a rough, order-of-magnitude report is needed in the executive summary.				

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
B. Basic aeronautical forecasts (0-5, 6-10, 11-20 years): Basic aeronautical forecasts (0-5, 6-10, 11-20 years):	Forecasts of future levels of aviation activity as approved by the FAA. These projections are used to determine the need for new or expanded facilities. See AC 150/5070-6, Chapter 7.				
1. Total annual operations	Total local and itinerant aircraft operations at the airport.				
2. Annual itinerant operations by all aircraft	Itinerant operations by aircraft that leaves the local airspace, generally 25 miles or more from the airport. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
3. Annual itinerant operations by current critical aircraft					
4. Annual itinerant operations by future critical aircraft					
5. Number of based aircraft	Aircraft that use the subject airport as a home base, i.e., have hangar or tie-down space agreements. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
6. Annual instrument approaches	Number of instrument approaches expected to be executed during a 12-month period. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
7. Number of enplanements	See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
8. Critical Aircraft (also referred as “design aircraft” or “critical design aircraft)	The critical aircraft is the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that the critical aircraft will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations or scheduled service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. Provide the aircraft, AAC, and ADG. (e.g. Boeing 737-400, C-III) See AC 150/5300-13A, Paragraph 105(b) and FAA Order 5090.3C, 3-4.				
9. Runway Design Code (RDC)	Describe the RDC for each runway. For the purpose of airport geometric design, each runway will contain a RDC which signifies the design standards to which the runway is to be built. The RDC consists of three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and the approach visibility minimums. These parameters represent the aircraft that are intended to be accommodated by the airport, regardless of substantial use. See AC 150/5300-13A, Paragraph 105(c).				
10. Runway Reference Code (RRC)	Describe the RRC for each runway. The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. The RRC consists of the same three components as the RDC, but is based on planned development and has no operational application. See AC 150/5300-13A, Paragraph 318.				
C. Alternatives/Proposed Development					

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
11. Explanation of proposed development items	Specific projects can be described as project listings on a master table, on individual project data sheets, or in projects booklets.				
12. Discuss near-term and future Approach Procedure Requirements or effects (e.g., LPV, Circling, etc.)	Based on existing or forecast usage. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.				
13. Navigational Aids or Other Equipment Needs (e.g., Approach Lights, Wind Cones, AWOS, etc.)	The need for new or additional navigational aids is a function of the fleet mix, the percentage of time that poor weather conditions are present, and the cost to the users of not being able to use the airport while it is not accessible.				
14. Wind coverage. Is it adequate for existing and future runway layouts? Has wind data been updated?	This analysis determines if additional runways are needed to provide the necessary wind coverage. Reference AC 150/5300-13A, Appendix 2 for guidance on wind coverage analysis techniques.				
D. Modification to Standards.	Any approved nonconformance to FAA standards, other than dimensional standards for RSAs and OFZs, require FAA approval. A description of all approved modification to standards shall be provided. See AC 150/5300-13A, Paragraph 106(b) and FAA Order 5300.1.				
E. Obstruction Surfaces (14 CFR Part 77 and Threshold Siting Surface)	Reference 14 CFR Part 77 and AC 150/5300-13A, Paragraph 303.				
F. Runway Protection Zone	A description of any incompatible land uses inside the RPZ shall be provided. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.				

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
G. Development summary (including sketches, schedules, and cost estimates) for stages of construction for: Development summary (including sketches, schedules, and cost estimates) for stages of construction for:	Documentation provided should include any electronic spreadsheets and files to facilitate in modifying the financial plan on an as-needed basis.				
15. Development Projects Completed Since Last ALP					
16. 0-5 years					
17. 6-10 years					
18. 11-20 years					
H. Shadow or line-of-sight study for towered airports (negative or positive statements are required).	Reference FAA Order 6480.4. This can be from the Airway Facilities Tower Integration Laboratory (AFTIL) or simpler GIS-generated studies.				
I. Letters of coordination with all levels of government, as needed.	Affected private and/or governmental groups, agencies, commissions, etc., that may have input on the plans. See AC 150/5070-6, Chapter 3.				
J. Wildlife Hazard Management Issues Review (in narrative).	Reference AC 150/5200-33.				
K. Preliminary Identification of Environmental Features	Potential or known features only. Further environmental analysis will be necessary. Reference FAA Order 5050.4B. Begin framework for NEPA analysis.				
19. Major airport drainage ditches					
20. Wetlands					
21. Flood Zones					
22. Historic or Cultural features					
23. Section 4(f) features					

Narrative Report					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
24. Flora/Fauna					
25. Natural Resources					
26. Etc. (other features identified in Order 5050.4B)					
L. Note Action Items from Runway Safety Program Office	List and note status of items from Runway Safety Program Office or Runway Safety Action Plan.				
M. Declared Distance (DD)	The narrative on declared distances is used to aid in understanding the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The narrative shall also provide clarification on why declared distances have been implemented. Declared distances data must be listed for all runway ends. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearway, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.				
Remarks					

A.2. Title Sheet

- The scale of the Title Sheet should be developed to include the items listed below.
- The minimum size for the final drawing set is 22" X 34" (ANSI D) and 24" X 36" (ARCH D). Coordinate use of 34" x 44" (ANSI E) and 26" X 48" (ARCH E) with FAA. Color drawings may be acceptable if they are still usable if reproduced in grey scale.

Title Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and revision blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Airport sponsor approval block	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.				
C. Date of ALP (date the airport sponsor signs the ALP)	The month and year of signature prominently shown near the title.				
D. Index of sheets (including revision date column)	Airport Layout Drawing, Airport Airspace Drawing, Inner Portion of the Approach Surface Drawing, Terminal Area Drawing, Land Use Drawing, Airport Property Map, Airport Departure Surface, etc.				
E. State Aeronautics Agency Approval Block (as needed)	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.				
F. State outline with county boundaries. County in which airport is located should be highlighted.	Provide as needed.				
G. Location map (general area)					
H. Vicinity map (specific airport area)					
Remarks					

A.3. Airport Data Sheet

- For smaller airports, some of the ALP sheets may be combined if practical and approved FAA.

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Wind Rose (all weather and IFR) with appropriate airport reference code and runway orientation depicted, crosswind coverage, and combined coverage, source of wind information and time period covered (for IFR runways applicable minimums should be included):	Assembly and analysis of wind data to determine ultimate runway orientation and also provides the operational impact of winds on existing runways. If instrument procedures are present or will be requested then both all-weather and instrument meteorological condition wind roses are required. See AC 150/5300-13A, Appendix 2.				
1. 10.5, 13, 16, 20 knots wind rose (based on appropriate airport reference code)	When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See also AC 150/5300-13A, Paragraph 302(c)(3) and AC 150/5300-13A, Appendix 2.				
2. Percentage of wind coverage/crosswind					
3. Source of data	Wind data may be obtained from NOAA at http://www.ncdc.noaa.gov/ Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5 and A2-6.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Age of data (last 10 consecutive years of data with most current data no older than 10 years)	Data must be from the latest 10-year period from the reporting station closest to the airport. Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5.				
C. Airport Data Table					
1. ARC for Airport	List the Airport Reference Code (ARC) for airport. 5300-13AARC is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. Reference AC 150/5300-13A.				
2. Mean maximum temperature of hottest month	List the mean maximum temperature and the hottest month for the airport location as listed in "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree-Days" (Climatography of the United States No. 81). See AC 150/5325-4, 506.b.				
3. Airport elevation (highest point of the landing areas, nearest 0.1 foot) – using North American Vertical Datum of 1988 (NAVD88)	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88. Reference AC 150/5300-13A, Paragraph 102(g) All elevations shall be in NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.				
4. Airport Navigational Aids, including ownership (NDB, TVOR, ASR, Beacon, etc.)	List the electronic aids available at the airport.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
5. Airport reference point coordinates, nearest second (existing, future if appropriate, and ultimate) - NAD83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the North American Datum of 1983 (NAD83) coordinate system. See AC 150/5300-13A, Paragraph 207. All latitude/longitude coordinates shall be in NAD83. A note shall be put on the Airport Layout Drawing that denotes that the NAD83 coordinate system was used.				
6. Miscellaneous facilities (taxiway lighting, lighted wind cone(s), AWOS, etc.) [Including type/model and any facility critical areas]	List any other facilities available at the airport.				
7. Airport Reference Code and Critical Aircraft (existing & future)	List the existing and ultimate Airport Reference Code and Critical Aircraft, the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes. See AC 150/5325-4, 102.a.(8) and AC 150/5070-6, 702.a. Indicated dimensions for wingspan and undercarriage, along with approach speed.				
8. Airport magnetic variation, date and source	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
9. NPIAS service level (GA, RL, P, CS, etc.)	See FAA Order 5090.3C.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
10. State equivalent service role	As applicable pursuant to State Aviation Department System Plan.				
D. Runway Data Table	The Runway Data Table should show information for both existing and ultimate runways.				
1. Runway identification (Include identifying runways that are “utility”)	A column for each runway end should be present. List the runway end number and if pavement strength is less than 12,500 pounds (single-wheel), then note as utility.				
2. Runway Design Code (RDC)	5300-13AThe first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics); whichever is more restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1200, 1600, 2400, and 4000. List the RDC for each runway. See AC 150/5300-13A, Paragraph 105(c).				
3. Runway Reference Code (RRC)	The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. Like the RDC, it is composed of three components: AAC, ADG, and visibility minimums. List the RRC for each Runway. See AC 150/5300-13A, Paragraph 318.				
4. Pavement Strength & Material Type	Indicate the runway surface material type, e.g., turf, asphalt, concrete, water, etc.				
a. Strength by wheel loading	List the existing and ultimate design strength of the landing surface. See AC 150/5320-6, Chapter 3.				
b. Strength by PCN	See AC 150/5335-5.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
c. Surface treatment	Note any surface treatment: grooved, PFC, etc.				
5. Effective Runway Gradient (%) Author to note maximum grade within runway length. Note to included statement that the runway meets line of sight requirements	List the maximum longitudinal grade of each runway centerline. See AC 150/5300-13A, Paragraph 313.				
6. Percent (%) Wind Coverage (each runway)	List the percent wind coverage for each runway for each Aircraft Approach Category. See AC 150/5300-13A, Appendix 2.				
7. Runway dimensions (length and width)	Dimensions determined for the Critical Design Aircraft by using graphical information in AC 150/5325-4.				
8. Displaced Threshold	Provide the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(2).				
9. Runway safety area dimensions (actual existing and design standard)	List the existing and ultimate dimensions of the Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307.				
10. Runway end coordinates (NAD83) (include displaced threshold coordinates, if applicable) to the nearest 0.01 second and 0.1 foot of elevation.	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second and 0.1 foot of elevation.				
11. Runway lighting type (LIRL, MIRL, HIRL)	List the existing and ultimate type of runway lighting system for each runway, e.g., Reflectors, Low Intensity Runway Lighting (LIRL), Medium Intensity Runway Lighting (MIRL), or High Intensity Runway Lighting (HIRL). LIRLs will typically not be shown for new systems. See AC 150/5340-30, Ch. 2.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
12. Runway Protection Zone (RPZ) Dimensions	List the existing and ultimate Runway Protection Zone (RPZ) dimensions. See AC 150/5300-13A, Paragraph 310. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.				
13. Runway marking type (visual or basic, non-precision, precision)	Indicate the existing and ultimate pavement markings for each runway. See AC 150/5340-1, Section 2.				
14. 14 CFR Part 77 approach category (50:1; 34:1; 20:1) Existing and Future	List the existing and ultimate approach surface slope. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.				
15. Approach Type (precision, non-precision, visual)	List the existing and ultimate Part 77 Approach Use Types. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.				
16. Visibility minimums (existing and future)	List the existing and ultimate visibility minimums for each runway. See AC 150/5300-13A, Table 1-3.				
17. Type of Aeronautical Survey Required for Approach (Vertically Guided, not Vert. Guided)	List the type of aeronautical survey required for the visibility minimums given. See AC 150/5300-18, Section 2.7 and AC 150/5300-13A, Table 3-4 and Table 3-5.				
18. Runway Departure Surface (Yes or N/A)"	Determine applicability of 40:1 Departure Obstacle Clearance Surface (OCS) as defined in Paragraph 303(c) of AC 150/5300-13A.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
19. Runway Object Free Area	List the existing and ultimate dimensions of the Runway Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA, unless a modification to standard has been approved.				
20. Obstacle Free Zone	The OFZ clearing standard precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Modification to standards does not apply to the OFZ. List the Runway OFZ, Inner-approach OFZ, Inner-transitional OFZ, and Precision OFZ if applicable.				
21. Threshold siting surface (TSS)	List the existing and ultimate threshold siting surface (i.e. approach and departure surfaces). Identify any objects penetrating the surface. If none, state “No TSS Penetrations”. Reference AC 150/5300-13A, Paragraph 303.				
22. Visual and instrument NAVAIDs (Localizer, GS, PAPI, etc.)	List the existing and ultimate visual navigational aids serving each runway.				
23. Touchdown Zone Elevation	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.				
23. Taxiway and Taxilane width	List the existing and ultimate width of the taxiways and taxilane. Reference AC 150/5300-13A, Paragraph 403 and Table 4-2.				
24. Taxiway and Taxilane Safety Area dimensions	List the existing and ultimate taxiway and taxilane safety area dimensions. Reference AC 150/5300-13A, Paragraph 404(c) and Table 4-1.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
25. Taxiway and Taxilane Object Free Area	List the existing and ultimate taxiway and taxilane object free area dimensions. Reference AC 150/5300-13A, Paragraph 404(b) and Table 4-1.				
26. Taxiway and Taxilane Separation	List any objects located inside the Taxiway/Taxilane Safety Area and Taxiway/Taxilane Object Free Area. Also provide the distance from the taxiway/taxilane centerline to the fixed or movable object. Reference Paragraph 404(a) and Table 4-1.				
27. Taxiway/Taxilane lighting	List the existing and ultimate type of taxiway lighting system, e.g., Reflectors, Low Intensity Taxiway Lighting (LITL), Medium Intensity Taxiway Lighting (MITL), or High Intensity Taxiway Lighting (HITL). LITLs will typically not be shown for new systems. See AC 150/5340-30, Chapter 4.				
28. Identify the vertical and horizontal datum	All latitude/longitude coordinates shall be in North American Datum of 1983 (NAD 83). A note shall be put on the Airport Layout Drawing that denotes that the NAD 83 coordinate system was used. All elevations shall be NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.				
E. Modification to Standards Approval Table (if applicable, a separate written request, including justification, should accompany the modification to standards). Show: Approval Date/ Airspace Case No. / Standard to be Modified / Description	Provide a table to list all FAA approved Modifications to Standards. See AC 150/5300-13A, Paragraph 106(b), and FAA Order 5300.1. List “None Required” on the table if no Modifications have yet been proposed or approved.				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
F. Declared Distances Table	Required even if Declared Distances are not in effect. Declared distances are only to be used for runways with turbine-powered aircraft. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearways, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.				
1. Take Off Run Available (TORA)	List the runway length declared available and suitable for the ground run of an airplane taking off, i.e., Take Off Run Available (TORA). The TORA may be reduced such that it ends prior to the runway to resolve incompatible land uses in the departure RPZ, and/or to mitigate environmental effects. Reference AC 150/5300-13A, Paragraph 323(d)(1).				
2. Take Off Distance Available (TODA)	List the length of remaining runway or clearway (CWY) beyond the far end of the TORA ADDED TO the TORA. The resulting sum is the Take Off Distance Available (TODA) for the runway. The TODA may be reduced to mitigate penetrations to the 40:1 instrument departure surface, if applicable. The TODA may also extend beyond the runway end through the use of a clearway Reference AC 150/5300-13A, Paragraph 323(d)(2).				
3. Accelerate Stop Distance Available (ASDA)	5300-13A List the length the length of runway plus stopway (if any) declared available and suitable for satisfying accelerate-stop distance requirements for a rejected takeoff. Additional RSA and ROFA can be obtained by reducing the ASDA. Reference AC 150/5300-13A, Paragraph 323(d)(3).				

Airport Data Sheet					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Landing Distance Available (LDA)	5300-13A List the length of runway declared available and suitable for satisfying landing distance requirements. The LDA may be reduced to satisfy the approach RPZ, RSA, and ROFA requirements. Reference AC 150/5300-13A, Paragraph 323(e).				
G. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.				
Remarks					

A.4. Airport Layout Plan Drawing

- For smaller airports, some of the ALP sheets may be combined if practical and approved by FAA.
- Two, or more, sheets may be necessary for clarity, existing and proposed. The reviewer should be able to differentiate between existing, future, and ultimate development. If clarity is an issue, some features of this drawing may be placed in tabular format. North should be pointed towards the top of the page or to the left. (scale 1"=200' to 1"=600')

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Space for the FAA approval stamp	Leave a blank four-inch by four-inch area for the FAA approval stamp.				
C. Layout of existing and proposed facilities and features:	To assure full consideration of future airport development in 14 CFR Part 77 studies, airport owners must have their plans on file with the FAA. The necessary plan data includes, as a minimum, planned runway end coordinates, elevation, and type of approach for any new runway or runway extension. See AC 150/5300-13A, Paragraph 106.				
1. True and magnetic North arrow with year of magnetic declination	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
2. Airport reference point – locate by symbol a Lat./Long. To nearest second (existing, future, and ultimate) NAD 83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the NAD 83 coordinate system. See AC 150/5300-13A, Paragraph 207.				
3. Wind cones, segmented circle, beacon, AWOS, etc.	Show as applicable pursuant to AC 150/5300-13A, Chapter 6.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Contours (showing only significant terrain differences)	Topography, budget, and future uses of the base mapping, will dictate what intervals of topographical contours to use on the maps. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, 1005.				
5. Elevations: All NAVD88	All latitude/longitude coordinates shall be in NAD83/NAVD88.				
a. Runway – existing, future, and ultimate ends (nearest 0.1 ft.)	Show the latitude and longitude of the threshold center and end of pavement.				
b. Touchdown Zone Elevation (highest point in first 3,000 ft. of runway)	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.				
c. Runway high/low points (existing and future)	For all runways identify high and low points (centerline) and provide elevation information.				
d. Label runway/runway intersection elevations	Label the pavement elevation of runway intersections where the centerlines cross.				
e. Displaced Thresholds (if any)	Label the pavement elevation and coordinates of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).				
f. Roadways & Railroads (where they intersect Approach surfaces, the extended runway centerline, and at the most critical points)	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
g. Structures, Buildings, and Facilities	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL. If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation. Don't forget navigation aid shelters, AWOS/ASOS, RVRs, PAPIs, Fueling systems, REILs, etc. Also identify the structure use (hangar, FBO, crew quarters, etc.), as needed. Some lesser objects may be identified by symbols in the legend.				
h. Define features to include: trees streams, water bodies, etc.	Provide information and delineate trees, streams, water bodies, etc., on or near airport property and approach surfaces.				
6. Runway Details					
a. Runway Design – runway length, runway width, shoulder width, blast pad width, blast pad length, and cross wind component. (existing, future, and ultimate)	AC 150/5325-4 describes procedures for establishing the appropriate runway length. AC 150/5300-13A, Table 3-4 and Table 3-5 provides the minimum runway length. AC 150/5300-13A, Table 3-8 provides the standard dimensions of the runway width, shoulder width, blast pad width, blast pad length, and crosswind component based on RDC. Clearly denote the runway numbers at the thresholds. Show location of existing and future threshold lights.				
b. Orientation – true bearing to nearest 0.01 second (and runway numbers)	Show the true bearing to the nearest .01 of a degree of the runway centerline.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
c. End Coordinates – existing, future, and ultimate degrees, minutes, seconds (to the nearest 0.01 second)	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second.				
d. Runway Safety Areas (RSA) – actual, existing, future, and ultimate (including dimensions)	Show the extents of the existing and ultimate RSA 5300-13A. Reference AC 150/5300-13A, Paragraph 307.				
e. Runway Object Free Areas (ROFA)	Show the extents of the existing and ultimate ROFA. Reference AC 150/5300-13A, Paragraph 309.				
f. Precision Obstacle Free Zone (POFZ)	Show the extents of the existing and ultimate POFZ. Reference AC 150/5300-13A, Paragraph 308(d).				
g. Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ. Reference AC 150/5300-13A, Paragraph 308.				
h. Clearways and Stopways	Show any/all clearways and stopways/overruns and the markings used to denote these areas. See AC 150/5300-13A, Paragraph 311 and 312; and AC 150/5340-1, Section 2, Paragraph 14.				
i. Runway Protection Zone (RPZ) - Dimensions (existing, future, and ultimate)	Show existing and ultimate RPZ. See AC 150/5300-13A, Paragraph 310. Show the existing and ultimate protective area/zone type of ownership. Identify any incompatible objects and activities inside the RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
j. 14 CFR Part 77 Approach Surfaces	Show the portion of the existing and ultimate approach surfaces that are over airport and adjacent property and identify the approach surface dimensions and slope. See FAA Order 7400.2, Figure 6-3-9.				
k. Threshold Siting Criteria: Approach/Departure Surface (existing, future, and ultimate) 5300-13A	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(b) and 303(c).				
l. Terminal Instrument Procedures (TERPS)surface and TERPS GQS, if applicable.	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(a)(4)(a), Table 3-4, and Table 3-5. Reference FAA Order 8260.3.				
m. Navigation Aids (NAVAIDS) – PAPI, ILS, GS, LOC, ALS, MALSR, REIL, etc., (plus facility critical area's)	Show all NAVAIDS and provide clearance distances from runways, taxiways, etc. Reference AC 150/5300-13A, Chapter 6.				
n. Marking – thresholds, hold lines, etc.	Show on the runway the type and location of markings, existing and ultimate. See AC 150/5340-1, Section 2.				
o. Displaced threshold coordinates and elevation	Show the latitude, longitude, and the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).5300-13A.				
p. Runway centerline separation distances	Show the runway centerline separation distances to parallel runway centerline, holding position, parallel taxiway/taxilane centerline, aircraft parking area, and helicopter touchdown pad, if applicable. Reference AC 150/5300-13A, Paragraph 321 and Table 3-8.				
7. Taxiway Details	Show the taxiway centerline separation distances to parallel taxiway/taxilane centerlines, fixed or movable objects.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
a. Dimensions – width (existing & ultimate)	Taxiway width based on Taxiway Design Group (TDG). See AC 150/5300-13A, Table 4-2.				
b. Taxiway Edge Safety Margin (TESM)	TESM dimension based on TDG. See AC 150/5300-13A, Table 4-2.				
c. Taxiway Shoulder Width	Taxiway shoulder width based on TDG. See AC 150/5300-13A, Table 4-2.				
b. Taxiway/Taxilane Object Free Area (TOFA)	TOFA width based on Taxiway Design Group (TDG). TOFA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.				
c. Taxiway/Taxilane Safety Area (TSA)	TSA width based on TDG. TSA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.				
d. Taxiway/Taxilane Centerline Separation from:					
i. Runway centerline	Show the distance from centerline of runway to centerline of taxiway. See AC 150/5300-13A, Table 4-1.				
ii. Parallel taxiway	Show the distance from centerline of taxiway to centerline of parallel taxiway. See AC 150/5300-13A, Table 4-1.				
iii. Aircraft parking	Show the distance from centerline of taxiway to marked aircraft parking/tie downs. See AC 150/5300-13A, Table 4-1.				
iv. Fixed or Movable Objects	Show the distance from centerline of taxiway to airport objects such as buildings, facilities, poles, etc. See AC 150/5300-13A, Table 4-1.				
8. Fences (identify height)	Show the location of existing and ultimate fences and identify height.				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
9. Aprons					
a. Dimensions (square footage, dimension, or length and width)	Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.				
b. Identify aircraft tie-down layout	Show proposed tie-down layout on the apron area. See AC 150/5300-13A, Figure A5-1, AC 20-35, and AC 150/5340-1.				
c. Identify Special Use Areas (e.g., deicing or aerial application areas on or near apron)	Show as applicable and pursuant to representative ACs.				
10. Roads	Label all roads.				
11. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.				
12. Items to be identified with distinct line types	Use distinct line types to identify different items and differentiate between existing and ultimate.				
a. NAVAID Critical Areas (Glide Slope, Localizer, AWOS, ASOS, VOR, RVR, etc.)	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.				
b. Building Restriction Lines 5300-13A(BRL)	The BRL is the line indicating where airport buildings must not be located, limiting building proximity to aircraft movement areas. See AC 150/5300-13A, Paragraph 213(a).				
c. Runway Visibility Zone (RVZ)	Show the RVZ for the existing and ultimate airport configurations. See AC 150/5300-13A, 305(c).				

Airport Layout Plan Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
d. Airport Property Lines and Easements (existing, future, and ultimate)	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations.				
13. Survey Documentation					
a. Survey Monuments (PACS/SACS, see AC 150/5300-16)	Show the location of all established survey monuments located on or near the airport property. Identify Primary and Secondary Airport Control Stations (PACS/SACS) if they exist. See AC 150/5300-16. Show the location of all section corners on or near the airport property.				
b. Offsets, stations, etc.	Show as applicable.				
14. Any Air Traffic Control Tower (ATCT) line of sight/shadow study areas (use separate sheet if necessary)	Reference FAA Order 6480.4.				
15. General Aviation development area (e.g., fuel facilities, FBO, hangars, etc.) – greater detail can be shown on the terminal area drawing	Show as applicable.				
16. Facilities and movement areas that are to be phased out, if any, are described	Show as applicable.				
Remarks					

A.5. Airport Airspace Drawing

- A required drawing.
- Scale 1" = 2000' plan view, 1" = 1000' approach profiles, 1"=100' (vertical) for approach profiles.
- 14 CFR Part 77, Objects Affecting Navigable Airspace, defines this as a drawing depicting obstacle identification surfaces for the full extent of all airport development. It should also depict airspace obstructions for the portions of the surfaces excluded from the Inner Portion of the Approach Surface Drawing.

Airport Airspace Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Plan view (based on ultimate runway lengths) Include location of water or sewage facilities if inside horizontal surface.					
1. U.S. Geological Survey (USGS) Quad Sheet for base map	Use the most current USGS Quadrangle(s) as a base map for the airspace drawing.				
2. Runway end numbers	Show the ultimate runways and runway numbers. Contact the FAA before renumbering existing runways.				
3. Part 77 Surfaces (Horizontal, Conical, Transition, based on ultimate). Including elevations at the point where surfaces change.	Show the extents of the Part 77 imaginary surfaces. For airports that have precision approach runways show balance of the 40,000' approach on a second sheet, if necessary. See 14 CFR Part 77.19.				
4. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on all sloping Part 77 imaginary surfaces. See 14 CFR Part 77.19.				
5. Top elevations of penetrating objects for the inner portion of the approach surface drawing	Identify by unique alphanumeric symbol all objects beyond the Runway Protection Zones that penetrate any of the Part 77 surfaces. See 14 CFR Part 77.				
6. Note specifying height restriction (ordinances/statutes)	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.				
7. North Arrow with	Magnetic declination may be				

Airport Airspace Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
magnetic declination and year	calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
C. Profile view					
1. Airport Elevation	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88 datum. See AC 150/5300-13A, Chapter 1, Paragraph 102(g).				
2. Composite Ground Profile along extended Runway Centerline (Representing the composite profile, based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface.				
3. Significant objects (bluffs, rivers, roads, schools, towers, etc.) and elevations	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects' same alphanumeric identifier that was used on the plan view. Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.				
4. Existing, future, and ultimate runway ends and approach slopes	Show existing and ultimate runway ends and FAR Part 77 approach surface slopes. See 14 CFR Part 77.19.				
D. Obstruction Data Tables (identify obstacles not depicted on the Inner Portion of the Approach Surface Drawing)					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach				

Airport Airspace Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
	surfaces, regardless of whether or not they are obstructions. Use the objects alphanumeric identifier that was used on the plan view. Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.				
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.				
3. Date of Obstruction Survey	Provide the date of latest obstruction survey.				
4. Ground Surface Elevation	Provide the ground surface elevation (MSL) at the base of each object.				
5. Object Elevation	List the above ground level (AGL) height and the top of object elevation (above mean sea level / AMSL / MSL) for each object.				
6. Amount of surface penetration	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77.				
7. Proposed or existing disposition of the obstruction	Provide a proposed or existing disposition of the object to remedy the penetration. See AC 70/7460-1.				
a. Proposed Disposition (existing)					
b. Proposed Disposition (future)					
Remarks					

A.6. Inner Portion of the Approach Surface Drawing

- A required drawing.
- Scale 1"=200' Horizontal, 1"=20' Vertical, two sheets may be necessary for clarity. Typically, the plan view is on the top half of the drawing and the profile view is on the bottom half. Views should be drawn from the runway threshold to a point on the approach slope 100 feet above the runway threshold elevation, at a minimum, or the limits of the RPZ, whichever is further.
- Drawings containing the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface penetrations. The drawing will depict the obstacle identification approach surfaces contained in 14 CFR Part 77, Objects Affecting Navigable Airspace. The drawing may also depict other surfaces, including the threshold-siting surface, Glideslope Qualification Surface (GQS), those surfaces associated with United States Standards for Instrument Procedures (TERPS), or those required by the local FAA office or state agency. The extent of the approach surface and the number of airspace obstructions shown may restrict each sheet to only one runway end or approach.

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Plan View (existing, future, and ultimate)					
1. Inner portion of approach surface	Show the area from the runway threshold out to where the ultimate approach surface slope is 100 feet above the threshold elevation.				
2. Aerial photo for base map	Use an aerial photograph for the base map.				
3. Objects (identified by numbers)	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.				
4. Property line within approaches	Show the property lines that are within the area/portion of airport shown.				

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
5. Road & railroad elevations, plus movable object heights	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverse way elevation plus the traverse way adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.				
6. Part 77 Approach Surface clearance over Roads and Railroads at the most critical points, the Centerline and Edge of the surface.	Provide elevation information for the traverse ways where they intersect the edges and centerline of the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.				
7. Physical end of runway, end number, elevation (NAVD88) Nearest 0.1 foot	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center.				
8. Airport Design Surfaces					
a. Runway Safety Area	Show the extents of the existing and ultimate Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307 and Table 3-8.				
b. Runway Object Free Area	Show the extents of the existing and ultimate Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309 and Table 3-8.				
c. Runway Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ which includes the inner-approach OFZ, inner-transitional OFZ, and the Precision OFZ (POFZ), if applicable. See AC 150/5300-13A, Paragraph 308.				

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
d. Runway Protection Zone (RPZ)	Show the extents of the existing and ultimate RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310, Table 3-5 and FAA memorandum dated September 27, 2012.				
e. NAVAID critical area	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.				
9. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, Paragraph 1005.				
10. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, Chapter 2, Section 5, for further information.				
C. Profile view					
1. Existing and proposed runway centerline ground profile (list elevations at runway ends & at all points of grade changes) (representing the composite profile based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface to where the ultimate approach surface slope is 100 feet above the threshold elevation. A more effective presentation may be a rendering of a composite critical profile.				

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
2. Future development from plan view	Identify future development using same alphanumeric identifier that was used on the plan view.				
3. Part 77 Approach/transition surface; existing and future VASI/PAPI siting surface	Show the boundaries of the existing and ultimate Part 77 Approach Surface. See FAA Order 7400.2, Figure 6-3-9, See also 14 CFR Part 77.				
4. Threshold Siting Surface	Depict any applicable siting requirements pursuant to Table 3-2 of FAA AC 150/5300-13A.				
5. Terrain in approach area (fences, streams, etc.)	Show all significant terrain(fences, streams, mountains, etc.) within the approach surfaces, regardless of whether or not they are obstructions				
6. Objects – identify the controlling object (same numbers as plan view)	Show all significant objects (roads, rivers, railroads, towers, sign and power poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Identify the objects using same alphanumeric identifier that was used on the plan view.				
7. Cross section of road & railroad	Show the cross-section of any roads and/or railroads that cross the area shown. Indicate cross section elevations of roads and railroads at edges and extended centerlines that cross the area shown.				
8. Existing and proposed property and easement lines	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations. AC 5300-13A Note easements for pipelines and residential through the fence gateways.				
D. Obstruction tables for each approach surface (surface should be identified)	A separate table for each runway end must be used to enhance information clarity.				
1. Object identification number	List each object by the same alphanumeric symbol used in the plan view.				

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.				
3. Date of Obstruction Survey and Survey Accuracy	Provide the date of latest obstruction survey.				
4. Surface Penetrations	5300-13A For any object that penetrates the Part 77 surface, the approach surface, or the obstacle free zone, describe the vertical length the object protrudes.				
5. Proposed disposition of surface penetrations	Provide a proposed disposition of the object to remedy the penetration as described in item 4 above. See AC 70/7460-1 for Part 77 violations. “Removal” and/or “Lower” should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303 and 308.				
6. Object elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.				
7. Triggering Event (e.g., a runway extension) – Timeframe/expected date for removal	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77 and AC 150/5300-13A, Paragraphs 303 and 308.				
8. Allowable approach surface elevation (if applicable)					
9. Amount of approach surface penetration (if applicable)					
10. Proposed disposition of approach surface obstruction (if applicable)	Provide a proposed disposition of the object to remedy the penetration. See AC 70/7460-1 for Part 77 violations. “Removal” and/or “Lower” should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303.				

Inner Portion of the Approach Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
11. Obstacle Free Zone (OFZ)	Determine and depict the applicable OFZ surfaces, see AC 150/5300-13A, Paragraph 308. Provide a proposed disposition of the object to remedy the penetration. Note: Modification to the OFZ standard is not permitted.				
E. Runway Centerline Profile	This may be shown on the Inner Portion of the Approach Surface drawing if there is space to show the runway and Runway Safety Area in sufficient detail otherwise a separate sheet may be necessary. At a minimum this drawing is to show the full length of the runway and Runway Safety Area including: runway elevations, runway and Runway Safety Area gradients, all vertical curves, and a line representing the 5' line-of-sight. See AC 150/5300-13A, Paragraph 305.				
1. Scale	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Paragraph 305.				
2. Elevation	Show runway elevations, runway and Runway Safety Area gradients, and all vertical curve data. See AC 150/5300-13A, Paragraph 318.				
3. Line of Sight	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Section 305.				
Remarks					

A.7. Runway Departure Surface Drawing

- Required where applicable. For each runway that is designated for instrument departures.
- This drawing depicts the applicable departure surfaces as defined in Paragraph 303 of FAA AC 150/5300-13A. The surfaces are shown for runway end(s) designated for instrument departures.
- 40:1 for Instrument Procedure Runways (Scale, 1" = 1000' Horizontal, 1" = 100' Vertical, Out to 10,200' beyond Runway threshold) 62.5:1 for Commercial Service Runways (Scale, 1" = 2000' Horizontal, 1" = 100' Vertical, Out to 50,000' beyond Runway threshold).
- Contact the FAA if the scale does not allow the entire area to fit on a single sheet. The depiction of the One Engine Inoperative (OEI) surface is optional; it is not currently required.

Runway Departure Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Plan view (existing & future)	See AC 150/5300-13A, Paragraph 303(c).				
1. Aerial Photo for base map	Use an aerial photograph for the base map. A USGS 7.5 minute series map is also acceptable.				
2. Runway end numbers and elevations (nearest 1/10 of a foot)	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center. For runways that have a clearway, depict this surface and the relocated departure surface. Reference AC 150/5300-13A, Paragraph 303(c)(1).				
3. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on the Part 77 imaginary surfaces. See 14 CFR Part 77.19.				
4. Depict property line, including easements	Show the property line(s) that are within the area/portion of airport shown.				
5. Identify, by numbers, all traverse ways with elevations and computed vertical clearance in the departure surface	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters.				

Runway Departure Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
6. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used.				
C. Profile view (existing & future)					
1. Ground profile	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the departure surface to extents of the surface dimensions.				
2. Significant objects (bluffs, rivers, roads, buildings, fences, structures, etc.)	Show all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.				
3. Identify obstructions with numbers on the plan view	Identify the objects using same alphanumeric identifier that was used on the plan view.				
4. Show roads and railroads with dashed lines at edge of the departure surface	Show the cross-section of any roads and/or railroads that cross the area shown.				
D. Obstruction Data Tables					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters. List each object by the same alphanumeric symbol used in the plan view.				
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Tree, Natural Gas Flare, etc.				
3. Object Elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.				

Runway Departure Surface Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
4. Amount of surface penetration	List the object protrudes above the departure surface. See AC 150/5300-13A, Paragraph 303(c).				
5. Proposed or existing disposition of the obstruction	Provide a proposed disposition of the object to remedy the penetration. See AC 150/5300-13A, Paragraph 303(c).				
6. Separate table for each departure surface	A separate table for each runway end must be used to enhance information clarity.				
Remarks					

A.8. Terminal Area Drawing

- Scale 1”=50’ or 1”=100’. Plan view of aprons, buildings, hangars, parking lots, roads.
- This plan consists of one or more drawings that present a large-scale depiction of areas with significant terminal facility development. Such a drawing is typically an enlargement of a portion of the ALP. At a commercial service airport, the drawing would include the passenger terminal area, but might also include general aviation facilities and cargo facilities. See AC 150/5300-13A, Appendix 5.
- Use scale that allows the extent of the terminal/FBO apron area to best fit the chosen sheet size, e.g., typical GA airports may be able to use 1”=50’ scale on a 22” X 34” sheet, but a complex hub airport with multiple terminal areas may require a 1”=100’ scale on a 36” X 48” sheet. Contact FAA if an airport layout requires scaling or sheet sizing other than what is listed.
- This drawing is not needed at every airport type and is therefore optional.

Terminal Area Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Building data table	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL.				
1. Structure identification number					
2. Top elevation of structures (AMSL)					
3. Obstruction marking/lighting (existing/future)	Show the location of existing and ultimate hangars. Include dimensions of apron and distance from runway and taxiway centerlines. See AC 150/5300-13A, Appendix 5. Show the elevation of the highest point of each structure.				
C. Buildings to be removed or relocated noted	If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation.				
D. Fueling facilities, existing and future	Show the location of existing and ultimate fueling facilities. Include dimensions of apron and distance from runway and taxiway centerlines.				

Terminal Area Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
E. Air carrier gates positions shown (existing/future)	Show the existing and ultimate air carrier gate positions. See AC 150/5300-13A, Chapter 5.				
F. Existing and future security fencing with gates	Show the existing and ultimate security fencing and gates. See AC 150/5300-13A, Paragraph 606.				
G. Building restriction line (BRL)	Show the Building Restriction Line (BRL) that is within the area/portion of airport shown. The BRL identifies suitable building area locations on airports. This should be located where the Part 77 surfaces are at 35' above the airport elevation unless a different height is coordinated with the FAA. See AC 150/5300-13A, Paragraph 213(a).				
H. Taxiway or Taxilane centerlines designated	Show centerlines of all taxiway and taxilanes within the area/portion of airport shown.				
I. Dimensions					
1. Clearance Dimensions between runway, taxiway, and taxilane centerlines and hangars, buildings, aircraft parking, and other objects.	Show the location of existing and ultimate apron. Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75. Show the dimensions between existing and ultimate runway, taxiway, and taxilane centerlines and existing and ultimate hangars, buildings, aircraft parking, and other fixed or movable objects. See AC 150/5300-13A, Chapter 3 and Chapter 4. Show proposed tie-down layout on the apron area as well as taxilane marking plan. See AC 150/5300-13A, Appendix 5, AC 20-35, and AC 150/5340-1.				
2. Dimensions of aprons, taxiways, etc. Apron/Hangar areas that do not meet dimensional standards of the critical aircraft should be identified and the wingspan/design group of the aircraft that can use that area depicted. Include tie down location with clearances					

Terminal Area Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
J. Property Line	Show the property line(s) that are within the area/portion of airport shown.				
K. Auto parking (existing & ultimate)	Show the existing and ultimate auto parking areas. See AC 150/5300-13A, Appendix 5.				
L. Major airport drainage ditches or storm sewers	Show any significant airport drainage ditches or storm sewers within the area/portion of airport shown.				
M. Special Use Area (e.g., Agricultural spraying support, Deicing, or Containment)	Show any special use areas within the area/portion of airport shown.				
N. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
O. Fence	Show the existing and ultimate perimeter fencing or general area fencing.				
P. Entrance Road	Show the existing and ultimate entrance road. See 5300-13AFAA Order 5100.38, Chapter 6, Section 2.				
Remarks					

A.9. Land Use Drawing

- Scale 1”=200’ to 1”=600’.
- A drawing depicting on- and off-airport land uses and zoning in the area around the airport. At a minimum, the drawing must contain land within the 65 DNL noise contour. For medium or high activity commercial service airports, on-airport land use and off-airport land use may be on separate drawings. The Airport Layout Drawing should be used as a base map.
- Drawing optional. Need based on scope of work.

Land Use Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.				
B. Airport boundaries/property, existing & future (fee and easement)	Show the existing and ultimate property lines. If known, show property lines for parcels surrounding the airport.				
C. Plan view of land uses by category (Agricultural, Aeronautical, Commercial, Residential, etc.). Use local land use categories.					
1. On-Airport (existing & future)	Label existing and ultimate on-airport property by usage, e.g., Terminal Area, Air Cargo, Public Ramp, Airfield - Movement, Airfield - Non-movement, etc. Include existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids).				
2. Off-Airport (existing & future) [to the 65 DNL Contour at a minimum, if contour known]	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.				
D. Boundaries of local government	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.				
E. Land use legend	Provide a legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.				

Land Use Drawing					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
F. Public facilities (schools, hospitals, parks, churches etc.)	Identify public facilities, e.g., schools, parks, etc.				
G. Runway visibility zone for intersecting runways	Show the Runway Visibility Zone(s) for the existing and ultimate airport configurations. See AC 150/5300-13A, Section 305.				
H. Show off-airport property out to 65 DNL if available	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.				
I. Airport Overlay Zoning or Zoning Restrictions	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.				
J. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
K. Drawing details to include runways, taxiways, aprons, RPZ, terminal buildings and NAVAIDS	Show existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids, etc.). See AC 150/5300-13A.				
L. Crop Restrictions	Show the Crop Restriction Line (CRL). See AC 150/5300-13A, Paragraph 322 and AC 150/5200-33.				
Remarks					

A.10. Airport Property Map / Exhibit A

- Scale 1”=200’ to 1”=600’.

Airport Property Map / Exhibit A					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Will Property Map serve as Exhibit A? – **If YES,** follow the directions to the right. – **If NO,** go to item B below.	If prepared in accordance with AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects, use ARP SOP no. 3.00 Exhibit A guidance instead of below checklist.				
If Property Map *will not* serve as Exhibit A: B. Title and Revision Blocks					
C. Plan view showing parcels of land (existing, future, and ultimate)					
1. Fee land interests (existing and future)					
2. Easement interests (existing and future)					
a. Part 77 protection					
b. Compatible Land Use					
c. RPZ protection					
3. Airport Property Line					
D. Legend – shading/cross hatching, survey monuments, etc.					
E. Data Table					
1. Depiction of various tracts of land acquired to develop airport	If any obligations were incurred as a result of obtaining property, or an interest therein, they should be noted. Obligations that stem from Federal grant or an FAA-administered land transfer program, such as surplus property programs, should also be noted. The drawing should also depict easements beyond the airport boundary.				

Airport Property Map / Exhibit A					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
2. Method of acquisition or property status (fee simple, easement, etc.)					
3. Type of Acquisition Indicated	(e.g., AIP-noise, AIP-entitlement, PFC, surplus property, local purchase, local donation, condemnation, other)				
4. Acreage					
F. Access point(s) for through-the-fence arrangements including residential					
Remarks					

APPENDIX B. ALP APPROVAL TYPES AND APPROVAL LETTERS

FAA has two Orders guiding approval of ALPs: FAA Order 5050.4B which deals with environmental requirements and FAA JO 7400.2 which deals with airspace matters. Requirements from each are contained in all ALP approval letters.

B.1. FAA Order 5050.4B Provisions

Airport sponsors, consultants, the public—and even FAA staff—sometimes request clarification on the meaning of "conditional" and "unconditional" approval of ALPs. FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions (or latest edition), clearly explains the specific criteria for those types of ALP approvals, as well as for a third, "mixed" approval. FAA's conditional, unconditional, or mixed approval of an ALP is a Federal action subject to NEPA and other environmental laws. Section 202 of the Order, the complete text of which is on the following pages, describes in detail those three approval types.

The vast majority of FAA's ALP approvals have been "conditional," as not all development depicted on the drawings has received formal environmental approval, especially that planned for the long-term. This type of approval also includes a caveat that development not yet shown on the ALP is subject to FAA environmental approval.

Although there is provision in the Order for completely "unconditional" approval of an ALP, as a practical matter, such approval is unlikely. Even the ALP for an entirely new airport would show development beyond the time-limited approval horizon of an Environmental Assessment (EA) or Environmental Impact Statement (EIS) (normally, approved work must commence within three years of the environmental finding or record of decision).

A "mixed" ALP approval includes an unconditional approval of specifically-listed projects which have received environmental approval and are cleared for work to begin, as well as conditional approval of planned development that must still receive environmental approval before work can start. (Note: There is another type of mixed approval, not mentioned in the Order, where specific planned or existing development is not approved, but for non-environmental reasons.) This summarizes the three types described in detail on the following pages:

a. Conditional ALP approval

(1) Does not confer environmental approval for all features depicted on the ALP.

(2) Approves the building of facilities only after FAA completes its environmental analysis of those facilities and issues an unconditional approval of the ALP depicting them.

(3) ALP is still subject to environmental review.

b. Unconditional ALP approval

(1) FAA has completed the environmental review process for near-term development.

(2) FAA has authorized construction of facilities depicted on the unconditionally-approved ALP.

c. "Mixed" ALP approval

(1) FAA has environmentally analyzed and unconditionally approved the near-term development shown on the ALP, but defers its environmental review of the long-term development.

(2) FAA has conditionally approved that portion of the ALP depicting the long-term development.

(3) FAA approval letter must specify those projects that are unconditionally or conditionally approved.

Again, the complete and detailed descriptions from Section 202 of the Order are contained here. The attachments consist of examples of conditional and/or mixed ALP approval letters which may be used as templates. The fourth sample letter illustrates a specific exception to an otherwise conditional approval.

Note: The following is an excerpt from Section 202 of FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.

202. AIRPORT LAYOUT PLAN (ALP).

a. General. An ALP identifies all existing and future runways, runway extensions, terminal buildings and other airfield facilities, and the descriptions of the development needed to support them. The ALP is for planning purposes only. It does not commit the airport sponsor to building any depicted airport facilities. Also, ARP's approval of an ALP does not commit ARP to contribute Federal financial support to the facilities the ALP depicts.

b. NEPA compliance for ALP approvals. As paragraph 9.g.(3) notes, FAA's conditional, unconditional, or mixed approval of an ALP is a Federal action subject to NEPA and other environmental laws.

c. FAA's ALP approval choices. The approving FAA official may issue a "conditionally" or "unconditionally" approve an ALP as discussed below. Also, that official may environmentally and unconditionally approve more immediate range development shown on an ALP, while deferring environmental action on later stages of proposed development depicted on the same ALP but not yet ripe for decision. This situation leads to the official a "mixed" ALP approval as discussed in paragraph 202.c (3).

(1) Conditional ALP approval. This approval signals that:

(a) The proposed ALP depicts features that are safe and efficient for airport operations and airport use.

(b) ARP has not yet completed its review of the environmental impacts the features depicted on the ALP would cause. ARP has not done so because the features are not yet needed and are not ripe for decision (see "tiering" paragraph 1403 of this Order for more information). or

(c) The approving FAA official has ***not*** authorized the airport sponsor or project proponent to begin building the facilities shown on the conditionally approved ALP. The sponsor or proponent may start building those facilities ***only after*** the ARP completes its environmental analysis of those facilities and the approving FAA official issues an unconditional approval of the ALP depicting those facilities.

Note: A conditional ALP approval normally qualifies as a categorical exclusion under the Administrative/General exclusions, FAA Order 1050.1E, paragraph 307.p. (also see Chapter 6, Table 6-1, of this Order). Because there is no reasonable expectation that the approval would cause environmental effects, it rarely involves extraordinary circumstances (FAA Order 1050.1E, paragraph 303d).

(2) Unconditional ALP approval. This approval signals that:

(a) The proposed ALP depicts features that are safe and efficient for airport operations and airport use and that the features are ripe for Federal decision.

(b) ARP has completed the environmental review process this Order requires for the near-term and immediate-term development that is ripe for decision. and

(c) The approving FAA official ***has*** authorized the airport sponsor or project proponent to begin building the facilities or equipment depicted on the unconditionally approved ALP.

(3) "Mixed" ALP approval. ARP would issue this approval when it unconditionally and conditionally approves the same ALP. ARP would likely issue this approval for ALPs resulting from master plans showing various airport development over a long period of time. In these cases, ARP would environmentally analyze and unconditionally approve the near-term and immediate-term development shown on an ALP that is ripe for decision. However, ARP would defer its environmental review of the long-term development that is not yet ripe for decision. When issuing a "mixed ALP approval:"

(a) The approving FAA official would unconditionally approve that portion of an ALP depicting the proposed near-term and immediate-term development the sponsor proposes. But to do so, ARP must have completed its environmental review and make applicable assurances (e.g., those addressing Section 4(f), relocation, wetlands, floodplains, and coastal zone management programs) for those actions ripe for decision. If ARP has evaluated the environmental effects for all of the development on the ALP, the official would unconditionally approve the entire ALP. ARP urges sponsors or proponents to begin all of the unconditionally approved development within 3 years of the date ARP completes its environmental review for that development. If they do not, ARP would need to complete a written re-evaluation of or a supplement to the NEPA document ARP completed earlier when it unconditionally approved the ALP. (See paragraphs 1401 and 1402 of this Order for more information).

(b) The approving FAA official would conditionally approve that portion of the ALP depicting the long-term development that is not yet ripe for decision. Later, when the airport sponsor or proponent chooses to build this development, it must ***first*** obtain the official's unconditional ALP approval for that development. To do so, ARP would have to complete the proper NEPA document, issue the proper assurances, and the official would have to unconditionally approve the ALP segments depicting the development that is now ripe for decision.

(4) Limitations on ALP approvals. The approving FAA official may not conditionally approve an ALP depicting a new airport, a new runway, or a major runway extension if any of those projects and their associated actions are the subjects of an EA or EIS that is being prepared. In these instances, the approving FAA official may unconditionally approve an ALP depicting those facilities and their connected actions, but only if FAA has issued a FONSI or ROD that is based on an EA or EIS that addresses those airport actions.[1] These limitations do not preclude ARP from taking any of the following actions:

(a) Approving ALPs depicting and approving Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) funding for projects having independent utility from those the ongoing NEPA document is addressing. For purposes of this Order, a project has independent utility when the project has logical starting and end points and would have a useful purpose without relying on other transportation improvements.

(b) Issuing airspace determinations that focus on the effect of proposed major airport development projects on the safe, efficient use of the airport's navigable airspace. or

[1] Memo from Manager, Community and Environmental Needs Division, dated November 17, 2003, addressing Airport Layout Plan Approvals.

(c) Issuing written findings that ALPs depict features that are safe and efficient for airport operations and airport use.

d. FAA's ALP approval letters. These letters reflect FAA's decision on the proposed project's effect on airport utility as well as safe and efficient use of the airport and navigable airspace. They also reflect the status of FAA environmental reviews for facilities the ALP depicts.

(1) A conditional ALP approval. When the approving FAA official conditionally approves an ALP, the approval letter must specifically identify those items on the associated ALP that FAA has ***not*** environmentally analyzed. In addition, the ALP should be dated. Either the dated plans or an approval letter accompanying it should clearly indicate that the approving FAA official has ***conditionally*** approved the ALP and that the ALP is ***still*** subject to environmental review. The approval letter should include text similar to this:

> "My signature on the enclosed ALP does not necessarily reflect the FAA's official views or policy, authorize construction of the development, nor constitute FAA's commitment to take part in the recommended development.
>
> The actions listed below are subject to Federal environmental laws, statutes, and regulations. FAA first must make an environmental finding on these actions before the airport sponsor may begin them. To satisfy these responsibilities, FAA must complete the environmental process described in the most current version of FAA Order 5050.4.

(ARP suggests listing here those actions requiring FAA's written environmental approval).

> "This approval does not cancel notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(2) An unconditional ALP approval. When the approving FAA official unconditionally approves an ALP, the letter must specifically state that fact. ARP suggests listing the facilities the official is unconditionally approving. A way to do so is to stamp the words, "UNCONDITIONALLY APPROVED" on the ALP and enter the date of that approval. Suggested language for the unconditional approval letter is:

> "The Federal Aviation Administration (FAA) has completed its environmental review of the enclosed Airport Layout Plan (ALP) and has unconditionally approved the facilities listed below. Note the approval does not necessarily reflect FAA's official views or policy. Also note my signature does not constitute the FAA's commitment to take part in the recommended development.
>
> This approval does not cancel notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(ARP suggests listing here those projects FAA is unconditionally approving).

(3) A "mixed" ALP approval. When the approving FAA official issues a "mixed" ALP approval, the letter must specify those projects that the decision maker has unconditionally and conditionally approved. Suggested language for a "mixed" ALP approval is:

> "Due to the various timing of projects depicted on this ALP, I am issuing unconditional and conditional ALP approvals as described below. FAA has completed its environmental reviews of those projects that I have unconditionally approved. For FAA purposes, the sponsor may undertake only those projects that have received that approval. All other projects depicted on the ALP have not yet been environmentally reviewed. Therefore, I have conditionally approved them. For FAA purposes, the sponsor is not authorized to construct those projects until FAA unconditionally approves them.
>
> Neither approval cancels notice and review requirements that 14 CFR Parts 77 and 157 impose because they address all proposed structures shown on the ALP."

(ARP suggests listing here those actions for which FAA has completed its environmental review (unconditionally approved) and those for which it has not (conditionally approved)).

B.2. FAA Order 7400.2J Provisions

In addition to FAA Order 5050.4B, another FAA Order, JO 7400.2J (or latest edition), Procedures for Handling Airspace Matters, contains provisions regarding ALP approvals. Portions of that Order pertinent to ALP approval are excerpted below. Although Order JO 7400.2J specifies only two types of ALP approvals—"Approved" and "Conditional Approval"—this SOP uses the three types specified in Order 5050.4B, as they are variations on the JO 7400.2J types. Language from Section 12-1-5 of Order JO 7400.2J is also included in the example approval letters, as the ALP approval letter also constitutes an aeronautical study determination.

Note: The following is an excerpt from Chapter 12 of FAA Order JO 7400.2J, Procedures for Handling Airspace Matters.

12−1−2. TERMINOLOGY

b. ALP. An ALP is a graphic depiction of the existing and future airport facilities showing the clearance and dimensional requirements to meet applicable standards. The ALP serves as a record of aeronautical requirements and is used by the FAA in its review of proposals that may affect the navigable airspace or other missions of the FAA.

1. Approved. An approved ALP is one that has met all the applicable requirements as set forth in the appropriate FAA documents. In order for an ALP to be unconditionally approved, the appropriate FAA offices must have reviewed and approved the location, type, and dimension of all proposed development. In addition, all proposed development must have been subject to the appropriate environmental processing and have written approval by the FAA.

2. Conditional Approval. The conditional approval of an ALP is one that has met all the applicable requirements. An ALP that has been conditionally approved is one where the proposed development has received conceptual approval by the appropriate FAA office. The proposed development has not received approval as to the final location, type, and dimension of all proposed development. New structures would require the submission of FAA Form 7460−1. In addition, where the appropriate environmental processing has not occurred, a conditional ALP approval would be required.

12−1−5. STATEMENT IN DETERMINATIONS

a. No Objections or Conditional. Include the following statement in the determination forwarded to the proponent:

1. "This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground."

2. "In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal."

3. "The FAA cannot prevent the construction of structures near an airport. The airport environs can only be protected through such means as local zoning ordinances, acquisitions of property in fee title or aviation easements, letters of agreement, or other means."

B.3. Example 1: Conditional ALP Approval

The conditions and exceptions in each letter are highlighted in yellow and bolded.

(Date)

(Airport Sponsor and address)

Dear ____:

The ____ Airport Layout Plan (ALP), prepared by ____, and bearing your signature, is approved and the master plan is accepted. A signed copy of the approved ALP is enclosed.

An aeronautical study (no. ____-NRA) was conducted on the proposed development. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means.

This ALP approval is conditioned on acknowledgement that any development on airport property requiring Federal environmental approval must receive such written approval from FAA prior to commencement of the subject development. This ALP approval is also conditioned on acceptance of the plan under local land use laws. We encourage appropriate agencies to adopt land use and height restrictive zoning based on the plan.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

Please attach this letter to the Airport Layout Plan and retain it in the airport. We wish you great success in your plans for the development of the airport.

Sincerely,

(Authorized signature, ADO or Airports Regional Office)

Enclosure

cc: (Consultants), (State Aeronautics), (Other FAA LOBs), (etc.)

B.4. Example 2: Conditional ALP Approval with Stipulation

The conditions and exceptions in each letter are highlighted in yellow and bolded.

(Date)

(Airport Sponsor and address)

Dear ____:

We have completed our review of the updated Airport Layout Plan (ALP) for the ____ Airport, ____, (state), and find it acceptable from a planning standpoint. **The ALP** was reviewed by FAA (airspace study ____-NRA) and **is conditionally approved.** This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means.

The approval, indicated by my signature, is **given subject to the condition that the depicted lengthening and strengthening of Runway ____ may not be undertaken without environmental approval by the Federal Aviation Administration.**

Notwithstanding, all items of development shall comply with the requirements of the National Environmental Policies Act of 1969 (P.L. 91-190). Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration.

When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

We are enclosing a copy of the approved ALP drawing set for your records. If you have any questions, please contact me at our office at (tel. no).

Sincerely,

(Authorized signature, ADO or Airports Regional Office)

Enclosure

cc: (Consultants), (State Aeronautics), (Other FAA LOBs), (etc.)

B.5. Example 3: "Mixed" ALP Approval with Specifically Approved Items

The conditions and exceptions in each letter are highlighted in yellow and bolded.

(Date)

(Airport Sponsor and address)

Dear ____:

____ Airport

Airport Layout Plan Update

Airspace Case No. ____-NRA

The ____ Airports District Office has completed the review of the Airport Layout Plan (ALP) update for the ____ Airport and we have found it acceptable from a planning standpoint, as detailed below. Please find enclosed a signed copy of the updated ALP, with a revision date of ____.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means. We encourage the appropriate local agencies to adopt land use and height restrictive zoning based on the revised plan.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

The approval indicated by my signature is given subject to the condition that the proposed airport development requiring environmental processing shall not be undertaken without the FAA's prior, written approval. The following proposed airport development reflected on the ALP has received the required environmental processing and is hereby unconditionally approved:

- **Widen and extend ____**
- **Extend Taxiway ____**
- **Construct Runway ____ and a parallel taxiway**
- **Widen Runway ____ and construct parallel taxiways**
- **Expand commercial apron**

The Capital Improvement Plan (CIP) shown in the updated master plan indicates the year in which the airport sponsor plans to initiate these development projects. While the ____ ADO will consider this CIP to develop and amend the FAA's ACIP for the airport, please note that the FAA will periodically review and revise its ACIP for the ____ Airport and it may vary from the CIP proposed in the updated master plan.

If you have questions regarding this ALP approval, please contact ____, ____ Program Manager, at ____ (tel. no.).

Sincerely,

(Authorized signature, ADO or Airports Regional Office)

Enclosure

cc: (Consultants), (State Aeronautics), (Other FAA LOBs), (etc.)

B.6. Example 4: Conditional ALP Approval with Exception

The conditions and exceptions in each letter are highlighted in yellow and bolded.

(Date)

(Airport Sponsor and address)

Dear ____:

The ____ Airport Layout Plan (ALP), prepared by ____, and bearing your signature, **is approved, with exception as noted.** A signed copy of the approved ALP is enclosed.

An aeronautical study (____-NRA) was conducted on the ALPs proposed development. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means.

The FAA ____ Flight Standards District Office (FSDO) correctly noted that the ALP's proposed location of future baseball fields would not have an adverse effect on aeronautical operations. That is not the issue, however, as it would be the aeronautical operations which would have an adverse effect on parents and children using the baseball fields, as they would be highly sensitive to low-flying aircraft conducting normal operations in the airport traffic pattern. Further, as evidenced by two recent aircraft accidents in playgrounds near the ____ Airport, there is an increased safety risk to persons and property on the ground in the final approach/departure areas to runways. The proposed location of the future baseball fields, therefore, is both a perceived and real safety issue and, consequently, an incompatible land use in such close proximity to an airfield. This was noted in ____ review comments letter on the draft ALP. The proposed location is also contrary to the [sponsor's] own proper designation of this part of the airport as "Aviation Related Use Area". **For these reasons, the location of future baseball fields as shown on the ALP is not approved.**

On the issue of non-aviation related uses, as you know, the ____ Airport property was originally conveyed from the United States to ____ under the Surplus Property Act of 1944. The Act requires that all non-aviation uses and tenants of the airport's property pay fair market rental value, i.e., the amount which they would have to pay to rent or lease comparable private property. If such uses do not pay fair market rates, or if the income is not used for airport operations or development, the FAA considers it revenue diversion. The fair market rental value requirement also applies to nonprofit organizations or uses, and would be applicable to the ALPs depicted non-aviation uses of baseball fields, hotel/conference center, recreational vehicle park, and golf course. Finally, even if depicted on the approved ALP, Federal Aviation Regulation (FAR) Part 77 and the [sponsor's] grant assurance obligations require that all proposed development on airport property be submitted to this office for aeronautical study using FAA Form 7460-1, Notice of Proposed Construction or Alteration.

This approval is conditioned on acknowledgement that any development on airport property requiring Federal environmental approval must receive such written approval from FAA prior to commencement of the subject development. This ALP approval is also conditioned on acceptance of the plan under local land use laws. We encourage appropriate agencies to adopt land use and height restrictive zoning based on the plan.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

Please attach this letter to the Airport Layout Plan and retain it in the airport files.

Sincerely,

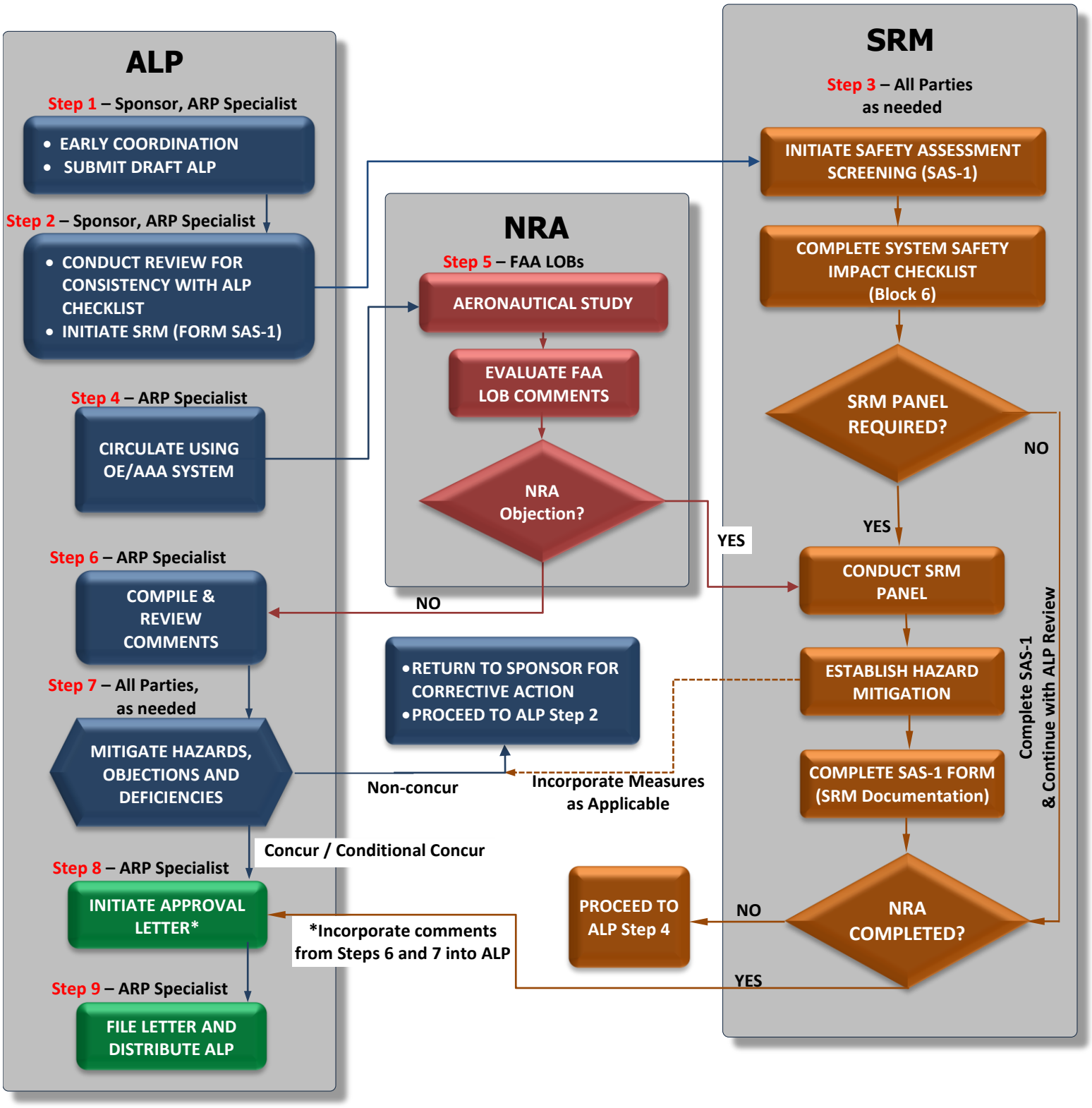
(Authorized signature, ADO or Airports Regional Office)

Enclosure

cc: (Consultants), (State Aeronautics), (Other FAA LOBs), (etc.)

This page intentionally left blank.

APPENDIX C. GENERAL ALP PROCESS CHART



NOTE:
Refer to text provided under the applicable Procedure Step for detailed information regarding actions and responsibilities.

FAA
Airports

ARP SOP 3.00

Effective Date:
October 1, 2013

Standard Operating Procedure (SOP)

Standard Operating Procedure (SOP) for FAA Review of Exhibit 'A' Airport Property Inventory Maps

1. PURPOSE

This SOP establishes uniform Airports Specialist procedures for reviewing and accepting Exhibit 'A' Airport Property Inventory Maps. Standards for developing Exhibit 'A' Airport Property Inventory Maps are located in FAA Advisory Circular 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects, Figure 1-2.

2. SCOPE

This SOP is limited to the review and acceptance of Exhibit 'A's. The Exhibit 'A' should be limited to those elements which will assist in the identification of property only. The primary content of this SOP includes an Exhibit 'A' Airport Property Inventory Map Review Process Chart (Appendix A) and a review checklist (Appendix B).

3. CANCELLATION

This SOP does not cancel a previous version.

4. APPLICABLE REGULATIONS, POLICY, AND GUIDANCE

Requirements identified within this SOP originate in or are further described in various FAA directives including Orders, regulations, and Advisory Circulars. Use the current versions.

a. FAA Advisory Circular 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects, Figure 1-2.

b. FAA Advisory Circular 150/5300-18B, General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards, Section 2.14.

c. FAA Advisory Circular 150/5070-6B, Airport Master Plans, Paragraph 1002 (10).

d. Grant Assurances – Airport Sponsors, updated April 2012. Grant Assurances 4, 5, 29 and 31.

e. FAA Order 5100.38C, Airport Improvement Program Handbook, Paragraphs 353, 500(a), 1010(a), 1031(b)(10) and 1313(b).

f. FAA Order 5190.6B, Compliance Handbook, Paragraph 7.19, 22.14.

g. FAA Order 5010.4, Airport Safety Data Program, airport specific 5010-1 form, data element #25.

h. FAA Program Guidance Letter 08-02, Management of Acquired Noise Land: Inventory - Reuse – Disposal.

i. FAA Order 5190.2R, List of Public Airports Affected by Agreements With the Federal Government.

5. EXHIBIT 'A' REQUIREMENTS AND OBJECTIVES

An Airport Sponsor has a federal obligation to submit accurate Exhibit 'A' Airport Property Inventory Maps (Exhibit 'A') when applying for and prior to execution of certain federal grants.

The Airport Sponsor is required to maintain and update the Exhibit 'A' by submitting it to the Federal Aviation Administration (FAA) Airports Specialist. The Exhibit 'A' is a snapshot of the inventory of parcels that make up dedicated airport property. The Exhibit 'A' indicates how the land was acquired, the funding source for the land and if the land was conveyed as Federal surplus land or Government Property. Other detached parcels owned by the Airport Sponsor that are dedicated to airport purposes must also be shown on the Exhibit 'A'. The Exhibit 'A' must show all dedicated airport property regardless of the type of funds (AIP, state, local, etc.) used to acquire that property. All land described in a project application and shown on an Exhibit 'A' constitutes the airport property federally obligated for compliance under the terms and covenants of a grant agreement.

An Airport Sponsor is federally obligated to obtain FAA consent to delete any land described and shown on the Exhibit 'A'.

New airports receiving a grant for the first time must submit an Exhibit 'A' depicting the land required to support the facilities needed to operate the airport.

6. DISTRIBUTION

This SOP is distributed to the Federal Aviation Administration (FAA) Airports Organization (ARP) and all interested parties. The SOP will be available electronically on the Airports section of the FAA website.

7. CHANGE TABLE

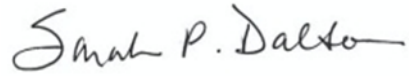
Date of Change	SOP Version	Page Changed	Reason for Change



Benito DeLeon
Director, Airport Planning and Programming



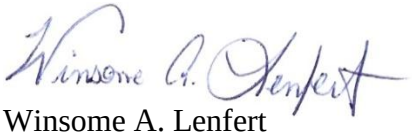
Byron K. Huffman
Manager, Alaskan Region Airports Division



Sarah P. Dalton
Manager, Northwest Mountain Region Airports Division



Jim A. Johnson
Manager, Central Region Airports Division



Winsome A. Lenfert
Manager, Southern Region Airports Division



Debbie Roth
Manager, Eastern Region Airports Division



Kelvin L. Solco
Manager, Southwest Region Airports Division



Susan Mowery-Schalk
Manager, Great Lakes Region Airports Division



Mark A. McClardy
Manager, Western-Pacific Region Airports Division



Mary T. Walsh
Manager, New England Region Airports Division

Table of Contents

1. Roles and Responsibilities 1

1.1. Airport Sponsor 1

1.2. Airport Consultant 1

1.3. State Agency 1

1.4. Airports Specialist 1

2. Process and Procedures 1

2.1. When to Submit the Exhibit 'A' 1

2.1.1. Noise Land 1

2.2. Review Procedures 2

2.2.1. Review for Completeness 2
2.2.2. Checklist Review 2
2.2.3. Exhibit 'A' Files 2

Appendix A. Exhibit 'A' Review Process Chart A-1

Appendix B. Exhibit 'A' Review Checklist B-1

1. ROLES AND RESPONSIBILITIES

1.1. Airport Sponsor

The Airport Sponsor is an entity that owns or controls an airport. The Airport Sponsor is responsible for submitting the Exhibit 'A' Airport Property Inventory Maps (Exhibit 'A') to the FAA and revising/updating it when necessary.

1.2. Airport Consultant

An Airport Consultant is a private or public company that provides technical expertise which the Airport Sponsor may not have on staff. The Airport Sponsor often hires an Airport Consultant to develop, revise and update the Exhibit 'A' on behalf of the Airport Sponsor.

1.3. State Agency

A State Agency is an organization of state government dealing with transportation or aviation. They may also be Airport Sponsors in some states. In some instances, particularly with block grant states, the State Agency may have certain Exhibit 'A' development or review responsibilities.

1.4. Airports Specialist

An Airports Specialist is an FAA employee in the Airports line of business. The Airports Specialist who reviews and accepts Exhibit 'A's may be in the Regional Office (RO) or in an Airports District Office (ADO). The Airports Specialist role can be filled by a number of different positions, including: Program Managers, Community Planners, Compliance Officers, Civil Engineers, etc. The Airports Specialist is responsible for reviewing, providing guidance on and accepting the Exhibit 'A'.

2. PROCESS AND PROCEDURES

2.1. When to Submit the Exhibit 'A'

The Airport Sponsor is responsible for submitting an Exhibit 'A' as part of the grant application when requesting Airport Improvement Program (AIP) funds for land acquisition or development projects. For development projects for which land acquisition is not necessary, the Sponsor may reference the previous Exhibit 'A' if it is still current. Land acquired under the Passenger Facility Charge (PFC) program at airports obligated under the AIP Grant Assurances or Surplus property conditions require an updated Exhibit 'A'. Also, in accordance with AIP Grant Assurances #4, "Good Title", #5, "Preserving Rights and Powers" and #31, "Disposal of Land", Airport Sponsors must submit an updated Exhibit 'A' when releasing airport property.

2.1.1. Noise Land

In accordance with FAA Program Guidance Letter (PGL) 08-02, the airport must include land that is acquired for noise compatibility purposes on the Exhibit 'A'. For complex airports, the Exhibit 'A' may reference a separate Noise Land Inventory Map. Noise Land must be shown on the Exhibit 'A', to document airport ownership of the land, and that each disposal parcel shall clearly be shown on a Noise Land Inventory Map and referenced to the parcel numbers of the acquired noise land, as found on the Exhibit 'A' property map. FAA will review and approve

the changes that are made to the Exhibit 'A' to incorporate the accepted Noise Inventory and Reuse Plan. Additionally, FAA must approve changes to the Exhibit 'A', including any necessary airspace or other restrictions on use of disposed unneeded land, when an Airport Sponsor proposes to convert noise land to airport development land or the exchange of noise land for airport development land.

2.2. Review Procedures

The Exhibit 'A' review process is summarized in the chart in Appendix A of this SOP.

2.2.1. Review for Completeness

Once the Airport Sponsor or the Airport Consultant on behalf of the Airport Sponsor submits the Exhibit 'A' for review, the Airports Specialist will check the submission for completeness. A complete Exhibit 'A' submittal includes:

- Checklist (from Appendix A in this SOP)
- Plan sheet(s) including items identified on the checklist
- Backup documentation (land descriptions, sponsor certifications, or title opinions if necessary, etc.)

The Airports Specialist will provide guidance and return the Exhibit 'A' to the Airport Sponsor if the submittal is incomplete or incorrect.

2.2.2. Checklist Review

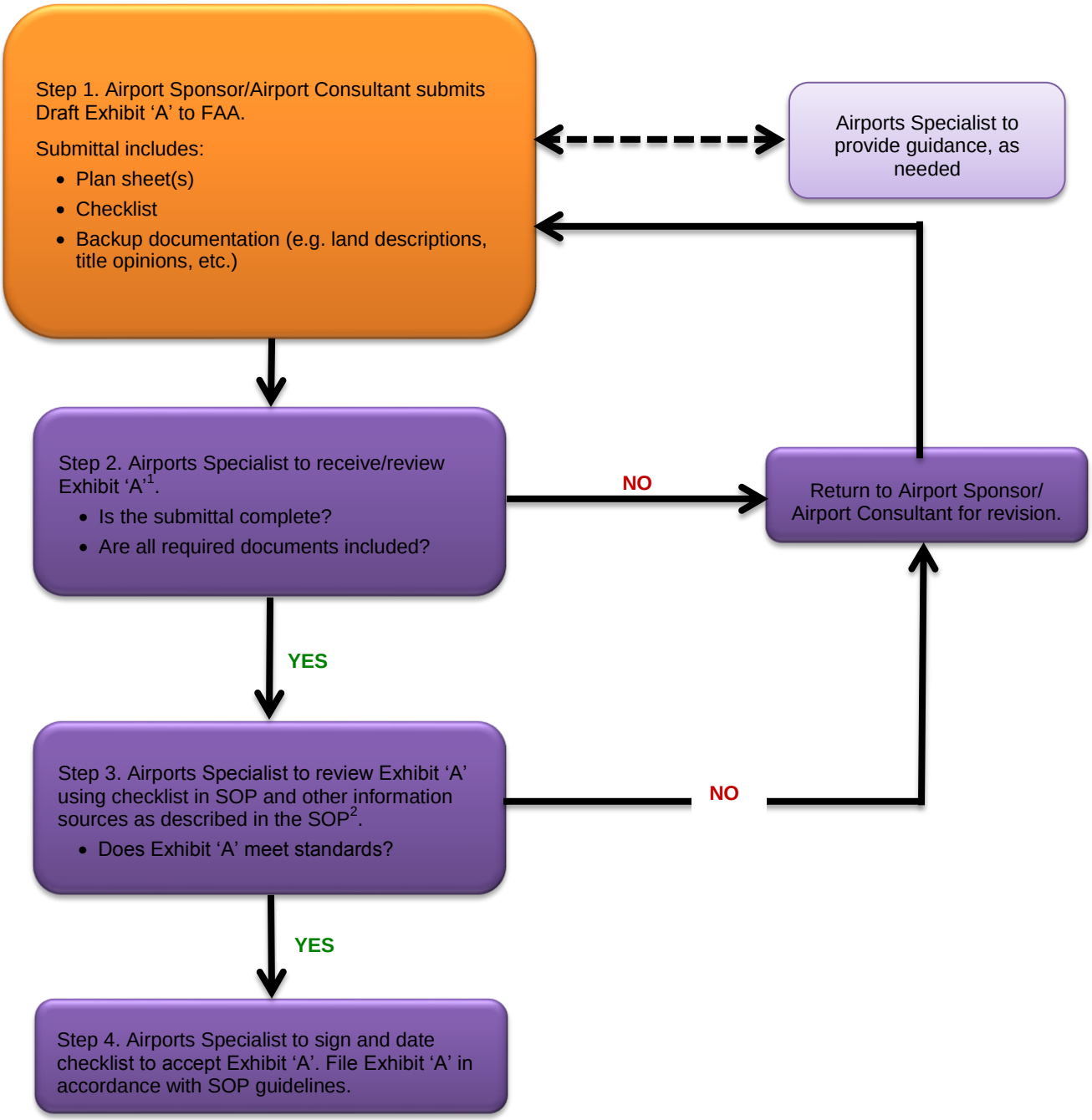
After the Airports Specialist deems the Exhibit 'A' to be complete, the submittal will be reviewed using the checklist in Appendix B of this SOP. The checklist identifies mandatory items that must be included on the document for it to be accepted. The items identified on the checklist in Appendix B reflect the minimum amount of information necessary for Exhibit 'A' acceptance. The Airports Specialist may request additional information from the Airport Sponsor if necessary.

Once the Airports Specialist determines that the Exhibit 'A' is acceptable, he/she will sign and date the checklist indicating FAA acceptance of the document.

2.2.3. Exhibit 'A' Files

After acceptance, the Exhibit 'A', the checklist and the associated backup documentation will be filed in an appropriate location, each Region may have local filing standards. It is preferable to have an Exhibit 'A' specific file for each Airport. For Exhibit 'A's that are submitted electronically (GIS/CAD), it is recommended that both an electronic (CD/DVD) and a paper copy be filed as the electronic copy may have future compatibility issues. Grant assurances relating to real property bind subsequent owners and assigns (i.e., they run with the land) so it is important to plan Exhibit 'A' storage requirements accordingly. In addition, if space allows, previous Exhibit 'A' submittals should be retained in the file.

APPENDIX A. EXHIBIT 'A' REVIEW PROCESS CHART



Notes:

1. The initial review (step 2) is strictly to ensure all the documentation needed is present. The adequacy of the documentation is reviewed in step 3.
2. Additional sources of information may include, but not limited to: airport site file, city/county title/deed records, bureau of land management records, previous Exhibit 'A' submittals, other projects/grants.

APPENDIX B. EXHIBIT 'A' REVIEW CHECKLIST

Checklist	Sponsor/Consultant			FAA
Review Item	**Yes**	**No**	**N/A**	**Agree**
1. Existing Dedicated Airport Property Boundary Line identified. This can consist of a combination of fee interest, easements and/or leases. It may include lands that are not contiguous with the airport boundary. Identify source of base map data.				
Airports Specialist Comments:				
2. All the airport property parcels are shown and have a unique designation. Parcels with designations from previous Exhibit 'A's should not be changed. However, a new system of designations may be used for new and future property acquisitions. Parcel designations must be consistent with grant descriptions.				
Airports Specialist Comments:				
3. Each segment of a parcel's boundary is described in some manner. Metes and bounds, township/range/section, lot and block, plat or other appropriate property description (may be an attachment to the Exhibit 'A' plan sheet or checklist). Points of reference may also be included to further describe the parcel.				
Airports Specialist Comments:				
4. Parcels that were once airport property are shown. The date they were released from federal obligations by the FAA and the date of disposal must be included.				
Airports Specialist Comments:				
5. Parcel information includes: (often in table format)				
a. Grantor (selling owner)				
b. Type of interest acquired (fee simple, easement, etc.)				
c. Acreage				
d. Type of conveyance instrument				
e. Liber/book and page of recording				
Airports Specialist Comments:				
6. Each airport property parcel shows: (often in table format)				
a. FAA grant number, including year if acquired under a grant				
b. PFC Project Number if acquired with Passenger Facility Charge funds (recommended)				
c. Surplus Property Transfer, Government Land Transfer or other statutory federal agreements/conditions. See FAA Order 5010.4 and form 5010-1 Data Element #25 for additional information.				
d. Type of easement (clearing, avigation, utility, right of way, expiration date, easement held by others, subordination agreement, etc.)				

Checklist	Sponsor/Consultant			FAA
Review Item	**Yes**	**No**	**N/A**	**Agree**
e. Date and type of release/land use change approval (aeronautical use, interim use, concurrent use, etc.). This can also include any release from federal obligations such as a release from the National Emergency Use Provision (NEUP), mineral rights, liens, residential through-the-fence access agreements, etc.				
f. Date of property disposal				
g. Public land references, if applicable (PIN #/Assessors #, date of recording, book and page, etc.)				
h. Any known encumbrances on the property				
Airports Specialist Comments:				
7. Purpose of acquisition (current/future development, concurrent use, noise, revenue production, etc.), often in table format. Interim use can be identified with an attached reference.				
Airports Specialist Comments:				
8. The plan shows the following for both existing and future configurations based upon the approved Airport Layout Plan:				
a. Runway Protection Zones (RPZ)				
b. Runways				
c. Runway Safety Areas (RSA)				
d. Runway Object Free Areas (OFA)				
e. Taxiways				
f. Other airport design surfaces (as necessary, must maintain a legible map)				
g. Road/railroad right-of-ways				
h. Bearing and distance of airport property lines				
Airports Specialist Comments:				
9. North arrow, legend and graphic/numerical scale is shown				
Airports Specialist Comments:				
10. If the Exhibit 'A' is being submitted as part of a land acquisition project, the parcels being acquired are shown				
Airports Specialist Comments:				
11. Title block clearly labeled as Exhibit "A" Airport Property Inventory Maps and dated				
Airports Specialist Comments:				
12. Revision block/table, Sponsor approval block, Preparer's block, dated				

Checklist	Sponsor/Consultant			FAA
Review Item	**Yes**	**No**	**N/A**	**Agree**
Airports Specialist Comments:				
13. Understandable and legible legend, including all linetypes and symbols used				
Airports Specialist Comments:				
14. Parcel table is legible				
Airports Specialist Comments:				
Provide an explanation for any checklist item marked 'No'.				

Accepted By: _____ Date: _____

Airports Specialist

Sebastian Municipal Airport
Master Plan Update

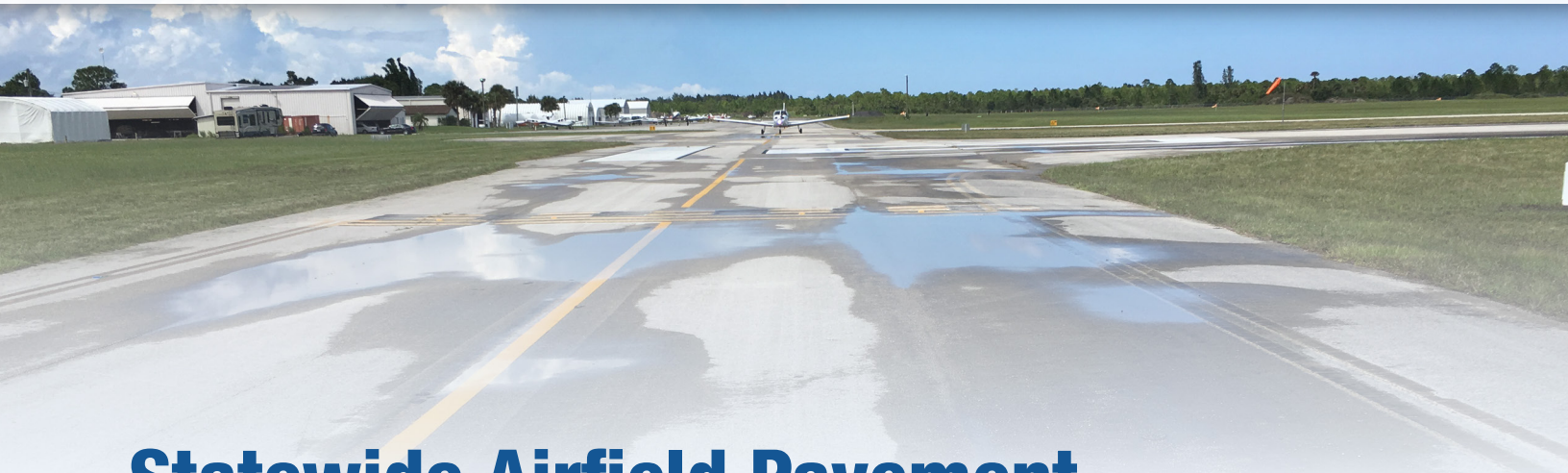


APPENDIX H – FDOT AIRPORT INSPECTION RECORD

JANUARY 2017

This Page was Intentionally Left Blank

FLORIDA DEPARTMENT OF TRANSPORTATION
AVIATION AND SPACEPORTS OFFICE



Statewide Airfield Pavement Management Program

Airport Pavement Evaluation Report
September 2017





FDOT

Sebastian Municipal Airport (X26)
General Aviation Airport
District 4



OFFICE OF FREIGHT, LOGISTICS & PASSENGER OPERATIONS



Florida Department of Transportation

Statewide Airfield Pavement Management Program

Prepared by:

FDOT Aviation and Spaceports Office
605 Suwannee Street
Tallahassee, Florida 32399-0450

OFFICE OF FREIGHT, LOGISTICS & PASSENGER OPERATIONS

Table of Contents

Executive Summary *10*

Program Background 10

Summary of Results 11

Pavement Condition Index (Latest Inspection) 11

Forecasted Pavement Condition Index 2018-2027 12

Major Rehabilitation Planning 2018-2027 13

Summary of Sebastian Municipal Airport 14

Chapter 1 – Introduction *16*

1.1 Background 16

1.2 Statewide Airfield Pavement Management Program (SAPMP) Update 2016-2017 16

1.3 Organization 18

1.3.1 Florida Department of Transportation Aviation and Spaceports Office Program Manager 18

1.3.2 Participating Florida Public-Use and Publicly Owned Airports 18

1.3.3 Florida Department of Transportation District Offices 18

1.3.4 Consultant 18

1.4 Purpose of Airport Pavement Evaluation Report 20

1.5 History of the Program 20

1.6 Federal Aviation Administration (FAA) 22

1.7 FDOT SAPMP Objectives and Components 22

1.7.1 Program Objectives 22

1.7.2 Program Components 22

1.8 References 26

Chapter 2 – Methodology *28*

2.1 Airfield Pavement Database 28

2.2 Airfield Pavement System Inventory 28

2.2.1 Pavement Management Program Network Definition Terminology 29

2.3 Airfield Pavement Structure 31

2.3.1 Pavement Structure Types 31

2.4 Airfield Pavement Work History 33

2.4.1 Airfield Pavement Record Keeping 33

2.5 Airfield Pavement Traffic 33

2.6 Airfield Pavement Condition Index (PCI) Survey 33

2.6.1 PCI Survey Methodology 33

2.6.2 Pavement Distress Types 35

2.6.3 PCI Survey Inspection Procedures 39
2.6.4 Updates to the ASTM D5340-12 40

Chapter 3 – Airfield Pavement System Inventory 43

3.1 Airfield Pavement Network Information 43
3.1.1 Previous and/or Anticipated Airfield Pavement Construction 43
3.1.2 Estimated Pavement Age 45
3.1.3 Functional Use Classification 47
3.1.4 Pavement Surface Type 48
3.1.5 Pavement System Inventory Details 49

Chapter 4 – Airfield Pavement Condition 53

4.1 Airfield Pavement Condition Index (Latest Inspection) 53
4.1.1 Network-Level Analysis 53
4.1.2 Branch-Level Analysis 53
4.1.3 Section-Level Analysis 56

4.2 Summary of Pavement Condition Evaluation Results 59
4.2.1 Network-Level Observations 59
4.2.2 Branch-Level Observations 59

4.3 Forecasted Pavement Conditions 61
4.3.1 Performance Models and Prediction Curves 61
4.3.2 Branch-Level Pavement Condition Forecast 61
4.3.3 Section-Level Pavement Condition Forecast 63
4.3.4 Forecasted PCI Considerations 65

Chapter 5 – Localized Maintenance and Repair Planning 67

5.1 Localized Maintenance and Repair 67

5.2 Localized Maintenance and Repair Policy 68

5.3 Localized Maintenance and Repair Analysis and Recommendations 72

Chapter 6 – Major Rehabilitation Planning 76

6.1 Major Rehabilitation 76
6.1.1 Critical PCI 78
6.1.2 FDOT Recommended Minimum Service-Level PCI 78

6.2 Major Rehabilitation Policy 79
6.2.1 Major Rehabilitation Pavement Section Development 79
6.2.2 Major Rehabilitation Planning-Level Unit Costs 80

6.3 Major Rehabilitation Needs 81
6.3.1 10-Year Unconstrained Budget Major Rehabilitation Needs 81

Chapter 7 – Conclusion 86

7.1 Recommendations 86
7.1.1 Continued PCI Survey Inspections 86
7.1.2 Localized Maintenance and Repair 86

7.1.3 Major Rehabilitation 86
7.1.4 Pavement Management System 86

7.2 Supporting Documents 87
001 – Airfield Pavement Network Definition Exhibit 87
002 – Airfield Pavement System Inventory Exhibit 87
003 – Airfield Pavement Condition Index Exhibit 87
004 – Airfield Pavement Major Rehabilitation Exhibit 87
Inspection Photograph Documentation 87

7.3 Conclusion 88

Appendix A	Airfield Pavement Analysis Tables
Appendix B	Airfield Pavement Localized Maintenance and Repair and Major Rehabilitation
Appendix C	Technical Exhibits
Appendix D	Inspection Photograph Documentation
Appendix E	Inspection Distress Details

List of Figures

Figure E-4 Major Rehabilitation Planning Annual Budget 2018-2027 14

Figure 1.2 Florida Aviation System (Facilities with Pavement) and FDOT Districts 17

Figure 1.7-1 Typical Pavement Condition Life Cycle 23

Figure 1.7-2 General Pavement Treatments by Condition Range 24

Figure 1.7-3 Flexible Asphalt Concrete 25

Figure 1.7-4 Rigid Portland Cement Concrete 25

Figure 3.1.1-1 2017 Airfield Pavement Network Definition Exhibit 44

Figure 3.1.1-2 2017 Airfield Pavement System Inventory Exhibit 45

Figure 3.1.2 Average Age of Pavements at Inspection 46

Figure 3.1.3 Airfield Pavement Functional Classification Use by Area 47

Figure 3.1.4 (a) Pavement Surface Type by Area (SF) 48

Figure 3.1.4 (b) Pavement Surface Type by Area (%) 49

Figure 4.1.1 Latest Condition – Overall Network 53

Figure 4.1.2 (a) Latest Condition – Runway Pavements 54

Figure 4.1.2 (b) Latest Condition – Taxiway Pavements 54

Figure 4.1.2 (c) Latest Condition – Apron Pavements 55

Figure 4.1.3 2017 Airfield Pavement Condition Index Exhibit 58

Figure 4.2.2 Pavement Condition Summary by Facility Use 59

Figure 4.3.2 (a) Forecasted Runway Pavement Performance 61

Figure 4.3.2 (b) Forecasted Taxiway Pavement Performance 62

Figure 4.3.2 (c) Forecasted Apron Pavement Performance 62

Figure 6.1-1 Major Rehabilitation Planning Decision Diagram, PCI ≤ Critical PCI 76

Figure 6.1-2 Major Rehabilitation Planning Decision Diagram, PCI > Critical PCI 77

Figure 6.3.1-1 10-Year Major Rehabilitation Needs by Program Year 83

Figure 6.3.1-2 10-Year Major Rehabilitation Needs by Program Year Exhibit 84

List of Tables

Table E-1 Pavement Condition Index Summary (Last Inspection) – Section Level 11

Table E-2 Pavement Condition Index Forecast 2018-2027 12

Table E-3 Major Rehabilitation Planning 2018-2027 13

Table 2.2.1 Airfield Pavement Database Network Definition Terminology 30

Table 2.6.2-1 (a) Pavement Distress Types – Flexible Asphalt Concrete-Surfaced Airfields 35

Table 2.6.2-1 (b) Pavement Distresses Possible Causes – Flexible Asphalt Concrete-Surfaced Airfields 36

Table 2.6.2-1 (c) Pavement Distresses Possible Effects – Flexible Asphalt Concrete-Surfaced Airfields 36

Table 2.6.2-2 (a) Pavement Distresses – Rigid Portland Cement Concrete-Surfaced Airfields 37

Table 2.6.2-2 (b) Pavement Distresses Possible Causes – Rigid Portland Cement Concrete-Surfaced Airfields 38

Table 2.6.2-2 (c) Pavement Distresses Possible Effects – Rigid Portland Cement Concrete-Surfaced Airfields 38

Table 2.6.3 (a) Recommended Sample Rate Schedule for Flexible Asphalt Concrete 39

Table 2.6.3 (b) Recommended Sample Rate Schedule for Rigid Portland Cement Concrete 39

Table 2.6.4 Summary of Updates to ASTM D5340-12 41

Table 3.1.1 Previous and/or Anticipated Airfield Pavement Construction 43

Table 3.1.5 Pavement System Inventory Details 50

Table 4.1.3 Latest Pavement Condition Index Summary 57

Table 4.3.3 Forecasted PCI 2018-2027 64

Table 5.2-1 Localized Maintenance and Repair – Flexible Asphalt Concrete 68

Table 5.2-2 Localized Maintenance and Repair – Rigid Portland Cement Concrete 69

Table 5.2-3 (a) Localized Repair Planning-Level Unit Costs – Flexible Asphalt Concrete 71

Table 5.2-3 (b) Localized M&R Planning-Level Unit Costs – Rigid Portland Cement Concrete 71

Table 5.3-1 Summary of Airport Localized M&R Planning Cost and Quantity at Network Level 72

Table 5.3-2 Summary of Airport Localized M&R Planning Cost and Quantity at Section Level .73

Table 5.3-3 Summary of Localized Maintenance.....74

Table 6.1.2 FDOT Recommended Minimum Service-Level PCI 78

Table 6.2.1 (a) Conceptual Pavement Section for Major Rehabilitation – Flexible Asphalt Concrete 79

Table 6.2.1 (b) Conceptual Pavement Section for Major Rehabilitation – Rigid Portland Cement Concrete 80

Table 6.2.2 General Aviation Major Rehabilitation Planning-Level Unit Cost by Pavement Type 81

Table 6.3.1 10-Year Major Rehabilitation Needs 82

Statewide Airfield Pavement
Management Program

FDOT



Executive Summary



Executive Summary

Program Background

Airport airfield pavement infrastructure facilities represent a large capital investment in the Florida Airport System. Timely and appropriate maintenance and strategic rehabilitation are essential as repair costs increase significantly in proportion to deterioration. Airport pavement distresses can also contribute to the development of loose debris and decreased ride quality, which can be a safety concern for aircraft operations.

In 2016, the Florida Department of Transportation (FDOT) Aviation and Spaceports Office (ASO) selected Kimley-Horn and Associates, Inc. with subconsultants Airfield Pavement Management Systems, LLC and AVCON, Inc. to provide professional services in support of FDOT in the continued efforts of performing a system update to the Statewide Airfield Pavement Management Program (SAPMP). This work is to be completed from fiscal year 2016 through fiscal year 2019. The SAPMP has 95 public use airport facilities throughout the seven FDOT Districts that participate in the system update. The results of this system update for this specific airport are presented in this report and can be utilized by FDOT and the Federal Aviation Administration (FAA) to identify, prioritize, and schedule pavement maintenance, repair, and major rehabilitation projects.

Pavement condition was assessed utilizing the pavement condition index (PCI) methodology as defined in the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP)"*** using the documented procedures set forth by ASTM ***D5340-12*** "***Standard Test Method for Airport Pavement Condition Index Surveys."***

Pavement deterioration, in accordance with the ASTM D5340-12, was characterized in terms of distinct distress types, severity level of distress, and quantity of distress. This information is utilized to calculate a PCI numeric that represents the overall condition of the pavement in a numeric index that ranges from 0 (a condition category of FAILED) to 100 (GOOD). The PCI methodology analyzes an overall measure of the pavement condition and provides an indication of the degree of maintenance, repair, or rehabilitation efforts that will be required to sustain functional pavement.

The tasks required for the system update at each participating airport consist of the following:

- Obtain recent and anticipated airfield pavement construction work data.
- Update airport airfield pavement system inventory records (construction history, identification, geometry, and facility classification).
- Perform PCI Survey Inspections at each participating airport.
- Update the FDOT SAPMP PAVER™ database system.
- Update the FDOT SAPMP GIS Airfield Navigation GPS enabled Maps.
- Update airfield pavement performance models and pavement condition forecasting.
- Identification of planning-level maintenance, repair, and major rehabilitation to address pavement needs based on functional PCI analysis.
- Development of planning-level opinion of probable construction costs for pavement rehabilitation.



Summary of Results

Pavement Condition Index (Latest Inspection)

Table E-1 Pavement Condition Index Summary (Last Inspection) – Section Level

Network ID	Branch Name	Branch Use	Section ID	Area (SF)	PCI	Condition Rating
X26	RUNWAY 5-23	RUNWAY	6205	295,188	75	Satisfactory
X26	Runway 10-28	RUNWAY	6305	134,512	80	Satisfactory
X26	Runway 10-28	RUNWAY	6310	44,362	80	Satisfactory
X26	Runway 10-28	RUNWAY	6315	45,750	87	Good
X26	Runway 10-28	RUNWAY	6320	15,376	82	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	405	57,743	81	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	415	16,504	81	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	420	60,300	83	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	425	7,067	54	Poor
X26	TAXIWAY BRAVO	TAXIWAY	610	119,314	77	Satisfactory
X26	TAXIWAY CHARLIE	TAXIWAY	305	51,193	13	Serious
X26	TAXIWAY CHARLIE	TAXIWAY	306	11,251	16	Serious
X26	TAXIWAY CONNECTOR	TAXIWAY	515	23,637	75	Satisfactory
X26	TAXIWAY E	TAXIWAY	700	29,416	91	Good
X26	WEST APRON	APRON	5105	133,925	84	Satisfactory
X26	WEST APRON	APRON	5115	31,900	15	Serious
X26	WEST APRON	APRON	5120	20,635	81	Satisfactory
X26	T-HANGAR APRON AREA	APRON	5305	28,960	78	Satisfactory
X26	SW RUN UP APRON	APRON	5405	19,824	85	Satisfactory
X26	E RUN UP APRON	APRON	5510	13,002	81	Satisfactory
X26	SOUTHEAST APRON	APRON	5605	100,723	27	Very Poor
X26	SOUTHEAST APRON	APRON	5610	21,960	87	Good
X26	SOUTHEAST APRON	APRON	5615	10,290	87	Good
X26	APRON TERMINAL	APRON	5705	32,590	89	Good
X26	APRON TERMINAL	APRON	5710	3,600	92	Good

Forecasted Pavement Condition Index 2018-2027

Table E-2 Pavement Condition Index Forecast 2018-2027

Network ID	Branch ID	Section ID	Last PCI	Forecasted PCI									
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
X26	AP RU E	5510	81	78	77	75	74	72	71	69	67	66	64
X26	AP RU SW	5405	85	82	81	79	78	76	75	73	71	70	68
X26	AP SE	5605	27	24	23	21	20	18	17	15	13	12	10
X26	AP SE	5610	87	84	83	81	80	78	77	75	73	72	70
X26	AP SE	5615	87	84	83	81	80	78	77	75	73	72	70
X26	AP TERM	5705	89	86	85	83	82	80	79	77	75	74	72
X26	AP TERM	5710	92	88	85	82	80	77	75	73	71	69	67
X26	AP T-HANG	5305	78	75	74	72	71	69	68	66	64	63	61
X26	AP W	5105	84	81	80	78	77	75	74	72	70	69	67
X26	AP W	5115	15	12	11	9	8	6	5	3	1	0	0
X26	AP W	5120	81	78	77	75	74	72	71	69	67	66	64
X26	RW 10-28	6305	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6310	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6315	87	84	83	81	80	78	76	75	73	71	70
X26	RW 10-28	6320	82	79	78	76	75	73	71	70	68	66	65
X26	RW 5-23	6205	75	72	69	67	66	64	63	62	61	61	60
X26	TW A	405	81	78	76	75	74	73	72	71	70	69	68
X26	TW A	415	81	78	76	74	73	71	70	69	68	67	66
X26	TW A	420	83	80	78	76	74	72	71	70	69	68	67
X26	TW A	425	54	52	50	48	47	45	44	42	40	39	37
X26	TW B	610	77	74	73	71	70	69	68	67	66	65	64
X26	TW C	305	13	9	6	4	1	0	0	0	0	0	0
X26	TW C	306	16	12	9	7	4	1	0	0	0	0	0
X26	TW CONN	515	75	72	71	70	69	68	67	66	65	64	63
X26	TW E	700	91	87	85	82	80	78	76	74	73	71	70



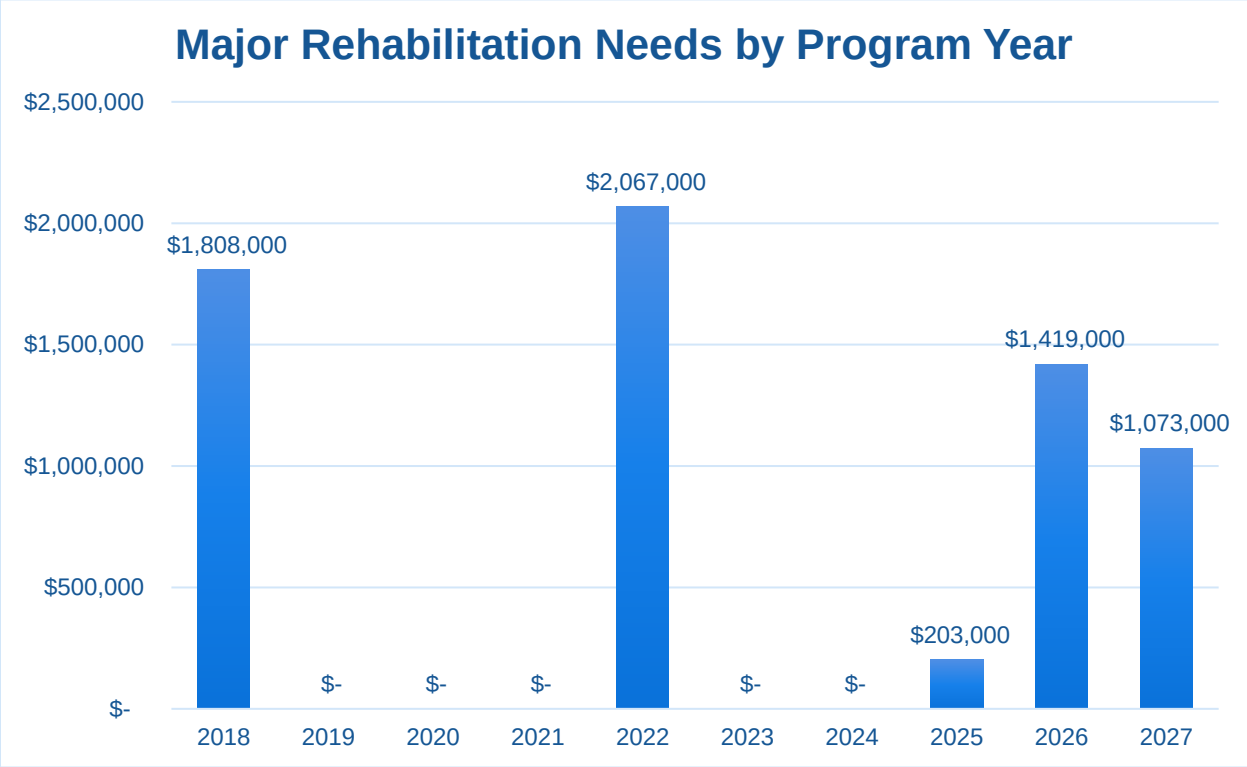
Major Rehabilitation Planning 2018-2027

Table E-3 Major Rehabilitation Planning 2018-2027

Program Year	Network ID	Branch ID	Section ID	Surface	Area (SF)	PCI Before	Rehabilitation Type	Planning Cost
2018	**X26**	AP SE	5605	AC	100,723	24	AC Reconstruction	$ 907,000.00
2018	**X26**	AP W	5115	AC	31,900	12	AC Reconstruction	$ 288,000.00
2018	**X26**	TW A	425	AC	7,067	52	AC Restoration	$ 50,000.00
2018	**X26**	TW C	305	AC	51,193	9	AC Reconstruction	$ 461,000.00
2018	**X26**	TW C	306	AC	11,251	12	AC Reconstruction	$ 102,000.00
2022	**X26**	RW 5-23	6205	AAC	295,188	64	AC Restoration	$ 2,067,000.00
2025	**X26**	AP T-HANG	5305	AC	28,960	64	AC Restoration	$ 203,000.00
2026	**X26**	RW 10-28	6305	AC	134,512	64	AC Restoration	$ 942,000.00
2026	**X26**	RW 10-28	6310	AC	44,362	64	AC Restoration	$ 311,000.00
2026	**X26**	TW CONN	515	AC	23,637	64	AC Restoration	$ 166,000.00
2027	**X26**	AP RU E	5510	AC	13,002	64	AC Restoration	$ 92,000.00
2027	**X26**	AP W	5120	AC	20,635	64	AC Restoration	$ 145,000.00
2027	**X26**	TW B	610	AC	119,314	64	AC Restoration	$ 836,000.00

**All planning cost values have been rounded to the nearest thousand-dollar.*

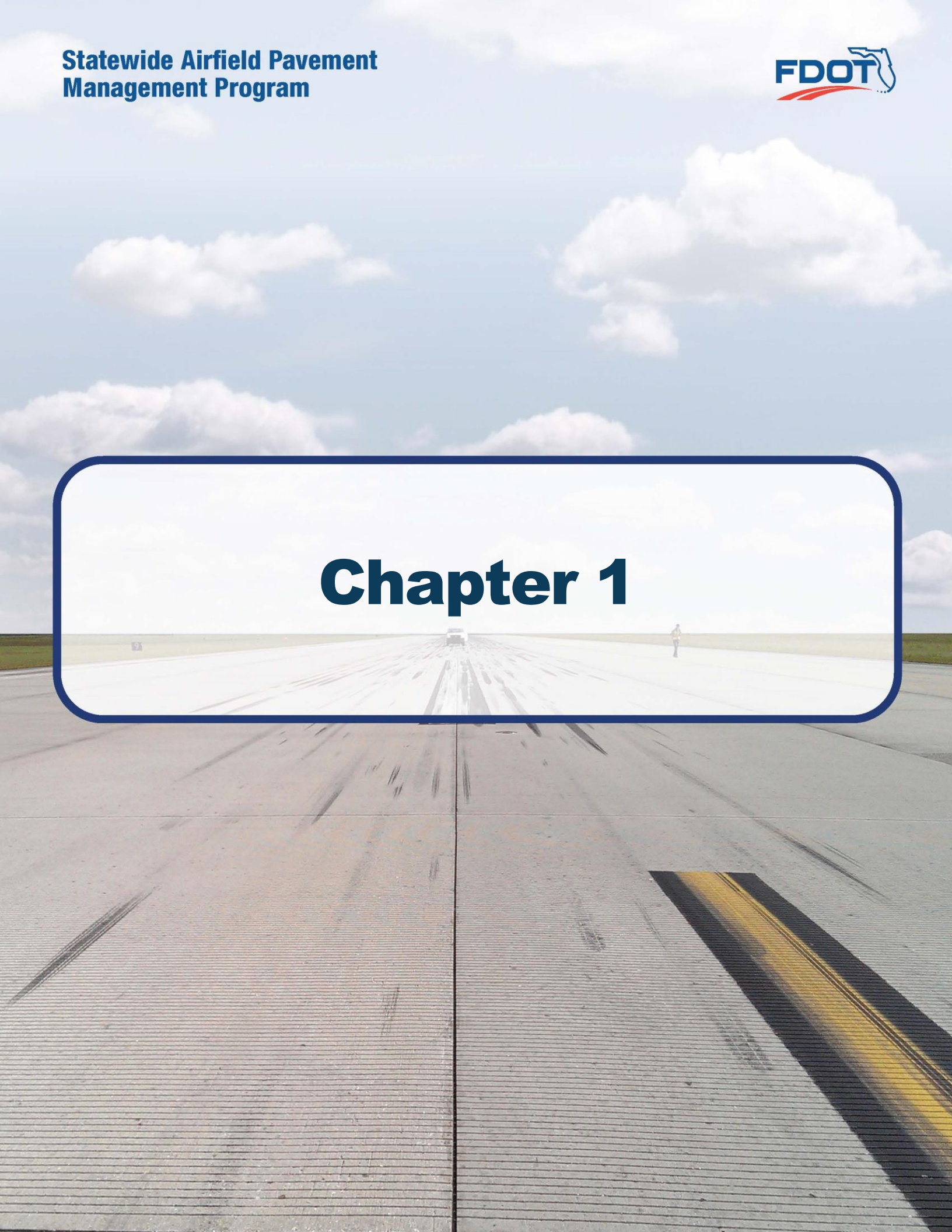
Figure E-4 Major Rehabilitation Planning Annual Budget 2018-2027



Summary of Sebastian Municipal Airport

Sebastian Municipal Airport was inspected in September 2016 – the overall weighted PCI value was 71, a condition rating of Satisfactory. The results of the maintenance, repair, and major rehabilitation analysis identified $463,670 in localized M&R needs based on current conditions and a 10-Year major rehabilitation need of $6,570,000 based on forecasted conditions. The current major rehabilitation needs based on the latest inspection consist of $1,808,000 for pavements below critical condition.

Localized maintenance and repair identified within this report are categorized as preventive or stopgap; the FDOT SAPMP has defined maintenance policies based on FAA recommendations. Major rehabilitation is identified within the FDOT SAPMP as major construction activity that would result in an improvement or resetting of the pavement section's PCI to a value of 100. Such activities could include: mill and hot-mix asphalt overlay, rigid pavement repair and slab replacement, and full-depth reconstruction. It is recommended that the airport use this as a planning tool for future project development and prioritization – all localized maintenance and repair and major rehabilitation recommendations should be considered as planning-level only. All final localized maintenance, repair, and major rehabilitation is subject to change based on airport prioritization and further design-level evaluation.



Chapter 1



Chapter 1 – Introduction

1.1 Background

The State of Florida has 128 public airports of which 100 public-use airports are recognized as part of the Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS) that are vital to the Florida economy as well as the economy of the United States. The Florida Aviation System (FAS) provides opportunities for the State to capitalize on an increasingly global marketplace. Florida's system of commercial service and general aviation (GA) airports are important to businesses throughout the entire State. Air travel is essential to tourism, Florida's number one industry.

There are millions of square feet of pavement infrastructure that consists of runways, taxiways, aprons, ramps, and other areas of airports that are vital to the support and safety of aircraft operations. Timely pavement maintenance, repair and major rehabilitation of these pavements will support the airport in operating safely, efficiently, economically and without excessive down time.

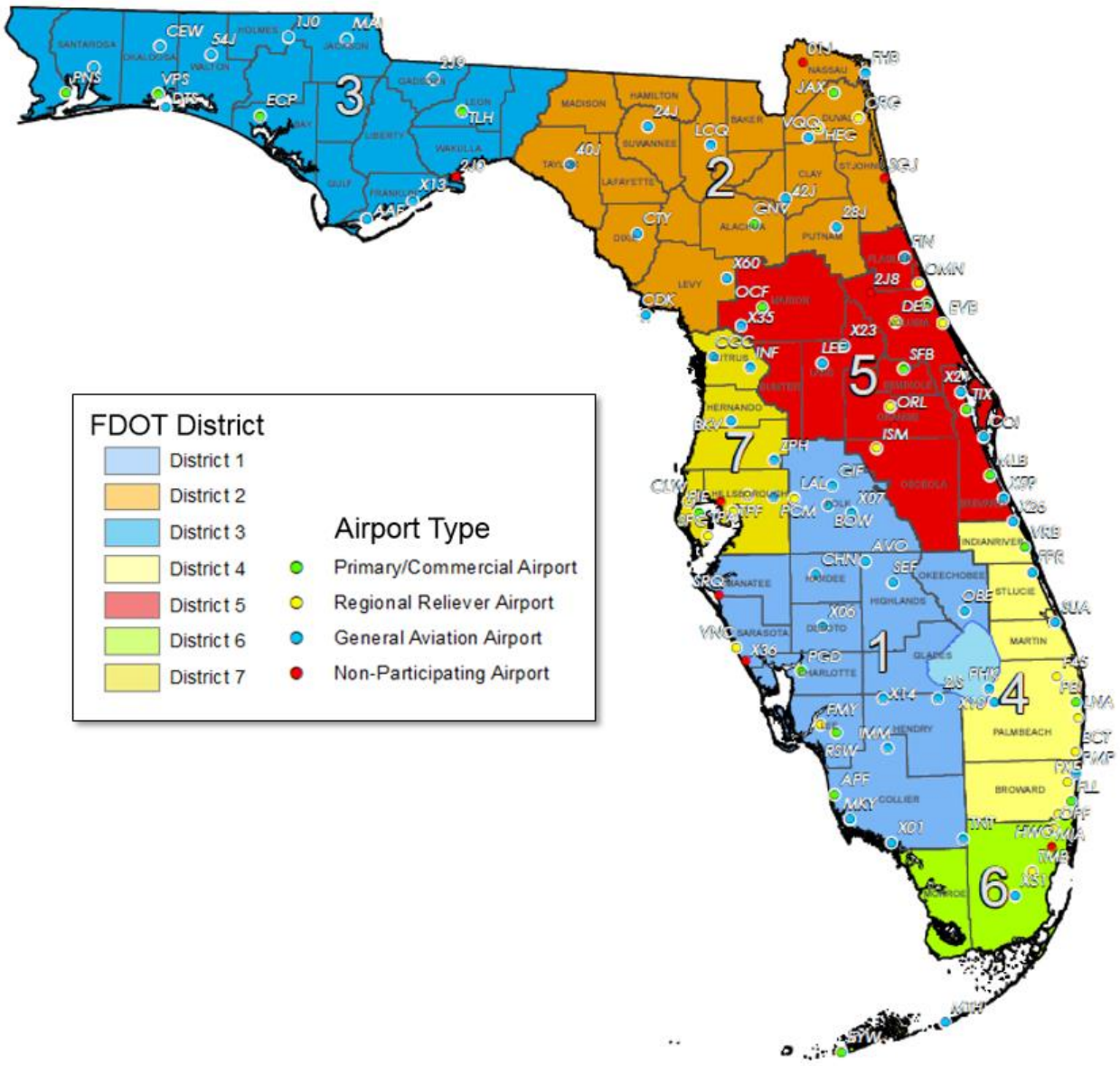
In general, adherence to the FAA Advisory Circulars are mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facilities Charges (PFC) Program. Further information is detailed in FAA Grant Assurance No. 11 "Pavement Maintenance," No. 34 "Policies, Standards, and Specifications," and PFC Assurance No. 9 "Standards and Specifications." The Florida Department of Transportation (FDOT) performs the Statewide Airfield Pavement Management Program (SAPMP) System Updates for the benefit of participating public-use and publicly owned airports through the Aviation and Spaceports Office (ASO).

The SAPMP addresses the requirements of maintaining an effective pavement management program for the participating airports at the network level. Network-level management of pavement assets provides insight for short-term and long-term budget needs, understanding of the overall condition of the network (current and future), and pavement facilities that are subject for project consideration. A network-level evaluation can be supportive in the identification of maintenance, repair, and major rehabilitation needs and budgetary planning-level opinions of probable construction costs.

1.2 Statewide Airfield Pavement Management Program (SAPMP) Update 2016-2017

In 1992, the FDOT established the Statewide Airfield Pavement Management Program (SAPMP) to provide program managers, District Aviation and Spaceport Offices, and airport operators a system to proactively manage airport airfield pavement infrastructure within the Florida Aviation System. The SAPMP performs network-level Pavement Condition Index (PCI) survey inspections for airport facilities that are categorized as General Aviation (GA), Reliever (RL), and Commercial (PR). Currently, the program consists of 95 actively participating public-use airports with pavement facilities and provides users with comprehensive data to better manage pavement assets.

Figure 1.2 Florida Aviation System (Facilities with Pavement) and FDOT Districts



In 2016, the Florida Department of Transportation Aviation and Spaceports Office contracted Kimley-Horn and Associates, Inc. along with subconsultants Airfield Pavement Management Systems, LLC and AVCON, Inc. to provide professional services in support of FDOT in the continued efforts of performing a system update to the SAPMP. This work is to be completed from fiscal year 2016 through fiscal year 2019.

1.3 Organization

1.3.1 Florida Department of Transportation Aviation and Spaceports Office Program Manager

The FDOT Aviation and Spaceports Office (ASO) Aviation Engineering Manager serves as the Program Manager (ASO-PM) for the SAPMP. The ASO-PM monitors the work performed by the designated Consultant for the program. The ASO-PM has review and approval authority for each program task and manages the program's day-to-day details and pertinent updates.

The ASO-PM reports updates and milestones to the FDOT State Aviation and Spaceports Manager and Development Administrator.

1.3.2 Participating Florida Public-Use and Publicly Owned Airports

The airports are the end-user and beneficiary of the SAPMP. The SAPMP provides a specific Airport Pavement Evaluation Report that meets the requirements of the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP)."*** Individual participating airports will be provided a final Airport Pavement Evaluation Report by the designated Consultant that is specific to each airport's airfield pavement condition index survey. The ASO-PM has full authority and final approval of each report prior to finalization. In advance of each PCI survey and prior to completion of each Airport Pavement Evaluation Report, participating airports are asked to provide the necessary record documentation for the proper analysis efforts. Relevant record documentation artifacts may consist of but are not limited to: Airport Layout Plans (ALP), Construction Bid Tabulations, As-Built Construction Drawings, Engineer's Reports, and/or field pavement inspection reports.

1.3.3 Florida Department of Transportation District Offices

The seven (7) FDOT District Offices, specifically the Aviation representatives (currently the Freight and Logistics personnel), provide essential support to the SAPMP update and the ASO-PM. Each District supports the SAPMP's on-going efforts by providing local construction cost information throughout the State. The construction cost information, typically consisting of plans and bid tabulations, are used as the basis of the development maintenance, repair, and major rehabilitation opinions of probable construction costs for planning purposes. Each District Office receives copies of individual Airport Pavement Evaluation Reports for the participating airport facilities located within their respective Districts.

1.3.4 Consultant

The Consultant, Kimley-Horn and Associates, Inc., provides technical and administrative support to the ASO-PM for the SAPMP update. The support consists of airfield pavement system inventory updates, performance of PCI Surveys in accordance with ASTM ***D5340-12*** "***Standard Test Method for Airport Pavement Condition Index Surveys,"*** evaluation and reporting of the pavement condition in accordance with the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP)."***

The Consultant Team consists of Kimley-Horn, Airfield Pavement Management Systems, LLC., and AVCON, Inc.



A brief description of the general scope of work undertaken to update the SAPMP includes but is not limited to:

- **Research and evaluation of existing record documentation** was performed to identify construction projects that have taken place since the most recent major update of the SAPMP. This data is used to update the pavement inventory and network definition.
- **An update to the existing Network Definition Map** was made to reflect geometric changes, pavement composition updates, and section characterization. Furthermore, an update to the PCI Survey sample units were made to reflect the field investigation efforts.
- **A functional pavement evaluation with PCI Survey inspections** was completed on all airfield pavements maintained by the Airport. The PCI Survey procedure, as defined by ASTM D5340-12, was used as the basis of the functional pavement evaluation. For this specific evaluation, the sample units defined by prior studies were inspected as to better develop performance models for prediction curves. Pavement subject to construction or anticipated construction during scheduled PCI Survey inspection or within 2 years were omitted from inspection based on confirmation of airport personnel.
- **Condition Analysis** was performed based on the distress data observed, rated, measured, and recorded in accordance with the ASTM D5340-12 for the calculation of PCI values and ratings. The results of the current condition analysis were used in concert with the historic PCI Survey data and construction work history to develop performance models to forecast future PCI values for each section for a 10-year study duration.
- **Maintenance, Repair, and Rehabilitation Planning** was performed predicated on the results of the condition analysis with updated policies and planning-level unit costs. The policies, or M&R policies, have been updated to reflect standard practices for maintenance, repair, and major rehabilitation as defined by the FAA **AC *150/5380-6C “Guidelines and Procedures for Maintenance of Airport Pavements.”*** Planning-level unit costs were developed based on representative construction bid tabulations provided by participating airports. The bid tabulations consisted of limited airfield pavement construction projects that took place between 2009 and 2015 at participating airports.



1.4 Purpose of Airport Pavement Evaluation Report

The individual airport airfield pavement evaluation report discusses the work performed, a summary of findings, condition analysis results, and recommendations for maintenance, repair, and major rehabilitation (M&R) planning associated with the SAPMP system update. It also briefly describes the procedures used to ensure that the appropriate engineering and scientific standards of care, quality, budget, schedules, and safety requirements were implemented during the performance of this work.

The purpose of this Airfield Pavement Evaluation Report is to achieve the following:

- Describe the goals, procedures, and purpose of the SAPMP
- Provide a brief technical explanation of the pavement management methodology, standard practices, and objectives
- Analyze pavement distresses data for the determination of pavement conditions and for identification of airfield pavement maintenance, repair, and major rehabilitation needs based on functional PCI trends

The identification of rehabilitation needs has been determined at the planning level. Design-level investigation is recommended prior to developing construction-level design documents and budgets.

In compliance with FAA Grant Assurances 11 and 19; the FDOT SAPMP provides airports with airfield pavement evaluation reports in accordance with FAA **AC 150/5380-7B Airport Pavement Management Program (PMP)** and **AC 150/5380-6C Guidelines and Procedures for Maintenance of Airport Pavements**. The application of the results of a PCI survey are for planning purposes and are limited to the visual observation of deteriorated pavements in limited sampling; design-level investigation is recommended in accordance with the FAA procedures defined in **AC 5320-6F Airport Pavement Design and Evaluation** and **AC 150/5370-11B Use of Nondestructive Testing in the Evaluation of Airport Pavements**. The aforementioned ACs provide the design-level material properties of in-situ pavement and subgrade layers for the determination of appropriate rehabilitation actions. The FDOT Statewide Airfield Pavement Management Program is organized to provide airports with planning-level data and does not intend to preclude the responsible engineer in performing the appropriate level of investigation and analysis in determining the appropriate design details of a pavement rehabilitation. It would not be advisable to solely base design-level rehabilitation without the appropriate level of investigation and determination of pavement deterioration beyond that of a visual functional condition assessment.

1.5 History of the Program

In 1992, the FDOT implemented the SAPMP to understand the pavement conditions at public airports in the FAS, systematically update pavement infrastructure information, and assist airport operators with recommendations of pavement maintenance, repair, and major rehabilitation needs. The 1992 SAPMP implementation provided the FDOT and the participating airports valuable information for establishing and performing timely and appropriate pavement rehabilitation.

During the 1992-1993 implementation and again during the 1998-1999 updates; the SAPMP performed the development with proprietary software for pavement management system analysis. This development allowed for the creation of pavement management database file system populated with airport attributes and condition data. The pavement management database was used to establish maintenance, repair, and rehabilitation policies; consider planning-level unit costs; and develop recommendations for performing pavement maintenance. This system, known as AIRPAV, was initially developed during the 1992-1993 SAPMP implementation for the analysis of distress data. The AIRPAV system was used again in the 1998-1999 SAPMP update.

In 2004, the SAPMP system update included the review of the AIRPAV software compared to other industry available non-proprietary software packages. As a result of this review, MicroPAVER™ (currently known as PAVER™) was selected for implementation of the system update. MicroPAVER™ was developed by the U.S. Army Corps of Engineers Construction Engineering Research Laboratory for pavement management. Data from the 1998-1999 FDOT SAPMP update, which was built upon the initial 1992-1993 implementation of AIRPAV, was reviewed and converted to be compatible with the MicroPAVER™ system. This data conversion included all documented pavement facilities, classifications, types, histories, geometries, PCI condition data and pertinent attributes gathered from airport feedback at the time. This information was used to develop the inventory of each participating airport's pavement facilities in a consistent format. This was the development of Airfield Pavement Network Definition Exhibits. These inventory exhibits visually depicted the branch, section, and sample units that were based upon the pavement construction history and composition information provided by each airport.

In the 2006-2008 system update, the SAPMP was updated again with continued use of the MicroPAVER™ system. Based on the distress data collected, a maintenance repair and major rehabilitation planning program was developed for each airport. As part of this SAPMP update, the procedures for the inspection and the collection of the pavement distress data were documented, and an interactive website (http://www.dot.state.fl.us/aviation/pavement.shtm) was established for input of data.

In the 2010-2012 system update, the SAPMP was updated using new global positioning system (GPS) integrated technology to digitally collect pavement distress data. Interactive geographic information system (GIS) map files were developed from updated Airfield Pavement Network Definition Exhibits to aid pavement condition inspectors in the collection of sample distress data. The data collected was utilized to develop pavement performance models to predict future pavement PCI values and make recommendations for major rehabilitation.

In the 2013-2015 system update, the SAPMP integrated PAVER™ and FieldInspector™ with the use of GPS and GIS capable field tablets. Furthermore, the update included continued adherence to the ASTM ***D5340-12*** "***Standard Test Method for Airport Pavement Condition Index Surveys."*** The ASTM update consisted of refinement of distress definition types and deduction values for select asphalt concrete and Portland Cement Concrete distresses.



1.6 Federal Aviation Administration (FAA)

Currently, airports participating in the Airport Improvement Program (AIP) Grant Program are required by the FAA to develop and implement a pavement maintenance program to be eligible for funding (FAA Advisory Circular ***150/5380-6C "Guidelines and Procedures for Maintenance of Airport Pavements"*** and ***150/5380-7B "Airport Pavement Management Program (PMP)"***). This program requires detailed inspection of airfield pavement conditions by trained personnel. The inspections are required to be performed at least once a year using the PASER method or every three years if the pavement is inspected as defined by the PCI survey procedure in accordance with the ASTM ***D5340-12*** "***Standard Test Method for Airport Pavement Condition Index Surveys."***

In general, adherence to the Advisory Circulars are mandatory for all projects funded with federal grant monies through the AIP program and with revenue from the Passenger Facilities Charges (PFC) Program. Further information is detailed in FAA Grant Assurance No. 11 "Pavement Maintenance," No. 34 "Policies, Standards, and Specifications," and PFC Assurance No. 9 "Standards and Specifications."

1.7 FDOT SAPMP Objectives and Components

The FDOT SAPMP is a program that provides the FAS support in implementing and/or maintaining a network-level Pavement Management Program in a consistent and regularly scheduled manner.

In accordance with FAA AC***150/5380-7B "Airport Pavement Management Program (PMP)"*** an effective Pavement Management Program consists of a system that achieves specific objectives. The FDOT SAPMP objectives are as follows:

1.7.1 Program Objectives

1 A systematic means for collecting and storing information regarding existing pavement structure and condition.
2 An objective and repeatable system for evaluating pavement condition.
3 Procedures for predicting future pavement condition.
4 Procedures for modeling both past and future pavement performance conditions.
5 Procedures to determine the budget requirements to meet management objectives, such as the maintenance, repair, and major rehabilitation budget required to keep a pavement at a specified PCI level or the budget required to improve to target PCI level.
6 Procedures for formulating and prioritizing maintenance, repair, and major rehabilitation projects.

The objectives are accomplished by the following components:

1.7.2 Program Components

A. Database
B. Pavement Inventory
C. Pavement Structure
D. Pavement Work History
E. Pavement Condition Data

F. Pavement Performance Modeling for the Prediction/Forecast of PCI
G. Maintenance, Repair, and Major Rehabilitation Policies and Budget Simulation

A well-maintained network-level pavement management program may provide airport staff a better understanding of the airfield pavement performance for developing and planning for specific maintenance, repair, and major rehabilitation projects. The understanding of specific distress types and severities will assist the airport in addressing pavement maintenance and repair with the appropriate treatments as defined by the FAA Advisory Circular ***150/5380-6C "Guidelines and Procedures for Maintenance of Airport Pavements."*** The development of projects with an understanding of system inventory, deterioration details, and pavement condition forecasts may assist airport staff in developing practical rehabilitation actions and budgets. Furthermore, the understanding of pavements' past performance and forecasted condition may assist airport staff in addressing pavement rehabilitation in a timely and cost-effective manner. **Figure 1.7-1 Typical Pavement Condition Life Cycle**, which is based on the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP)."*** **Figure 1.7-1 Typical Pavement Condition Life Cycle**, depicts a general duration of a pavement section and identifies the ideal condition to perform rehabilitative treatments at an optimal cost rather than allowing significant increase in rate of deterioration that would result in increased costs.

Figure 1.7-1 Typical Pavement Condition Life Cycle

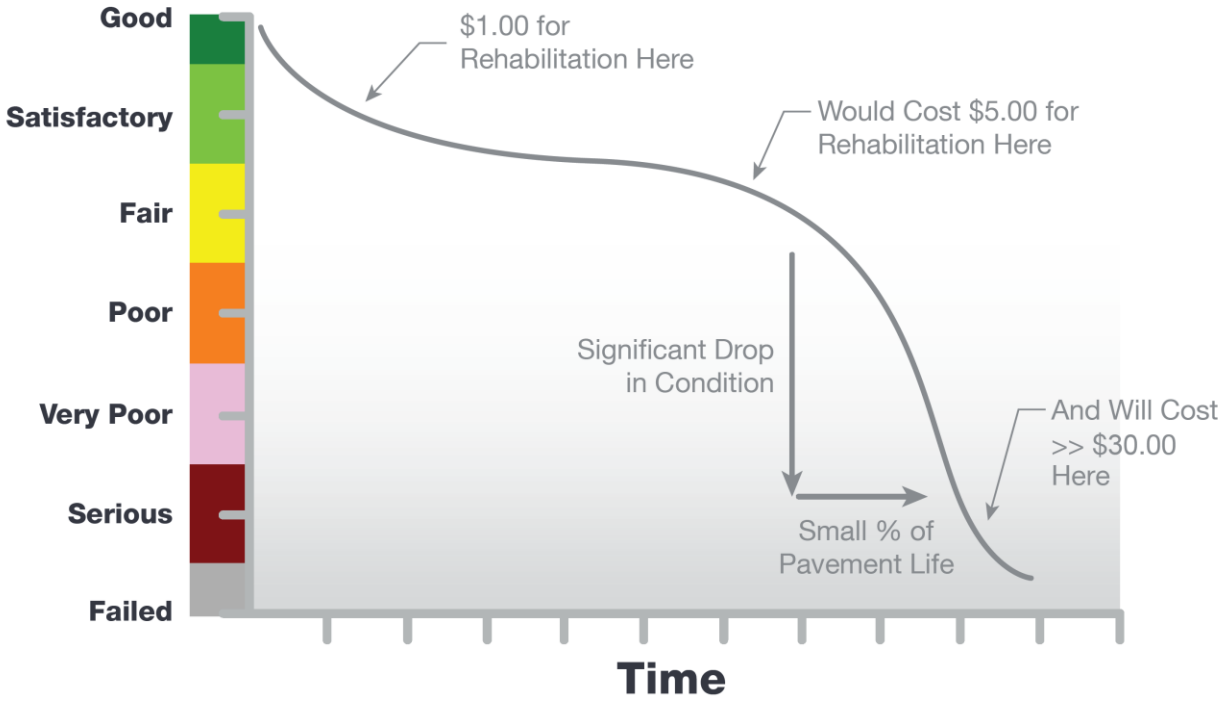
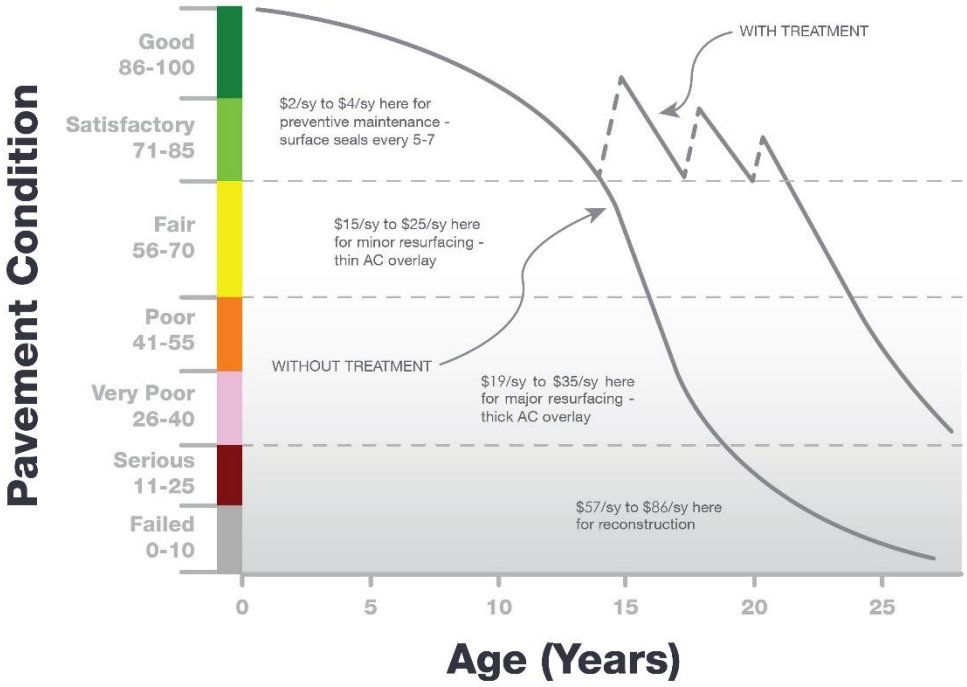


**Figure is for conceptual purposes only – unit costs are not specific to airfield pavements (AC vs PCC).*

Figure 1.7-2 General Pavement Treatments by Condition Range depicts generic flexible asphalt concrete (AC) pavement treatments that are effective at specific condition ranges. This graphic is a general concept and will vary based on pavement surface type and overall

composition. The intent is to convey various treatment types that would be effective based on the condition of the pavement along the deterioration model.

Figure 1.7-2 General Pavement Treatments by Condition Range



Pavement maintenance, repair, and major rehabilitation would be quite anticipatory if all pavements behaved as depicted in **Figures 1.7-1 and 1.7-2**, however pavement condition performance vary significantly based on several factors. Factors that contribute to a pavement section's condition and deterioration performance may include: functional design life, material type, material construction quality, climatic conditions, aircraft loading type and frequency, non-aircraft loading type and frequency, maintenance history, subgrade conditions, and other infrastructure in the vicinity. The list of factors is not all-inclusive of all factors that may contribute to a pavement's life cycle, it is intended to clarify that unique conditions certainly will affect a pavement's deterioration.

Figures 1.7-3 and Figure 1.7-4 depict visual conditions of pavement facilities, for both AC and PCC respectively, with approximated PCI ranges and corresponding repair and rehabilitation measures.

Figure 1.7-3 Flexible Asphalt Concrete

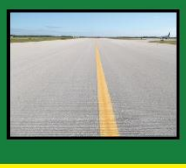
	PCI Range	Representative PCI	Representative Pavement Surface	Rehabilitation Activities
Routine Maintenance	86-100	90		Pavements with PCI values above 85, or 'Good', may require periodic joint/crack sealing and local patching.
Pavement Preservation	65-85	70		Pavements with PCI conditions ranging from 'Fair' to 'Satisfactory' may require surface treatments (seal coat), thin overlays, and/or joint/crack sealing.
Major Rehabiliation	40-64	50		Pavements that have deteriorated below a PCI 65, or within the range of 'Very Poor' to 'Fair' conditions, may require major rehabilitation such as pavement mill and overlay or partial full-depth reconstruction.
Major Reconstruction	0-39	15		Pavements that have deteriorated below a PCI 40, or within the range of 'Failed' to 'Very Poor' conditions, may require major reconstruction.

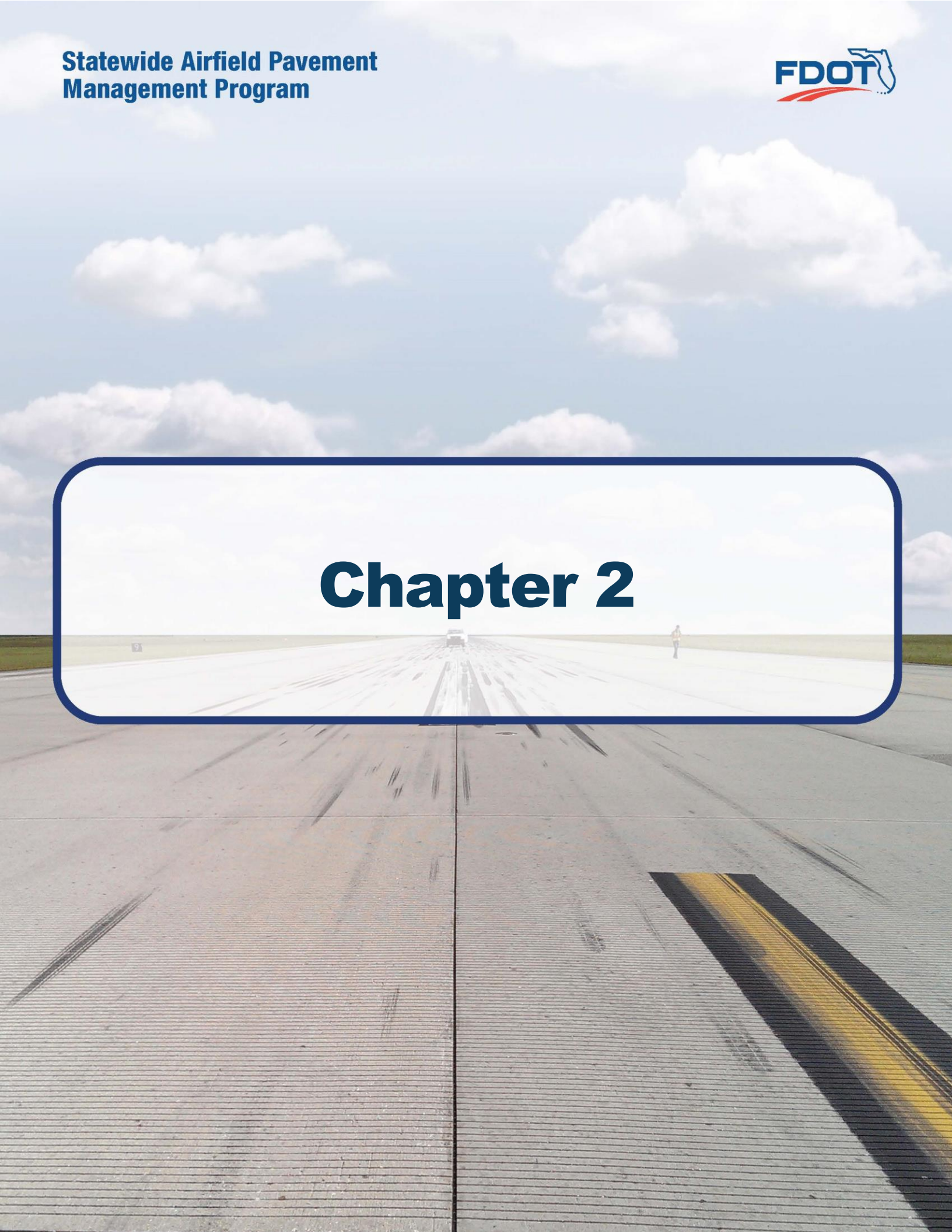
Figure 1.7-4 Rigid Portland Cement Concrete

	PCI Range	Representative PCI	Representative Pavement Surface	Rehabilitation Activities
Routine Maintenance	86-100	90		Pavements with PCI values above 85, or 'Good', may require periodic joint/crack sealing and local patching.
Pavement Preservation	65-85	70		Pavements with PCI conditions ranging from 'Fair' to 'Satisfactory' may require patches and/or joint/crack sealing.
Major Rehabiliation	40-64	50		Pavements that have deteriorated below a PCI 65, or within the range of 'Very Poor' to 'Fair' conditions may require major rehabilitation such as slab replacement and PCC restoration activity.
Major Reconstruction	0-39	15		Pavements that have deteriorated below a PCI 40, or within the range of 'Failed' to 'Very Poor' conditions, may require major reconstruction.

1.8 References

The following reference documents were referenced as specific guidelines and procedures for maintaining airport pavements; establishing an effective pavement maintenance program; and identifying specific pavement distresses, probable causes of distresses, inspection guidelines, and recommended methods of repair:

- ASTM D5340-12 “Standard Test Method for Airport Pavement Condition Index Surveys.”
- FAA Advisory Circular 150/5380-7B 150/5380-7B “Airport Pavement Management Program.”
- FAA Advisory Circular 150/5380-6C “Guidelines and Procedures for Maintenance of Airport Pavements.”
- FAA Advisory Circular 150/5320-6F “Airport Pavement Design and Evaluation.”
- Department of the Air Force, Air Force Civil Engineer Center “Engineering Technical Letter (ETL) 14-3: Preventive Maintenance Plan (PMP) for Airfield Pavements.”
- Unified Facilities Criteria (UFC) 3-260-16FA 16 “Airfield Pavement Condition Survey Procedures Pavements.”
- Unified Facilities Criteria (UFC) 3-260-03 “Airfield Pavement Evaluation.”
- Pavement Management for Airports, Roads, and Parking Lots 2nd Edition, M.Y. Shahin.



Chapter 2

Chapter 2 – Methodology

An effective pavement management program incorporates the regular collection of pavement condition information and communication of information to appropriate sponsors. This chapter of the report defines the specific methods utilized as part of the SAPMP System Update to meet the requirements of an effective pavement management system as defined by the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP)."***

2.1 Airfield Pavement Database

The SAPMP program has historically utilized PAVER™ (formerly MicroPAVER™); the current update has maintained the use of the PAVER™ 7.0 version of the software. The PAVER™ software application was developed by the U.S. Army Construction Engineering Research Laboratory sponsored by the FAA, Federal Highway Administration, U.S. Army, U.S. Air Force, and the U.S. Navy to meet the objectives of an effective pavement management system. The SAPMP consists of a network-level database of the airport's airfield pavement facilities that are part of the program. PAVER™ can achieve the following pavement management objectives: a manageable inventory system, the analysis of the current condition of pavements in accordance with the ASTM D5340, the development of pavement performance models to forecast conditions, and the development of maintenance, repair, and major rehabilitation recommendations based on budgetary scenarios.

PAVER™ inventory management is based on a tiered organizational structure that consists of networks, branches, and sections, with the section being the smallest unit of management. Critical elements of an effective pavement management program are maintained within the network-level PAVER™ database. These elements typically consist of pavement inventory characteristics, pavement structure, work history, historic condition records, and analytical customization.

The SAPMP System Update consisted of the conversion of the previous database from a PAVER™ version 6.5 to a version 7.0.

2.2 Airfield Pavement System Inventory

An airfield pavement system inventory typically maintains the location of all runways, taxiways, and aprons; geometric characteristics; type of pavement structure, year of construction and/or last major rehabilitation; and general composition details of the pavement.

The pavement inventory for an airport's airfield is an assembly of pavement infrastructure information that builds an inventory of branches and sections that codifies the airport's airfield pavement network. General geometry characteristics, estimated length, width, functional classification, pavement surface type, and operational function are among the characteristics identified at this initial phase in the pavement management process. The development of a pavement inventory that reasonably reflects the airport's airfield pavement facilities that are maintained by the airport provides a defined scope of the inspection and analysis efforts. As in the past, the SAPMP scope of work is specific to the airport-maintained airfield pavements as defined in the field network definition exhibits presented to current airport personnel.



A critical input to the pavement system inventory and network definition in the development of the SAPMP update is the date of last major rehabilitation/construction performed on the pavement assets that would set the asset at a PCI of 100 and a condition rating of Good. The airport provided a limited combination of record drawings, reports, and staff input that was pertinent information in developing the construction history of the airport's pavements from inception. Major rehabilitation/construction activities performed in the last 24-months or anticipated in the next 24-months are assumed to restore the PCI to 100. These activities include; pavement overlay, mill and replace, mill and overlay, new construction, and/or complete reconstruction.

Aerial imagery was obtained through the FDOT Surveying & Mapping Office's *Aerial Photo Look Up System (APLUS)*. This spatially projected imagery was utilized with computer-aided drafting software (AutoCAD) in concert with geographical information system software (ArcGIS) to develop a planning-level representative model that reasonably reflects the pavement assets at the airport.

2.2.1 Pavement Management Program Network Definition Terminology

There are several terms that are common in the communication of the results of the SAPMP System Update, these terms are defined as follows:

Pavement Network

A pavement network is a logical unit for organizing pavements into a structure for pavement management. A network will typically consist of one or more pavement *branches*, which are typically comprised of one or many pavement *sections*. The network is the starting point of the hierarchy of pavement management organization. For example, a network can be all the pavements within an airport's airfield or all the pavements in a statewide program. For the FDOT SAPMP, a network represents an individual airport's airfield pavement facilities maintained by the airport.

The SAPMP System Update consists of research and evaluation of existing record documentation for the participating airports' airfield facilities. The pavement network is typically limited to the pavement facilities subject to aircraft use that is also maintained by the airport owner and eligible for public funding.

Pavement Branch

A pavement branch, also known as a facility, is a logical unit of generally identifiable pavement of a network with distinct functional classification. For example, within an airfield each runway, taxiway, or apron is considered a branch. A branch must consist of at least one section.

Pavement Section

A pavement section, also known as a feature, is the most specific management unit when considering the application and selection of maintenance, repair, and/or major rehabilitation treatments on an area of pavement within a branch. Each branch consists of at least one section, but may consist of more if pavement feature characteristics are distinct throughout the branch. Characteristics considered when subdividing branches into sections include, but are not limited to: pavement structure, type, age, condition, and function; traffic composition and frequency (current and future); geometric location; construction history; and other related

infrastructure features (e.g. drainage). A pavement section is defined as a subordinate of a pavement branch, which is a subordinate of a "parent" pavement network.

Pavement Sample Unit

A pavement sample unit is a subdivision of a pavement section that has a standard size range: twenty (20) continuous slabs (±8 slabs) for Portland Cement Concrete (PCC) pavement and 5,000 contiguous square feet (±2,000 ft^2) for flexible asphalt concrete (AC) or porous friction course pavements.

Table 2.2.1 Airfield Pavement Database Network Definition Terminology

PMS Network Level	Common Definition	Airport Example
Network	Overall pavement assets maintained by the Airport	"Tallahassee International Airport – Airfield Pavements"
Branch Name	Commonly defined asset name as established by Airport and by use	"Runway 18-36"
Branch ID	Codified shorthand name for commonly defined asset established for database identification	"RW 18-36" RW, Branch Use, "Runway" 18-36, Runway Facility
Section ID	Codified identification for pavement asset that is distinct by the following: • Pavement Composition • Construction Work History • Aircraft Traffic • Condition Records	"6105"
Sample Unit	A numeric identification of an area of pavement (5,000±2,000 SF of AC or 20±8 slabs of PCC) that has been inspected in accordance with ASTM D5340-12.	"300"



2.3 Airfield Pavement Structure

2.3.1 Pavement Structure Types

Airport airfield pavements are constructed to provide adequate support for the loads imposed by aircraft and produce a firm, stable, smooth, all-year, all-weather surface free of debris or other particles that may be blown or dislocated by propeller wash or jet blast. Typical pavement planning and design requires coordination of factors that include but are not limited to; subgrade conditions, material layer types, aircraft fleet mix (type, frequency, and traffic growth), and functional use. A pavement structure is composed of constructed layers that consist of subgrade, subbase, base course, structural courses, and surfaces courses. For the FDOT SAPMP, two major pavement structure types are classified for evaluation and analysis: Flexible Asphalt Concrete Surface and Rigid Portland Cement Concrete Surface. Additionally, Composite Structures known as Whitetopping Pavements are also present at limited airports within the Florida Airports System; these unique pavement structures are evaluated separately.

Flexible Asphalt Concrete Surface

A pavement comprised of aggregate mixture with an asphalt cement binder. The FDOT SAPMP consists of three (3) asphalt concrete surface types: Asphalt Concrete (AC), Asphalt Concrete Overlaid on Asphalt Concrete (AAC), and Asphalt Concrete Overlaid on Portland Cement Concrete (APC).

Asphalt Concrete (AC)

A flexible pavement section consisting of aggregate mixture with asphalt cement binder layered on engineered base course material that is layered on subbase and subgrade soil material.

Asphalt Concrete Overlaid on Asphalt Concrete (AAC)

A flexible pavement section consisting of aggregate mixture with asphalt cement binder layered on an existing flexible AC pavement section. Flexible airfield pavement sections are AAC when a pavement rehabilitation consists of a pavement milling operation and a resurfacing of asphalt layers; or a direct overlay of asphalt concrete without surface preparation.

Asphalt Concrete Overlaid on Portland Cement Concrete (APC)

A flexible pavement section consisting of aggregate mixture with asphalt cement binder layered on an existing Rigid PCC pavement section. This unique pavement composition may result in distinct pavement distress manifestations known as reflective joint cracking.



Rigid Portland Cement Concrete Surface

A pavement comprised of aggregate mixture with a Portland Cement binder. The FDOT SAPMP recognizes Portland Cement Concrete (PCC) as the primary rigid pavement section.

Portland Cement Concrete (PCC)

A rigid pavement section composed of Portland cement concrete placed on a granular or treated base course that is supported on a compacted subgrade. The concrete surface must provide a texture of nonskid qualities, prevent the infiltration of surface water into the subgrade, and provide structural support to the airplanes. Rigid pavement construction requires the layout of appropriately designed joint spacing.

Composite Structure – Whitetopping Pavement

A composite pavement comprised of relatively thin Portland Cement Concrete overlaid on an existing flexible asphalt concrete pavement structure. There are three (3) types of Whitetopping Pavements; Conventional (WHT), Thin (TWT), and Ultra-Thin (UTW).

Conventional Whitetopping (WHT)

A composite pavement structure consisting of a modified PCC overlaid on an existing flexible AC pavement section area. The modified PCC layer is typically greater than 6-inches in thickness.

Thin Whitetopping (TWT)

A composite pavement structure consisting of a modified PCC overlaid on an existing flexible asphalt concrete pavement section. The modified PCC layer is typically between 4 and 6 inches in thickness.

Ultra-Thin Whitetopping (UTW)

A composite pavement structure consisting of a modified PCC overlaid on an existing flexible asphalt concrete pavement section. The Portland Cement Concrete layer is typically between 2 and 4 inches in thickness.



2.4 Airfield Pavement Work History

2.4.1 Airfield Pavement Record Keeping

It is strongly recommended that airports maintain records of all airfield construction and maintenance related to the pavement facilities. A history of all maintenance and repair performed and its associated costs (construction and soft costs) can provide valuable information on the effectiveness of various treatments on pavements. An airport should maintain detailed records of maintenance (routine, emergency, and proactive) activities. The records should consist of the following:

1. Location and Limits of Work.
2. Types and Severity of Distresses Repaired.
3. Type of Work.
4. Cost of Work.
5. Supporting Documents (contract documents, construction drawings, specifications, bid tabulations, repair product, photograph records, etc.).

2.5 Airfield Pavement Traffic

A pavement section is typically designed to meet the needs of the user (airlines, air cargo, general aviation, and/or military) in providing a safe, smooth, operational surface. Pavement deterioration generally occurs gradually through increased roughness and/or fatigue cracking caused by successive and heavy aircraft traffic.

This study does not consist of a study or analysis of each individual airport's airfield aircraft fleet mix or traffic operations. However, it is strongly recommended that airports incorporate the requirements of FAA Advisory Circular ***150/5320-6F Airport Pavement Design and Evaluation*** when developing design-level rehabilitation activities. The AC provides guidance on incorporation of aircraft traffic fleet mix data.

2.6 Airfield Pavement Condition Index (PCI) Survey

2.6.1 PCI Survey Methodology

In adherence to the FAA Advisory Circular ***150/5380-7B "Airport Pavement Management Program (PMP),"*** the FDOT SAPMP utilizes the PCI Survey Method of inspection to collect pavement distress data and analyze the condition. The PCI Survey Inspection procedure is a visual statistical sampling of pavements for recording primary distress types (e.g. cracking and deformation), associated severities, and quantities as defined by the ASTM D5340-12. This effort is the primary means of obtaining and recording pavement distress data. The survey inspection consists primarily of visual inspection of pavement surfaces for signs of distress and deterioration resulting from loading (aircraft) and environmental influences.

A visual pavement condition survey provides an indication of the cause and rate of deterioration of a pavement section from a functional point of view and can be an indicator of structural distress. The functional condition analysis assesses the rating of the operational surface. A visual PCI Survey Inspection does not predict the remaining structural life of a pavement section, or its ability to support loads. The functional condition determined by the PCI method



can provide a cost-effective means to plan for pavement rehabilitation projects. The timely application of pavement rehabilitation may lead to the extension of functional life of individual pavement sections. This method varies from structural evaluation; functional condition is limited to visually observed distresses and indicative modes of pavement deterioration. A formal structural evaluation analyzes subsurface conditions, material characteristics, and qualitative pavement structure attributes. A structural evaluation may consist of; subsurface geotechnical exploration, falling weight deflectometer testing, petrographic testing, material coring, and/or flexural testing.



2.6.2 Pavement Distress Types

For each section, the severity and quantity of defined distresses are recorded and then analyzed in accordance with the ASTM D5340-12 standard. The standard identifies 17 distinct flexible asphalt concrete distress types and 16 distinct rigid Portland Cement Concrete distress types.

Table 2.6.2-1 (a) Pavement Distress Types – Flexible Asphalt Concrete-Surfaced Airfields

Distress	Common Distress Mechanisms
Alligator Cracking	Load / Fatigue
Bleeding	Construction Quality/ Mix Design
Block Cracking	Climate / Age
Corrugation	Load / Construction Quality
Depression	Load / Subsurface
Jet Blast	Aircraft
Joint Reflection - Cracking	Climate / Subsurface Pavement / Traffic Load
Longitudinal/Transverse Cracking	Climate / Construction Quality
Oil Spillage	Aircraft / Vehicle
Patching	Utility / Pavement Repair / Age
Polished Aggregate	Repeated Traffic Loading
Raveling	Climate / Age
Rutting	Load / Fatigue
Shoving	PCC Pavement Growth / Movement
Slippage Cracking	Load / Pavement Bond / Mix Design
Swelling	Climate / Subsurface
Weathering	Climate / Age

Table 2.6.2-1 (b) Pavement Distresses Possible Causes – Flexible Asphalt Concrete-Surfaced Airfields

Classification by Possible Causes			
Load	Climate / Durability	Moisture / Drainage	Others
• Alligator Cracking • Corrugation • Depression • Patching of Load-based distress • Polished Aggregate • Rutting • Slippage Cracking	• Bleeding • Block Cracking • Joint Reflection Cracking • L/T Cracking • Patching of climate / durability-caused distresses • Shoving from PCC • Raveling • Weathering • Swelling	• Alligator Cracking • Depression • Patching of moisture / drainage caused distress • Swelling • Raveling • Weathering	• Oil Spillage • Jet Blast Erosion • Polished Aggregate

Table 2.6.2-1 (c) Pavement Distresses Possible Effects – Flexible Asphalt Concrete-Surfaced Airfields

Classification by Possible Effects			
Roughness	Skid / Hydroplaning Potential	FOD Potential	Rate of Deterioration and Maintenance Requirements
• Corrugation • Depression • Rutting • Shoving of asphalt pavement • Swelling • Raveling • Weathering	• Bleeding • Depression • Polished Aggregate • Rutting	• Block Cracking • Joint Reflection Cracking • L/T Cracking • Slippage Cracking	• All Distresses

Table 2.6.2-2 (a) Pavement Distresses – Rigid Portland Cement Concrete-Surfaced Airfields

Distress	Common Distress Mechanisms
Blowup	Climate / ASR
Corner Break	Load Repetition / Curling Stresses
Linear Cracking	Load Repetition / Curling Stresses / Shrinkage Stresses
Durability Cracking	Freeze-Thaw Cycling
Joint Seal Damage	Material Deterioration / Construction Quality / Age
Small Patch	Pavement Repair
Large Patch/Utility Cut	Utility / Pavement Repair
Popout	Freeze-Thaw Cycling / ASR / Material Quality
Pumping	Load Repetition / Poor Joint Sealant
Scaling	Construction Quality / Freeze-Thaw Cycling
Faulting	Subgrade Quality / ASR / Inadequate Load Transfer
Shattered Slab	Overloading
Shrinkage Cracking	Construction Quality / Climate
Joint Spalling	Load Repetition / Infiltration of Incompressible Material / Deterioration of Dowel (Load Transfer) Bars
Corner Spalling	Load Repetition / Infiltration of Incompressible Material / Deterioration of Dowel (Load Transfer) Bars
Alkali-Silica Reaction (ASR)	Construction Quality / Climate / Chemical Reaction

Table 2.6.2-2 (b) Pavement Distresses Possible Causes – Rigid Portland Cement Concrete-Surfaced Airfields

Classification by Possible Causes			
Load	Climate / Durability	Moisture / Drainage	Others
• Corner Break • Shattered Slab • L/T/D Cracking • Pumping • Patching of Load-associated distress • Spalling	• Blowup • "D" Cracking • Joint Seal Damage • Popouts • Scaling • Patch of Climate/Durability-associated distress • Shrinkage Cracking • Spalling • L/T/D Cracking	• Corner Break • Shattered Slab • Pumping • Patching of Moisture/Drainage-associated distress	• Settlement / Faulting

Table 2.6.2-2 (c) Pavement Distresses Possible Effects – Rigid Portland Cement Concrete-Surfaced Airfields

Classification by Possible Effects			
Roughness	Skid / Hydroplaning Potential	FOD Potential	Rate of Deterioration and Maintenance Requirements
• Blowup • Corner Break • L/T/D Cracking • Shattered Slab • Settlement / Faulting • Spalling	• Settlement / Faulting • Spalling	• Corner Break • L/T/D Cracking • "D" Cracking • Joint Seal Damage • Shattered Slab • Popouts • Scaling	• All distresses



2.6.3 PCI Survey Inspection Procedures

Inspection Sampling Rate

The FDOT SAPMP performs PCI Survey Inspections on sample units defined in the previous update. The sample units are subject to change at the discretion of the inspection personnel and/or to major pavement rehabilitation treatments. Furthermore, access to the sample units based on accessibility or impacts to operations may affect the overall sampling rate effort at each airport. The following **Tables 2.6.3 (a) and (b)** define the sampling criteria used by the FDOT SAPMP. A higher sampling rate may be utilized to achieve a greater statistical confidence should the airport have the available resources to perform PCI Survey Inspections independent of the FDOT SAPMP.

Table 2.6.3 (a) Recommended Sample Rate Schedule for Flexible Asphalt Concrete

Number of Total Sample Units in Section	Sample Units to Inspect	
	Runways	Taxiways, Aprons, and Others
1 - 4	1	1
5 - 10	2	1
11 - 15	3	2
16 - 30	5	3
31 - 40	7	4
41 - 50	8	5
51 or more	20% but ≤20	10% but ≤10

Table 2.6.3 (b) Recommended Sample Rate Schedule for Rigid Portland Cement Concrete

Number of Total Sample Units in Section	Sample Units to Inspect	
	Runways	Taxiways, Aprons, and Others
1 - 3	1	1
4 - 6	2	1
7 - 10	3	2
11 - 15	4	2
16 - 20	5	3
21 - 30	7	3
31 - 40	8	4
41 - 50	10	5
51 or more	20% but ≤20	10% but ≤10

2.6.4 Updates to the ASTM D5340-12

Airfield pavement distresses and conditions were surveyed in accordance with the methods outlined in FAA Advisory Circular 150/5380-6C and ASTM D5340-12. These procedures define distress type, severity, and quantity for sampling areas within each defined pavement section area to analyze and determine the PCI value and condition rating. During the 2013-2015 System Update, the incorporation of the significant chances to the ASTM D5340 (version D5340-12) resulted in an adjusted pavement condition indices on pavement sections subject to the distress types updated. Furthermore, the revision of the PCI deduction curves and the separation of distress types from the original, such as Weathering and Raveling, have in select cases increased the PCI value of the section without any rehabilitation performed.

Flexible Asphalt Concrete Pavement Distress Updates

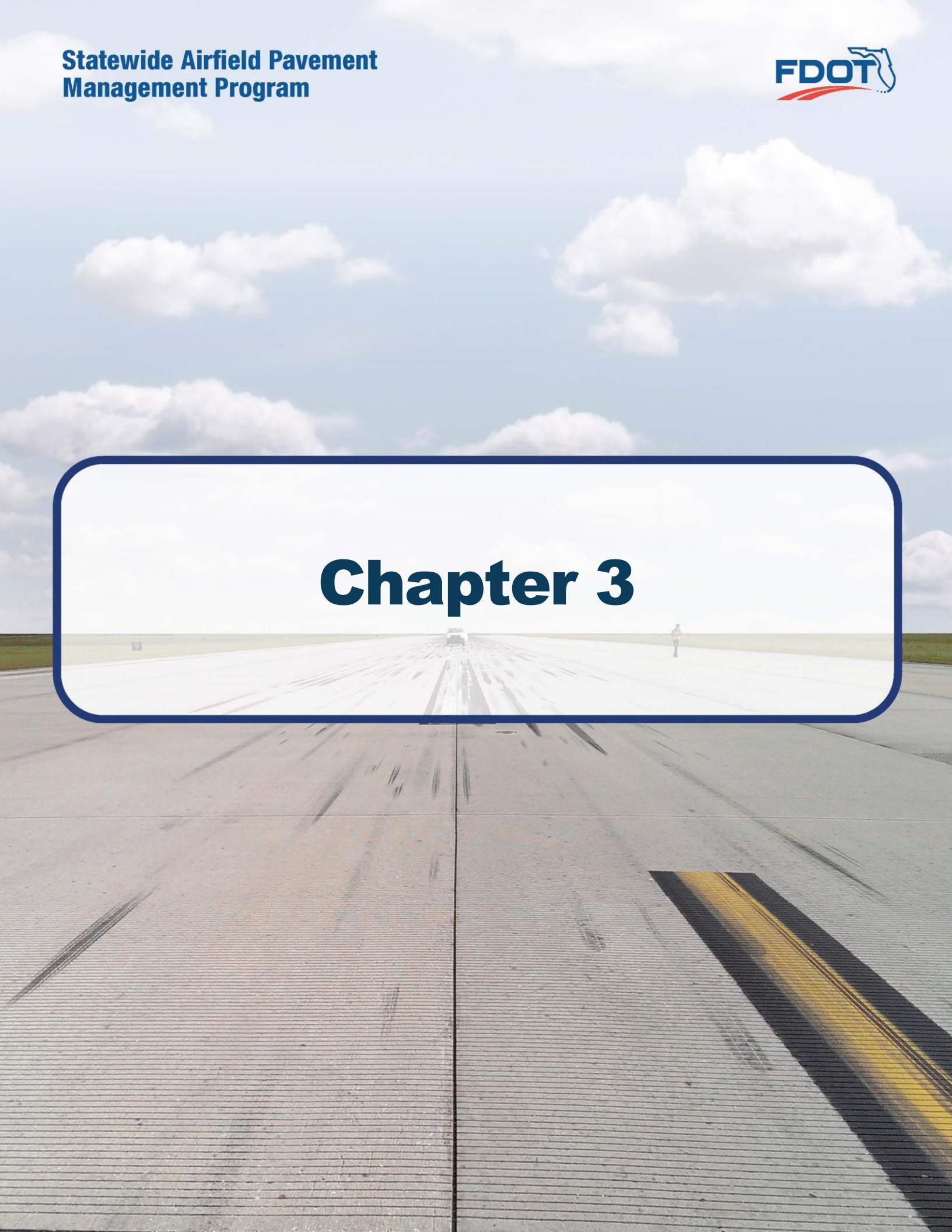
The previous methodology which featured “(52) Weathering and Raveling” distress has been separated into two distresses “(52) Raveling” and “(57) Weathering.” Previously, areas that were recorded as “Weathering and Raveling” were considered as one distress with a high deduction. Based on the updated methodology, in certain situations where “Weathering” only exists and does not meet the definition of “Raveling,” the PCI deduction is not as high as the former “Weathering and Raveling.” Therefore, areas identified only as “(57) Weathering” based on current ASTM standards, which were previously identified as “(52) Weathering and Raveling,” may be subject to an improvement in PCI. In instances where pavement PCI has increased due to this update, it is not due to an improvement in actual condition, however indicative of the adjusted distress deterioration effects.

Rigid Portland Cement Concrete Pavement Distress Updates

The previous methodology defined “(70) Scaling” as a distress that consisted of surface deterioration caused by construction defects, material defects, and environmental factors. The distress included *Alkali-Silica Reaction*, also known as ASR. The current methodology has separated Alkali-Silica Reaction as a distress identified as “(76) Alkali-Silica Reaction / ASR.” As a result the previous “(70) Scaling” numerical deduction contribution to the PCI has been reduced. Previous inspections that recorded “(70) Scaling,” and currently do not exhibit “(76) Alkali-Silica Reactivity / ASR” may potentially see an increase in PCI. Additionally, “(73) Shrinkage Cracks” has been redefined as “(73) Shrinkage Cracking”. Shrinkage Cracking is characterized in two forms; drying shrinkage and plastic shrinkage. Drying shrinkage occurs over time as moisture leaves the pavement, it develops when hardened pavement continues to shrink as excess water not needed for cement hydration evaporates. It forms when subsurface resistance to the shrinkage is present and may extend through the entire depth of the slab. Plastic shrinkage develops when there is rapid loss of water in the surface of recently placed pavement or can form from over finishing/overworking of the pavement during construction. These shrinkage cracks appear as a series of inter-connected hairline cracks, or pattern cracking, and are often observed throughout the majority of the slab surface. This condition is also referred to as map cracking or crazing.

Table 2.6.4 Summary of Updates to ASTM D5340-12

Distress Updates to Reflect ASTM 5340-12				
Use and Surface Type	**Updated Distress**	**Former Distress in Prior to 5340-10**	**Deduction Curve**	**Potential Effect**
AC/AAC/ APC Airfield	(52) Raveling - Low	(52) Weathering and Raveling - Low	No Change	N/A
	(52) Raveling - Medium	(52) Weathering and Raveling - Medium	No Change	N/A
	(52) Raveling - High	(52) Weathering and Raveling - High	No Change	N/A
	(57) Weathering - Low	N/A – was part of 'Weathering and Raveling'	New	Increase in PCI with no maintenance
	(57) Weathering - Medium	N/A – was part of 'Weathering and Raveling'	New	Increase in PCI with no maintenance
	(57) Weathering - High	N/A – was part of 'Weathering and Raveling'	New	Increase in PCI with no maintenance
PCC Airfield	(70) Scaling - Low	(70) Scaling, Map Cracking, and Crazing - Low	New	Increase in PCI with no maintenance
	(70) Scaling - Medium	(70) Scaling, Map Cracking, and Crazing - Medium	New	Increase in PCI with no maintenance
	(70) Scaling - High	(70) Scaling, Map Cracking, and Crazing - High	New	Increase in PCI with no maintenance
	(76) Alkali Silica Reaction – Low	N/A – was part of 'Scaling, Map Cracking, and Crazing'	New	Increase in PCI with no maintenance
	(76) Alkali Silica Reaction – Medium	N/A – was part of 'Scaling, Map Cracking, and Crazing'	New	Increase in PCI with no maintenance
	(76) Alkali Silica Reaction – High	N/A – was part of 'Scaling, Map Cracking, and Crazing'	New	Increase in PCI with no maintenance
	(73) Shrinkage Cracking	(73) Shrinkage Cracking	No Change	Prior distress types identified as 'Scaling, Map Cracking, and Crazing' may now be identified as 'Shrinkage Cracking'



Chapter 3



Chapter 3 – Airfield Pavement System Inventory

A significant element of an effective airfield pavement management system is the appropriate record keeping of changes due to construction or operational use of the pavement facilities. This chapter discusses the inventory data collected from the airport and summarizes network-level characteristics of the airport's airfield pavements. At the start of each FDOT SAPMP System Update, all airports are asked to review the existing Airfield Pavement Network Definition exhibit for accuracy. Furthermore, participating airports are asked to provide documentation for any recent or anticipated construction related to their airfield pavements.

3.1 Airfield Pavement Network Information

3.1.1 Previous and/or Anticipated Airfield Pavement Construction

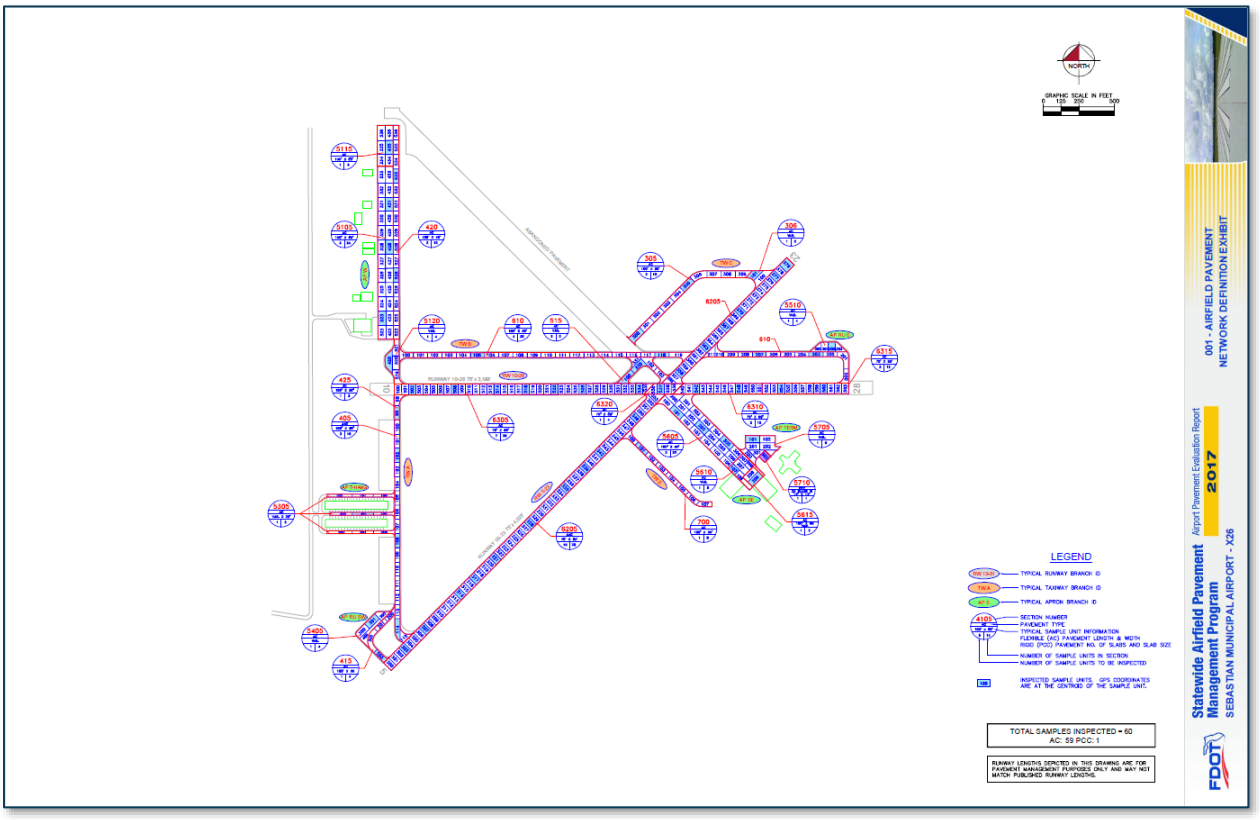
Based on information provided by the airport, the following **Table 3.1.1** summarizes the airfield pavement construction projects that have been incorporated into the SAPMP database system since the 2013-2015 System Update. **Figure 3.1.1-1** and **Figure 3.1.1-2** provides an inset view of the 2017 Airfield Pavement Network Definition Exhibit and the 2017 Airfield Pavement System Inventory Exhibits that depict the updated network details for the airport reflected in the PAVER Database. Large format exhibits are referenced in **Appendix C Technical Exhibits**.

Table 3.1.1 Previous and/or Anticipated Airfield Pavement Construction

Year	General Work Description
2017	**TW D** - New Construction
	TW E - New Construction
2018	**TW C** - New Construction

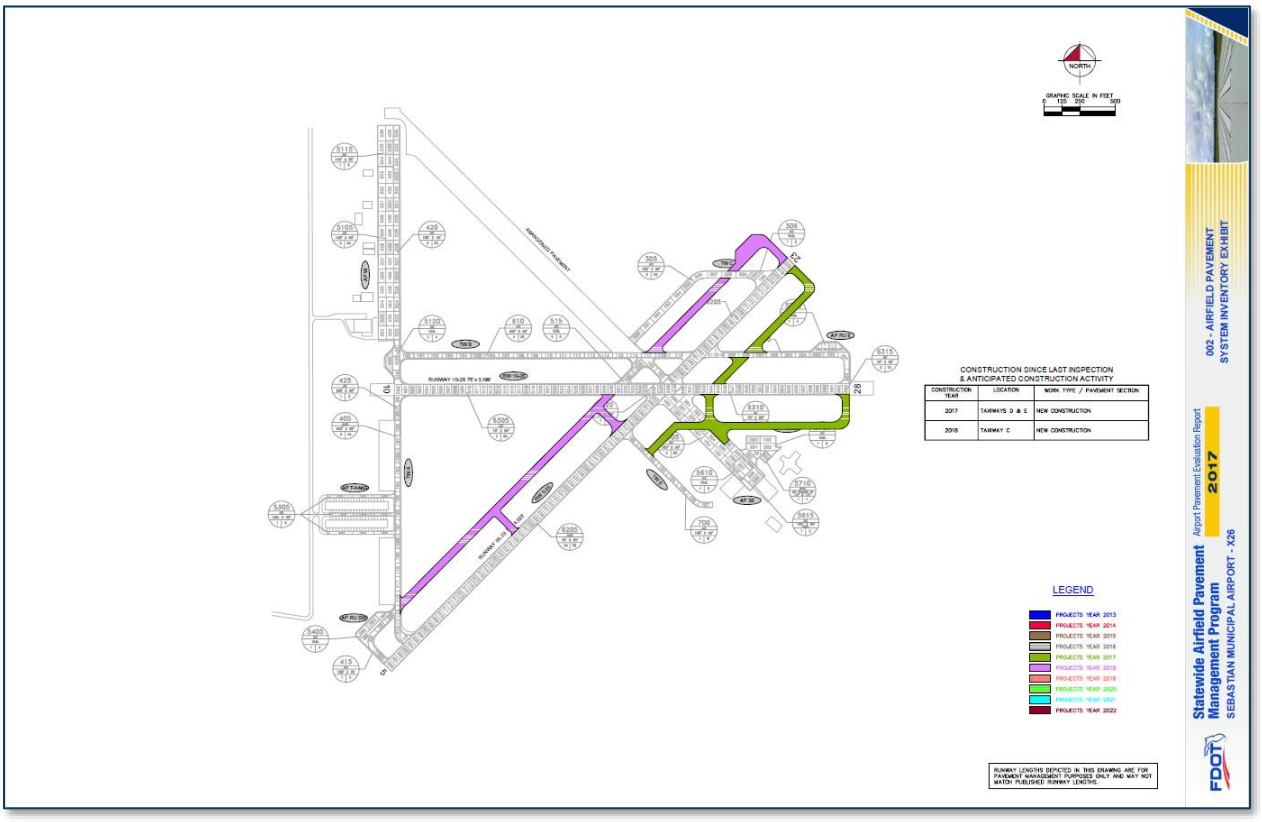
The airport provided a limited combination of record drawings, reports, and staff input that was pertinent information in developing the construction history of the airport's pavements from inception. Major rehabilitation/construction activities performed in the last 24-months or anticipated in the next 24-months are assumed to restore the PCI to 100. These activities include: pavement overlay, mill and replace, mill and overlay, new construction, and/or complete reconstruction. These pavements were not formally subject to a PCI Survey and actual conditions may vary. Furthermore, any localized maintenance or repair performed that would improve the PCI will be considered in the condition analysis, if performed within inspection areas.

Figure 3.1.1-1 2017 Airfield Pavement Network Definition Exhibit



The Airfield Pavement Network Definition Exhibit provides details to the PCI Survey inspection efforts. The exhibit identifies the pavement facilities, surface type, section definition, and sample unit delineation.

Figure 3.1.1-2 2017 Airfield Pavement System Inventory Exhibit

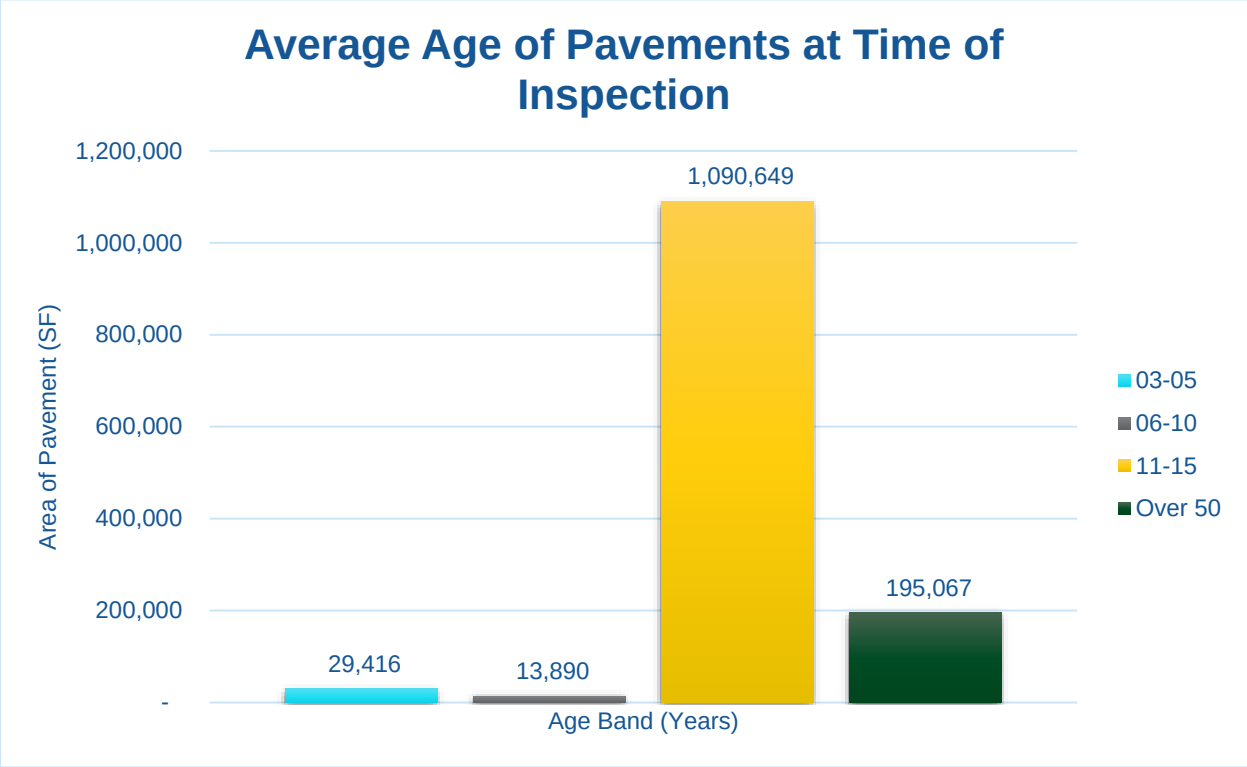


The Airfield Pavement System Inventory Exhibit provides details to the work history updates communicated by the Airport. The Exhibit provides the approximate limits of recent and/or anticipated construction on the airfield pavement facilities. The limits are based on documentation provided by the Airport and, if constructed, observed in the field.

3.1.2 Estimated Pavement Age

Standard pavement design practice considers a design life of a 20-year period. Design inputs typically require subgrade soil conditions, pavement section layer material characteristics, and anticipated loading (aircraft fleet mix) for the design-life period. Based on the review of the historic airfield pavement construction, **Figure 3.1.2** summarizes the average age of the pavement sections since any major construction activity has occurred during the PCI Survey inspection. This is intended to be a rough estimate based on interpretation of the limited data available at the time of report.

Figure 3.1.2 Average Age of Pavements at Inspection

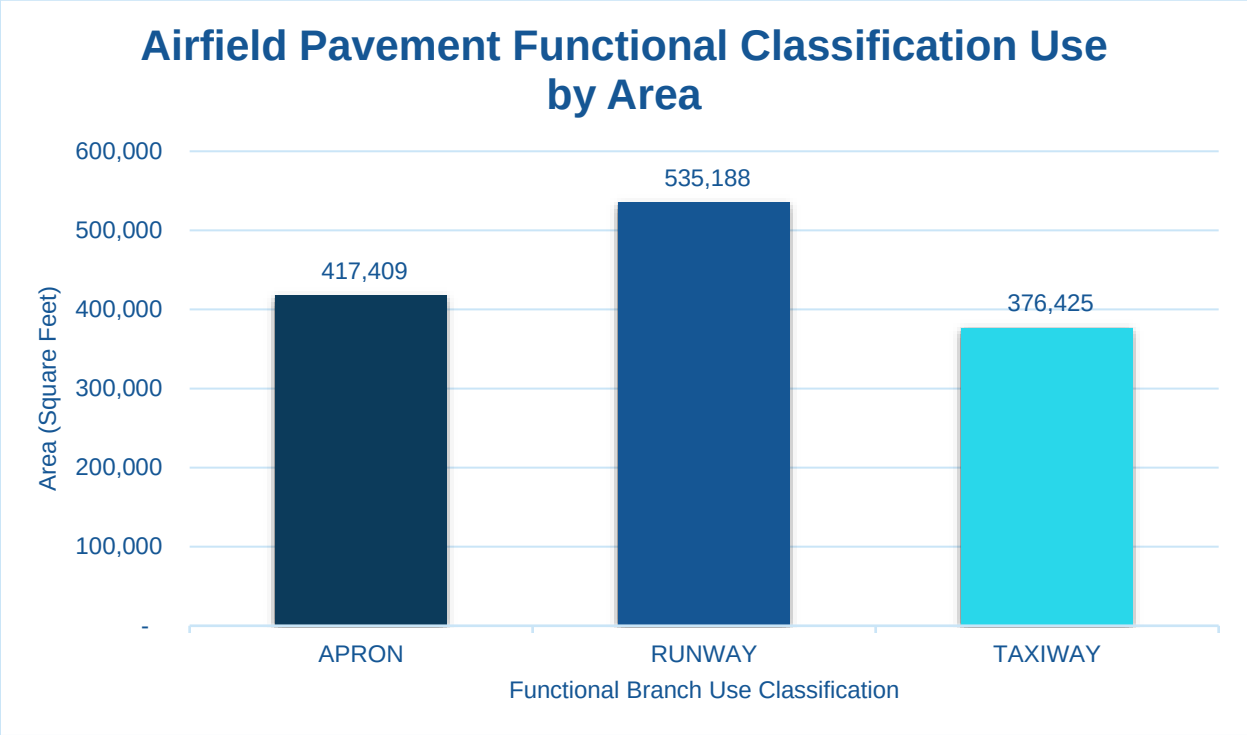


The estimation of the pavement age is based on information requested and provided by participating airports. Additionally, data collected in the prior system updates since 1992 have been relied upon.

3.1.3 Functional Use Classification

Pavements are subject to varying aircraft loading patterns based on utilization and overall operations. For this SAPMP Update, the following categories of airfield functional use have been identified and associated with the following possible pavement branch facilities: Apron, Runway, Taxiway, and Taxilane. **Figure 3.1.3** summarizes the identified pavements' functional use by area in square feet. The pavement areas reviewed exclude shoulder pavement facilities.

Figure 3.1.3 Airfield Pavement Functional Classification Use by Area



3.1.4 Pavement Surface Type

The airfield pavement facility surface types within the SAPMP include four common types of pavement: Portland cement concrete (PCC), asphalt concrete (AC), asphalt concrete overlaid on asphalt concrete (AAC), and asphalt concrete overlaid on Portland cement concrete (APC).

Based on the record documentation incorporated within the SAPMP database throughout the years, the pavement surface types have been assigned to the various pavement sections in accordance to its work history composition. The following **Figures 3.1.4 (a) and (b)** summarize the applicable pavement types observed at this specific airport's airfield.

Figure 3.1.4 (a) Pavement Surface Type by Area (SF)

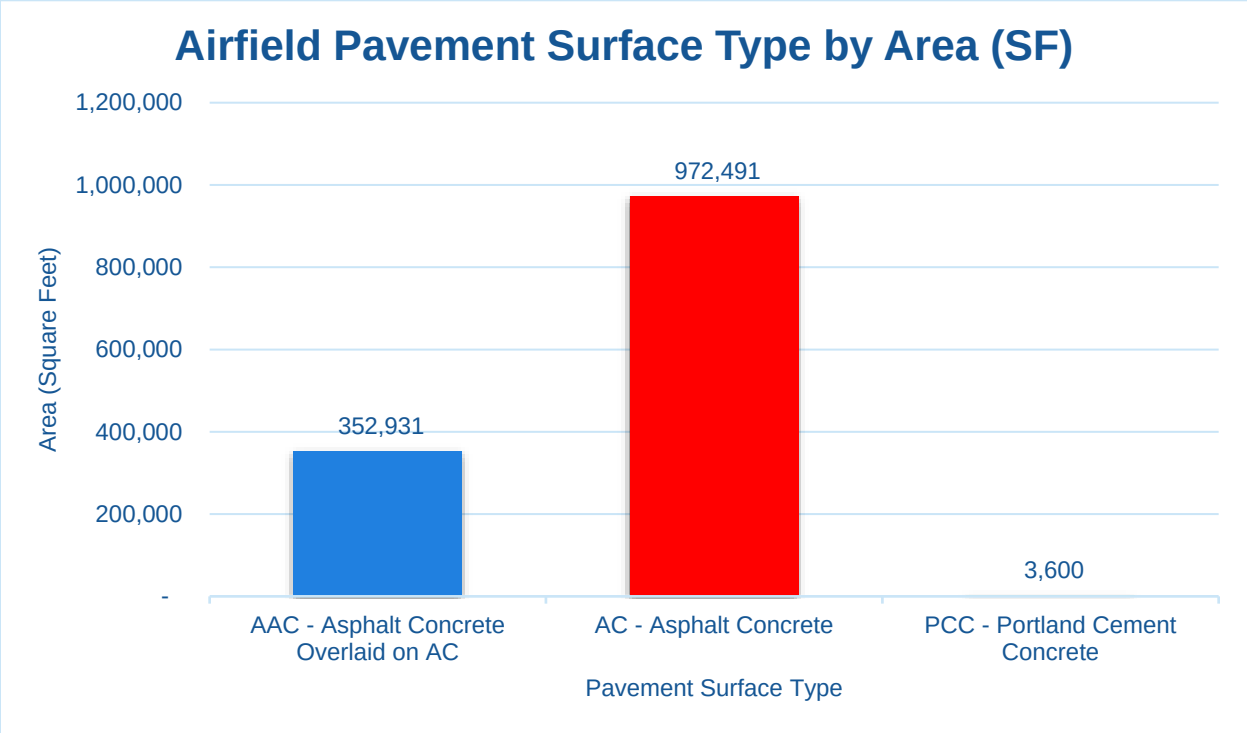
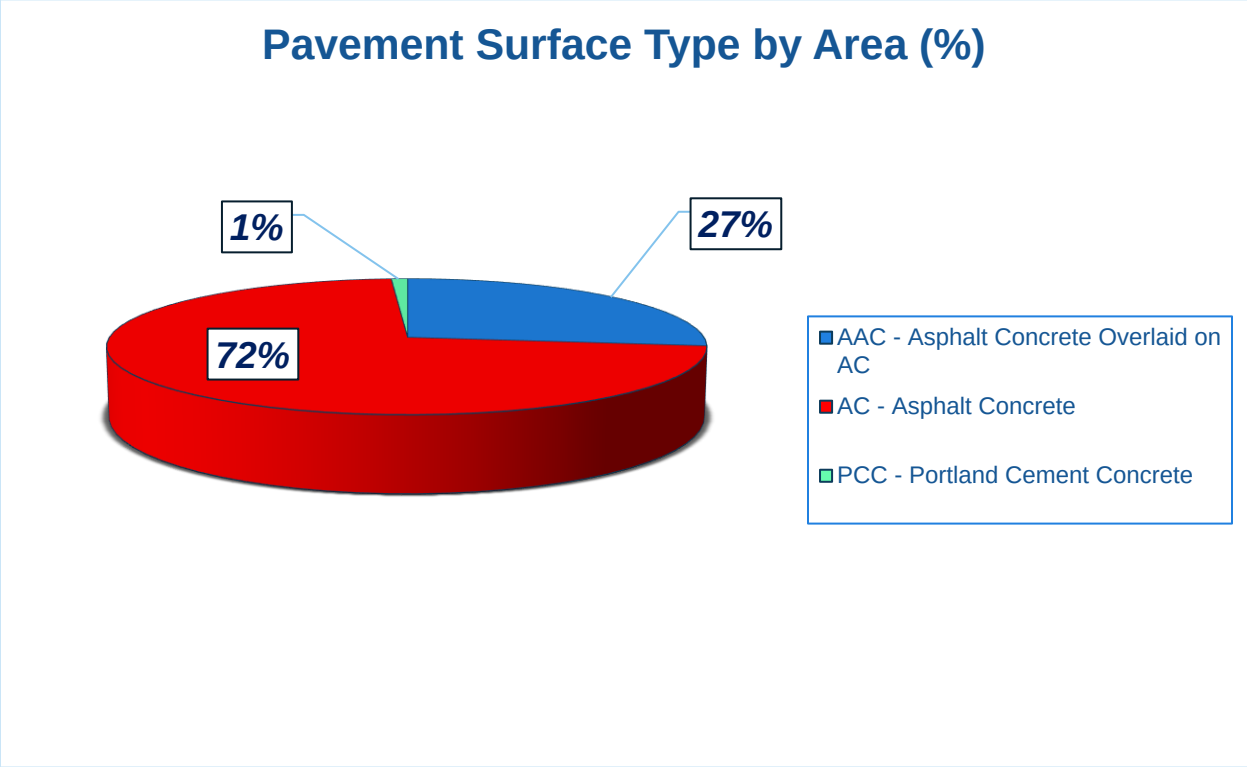


Figure 3.1.4 (b) Pavement Surface Type by Area (%)



3.1.5 Pavement System Inventory Details

The following **Table 3.1.5** displays the section-level details assembled as part of this update. The section-level details are based on the record documentation provided by the airports to FDOT and from SAPMP System Updates. The details assembled rely on the accuracy and the adequacy of data provided; however, it should be noted that characteristics such as pavement areas may be based on aerial interpretation of spatially projected imagery. The accuracy of data is presented with the intention of a network planning-level document; should the airport elect to perform rehabilitation work, it is recommended that further investigation be performed at the project level for construction purposes.

In summary, the scope of the pavement inventory update resulted in the updating of select existing pavement geometry and the development of an AutoCAD model with spatial projection for use within GIS. **Appendix A** includes the Airfield Pavement Network Definition Exhibit and the Airfield Pavement System Inventory Exhibit which visually summarize the results of the Airfield Pavement System Inventory analysis and reporting.

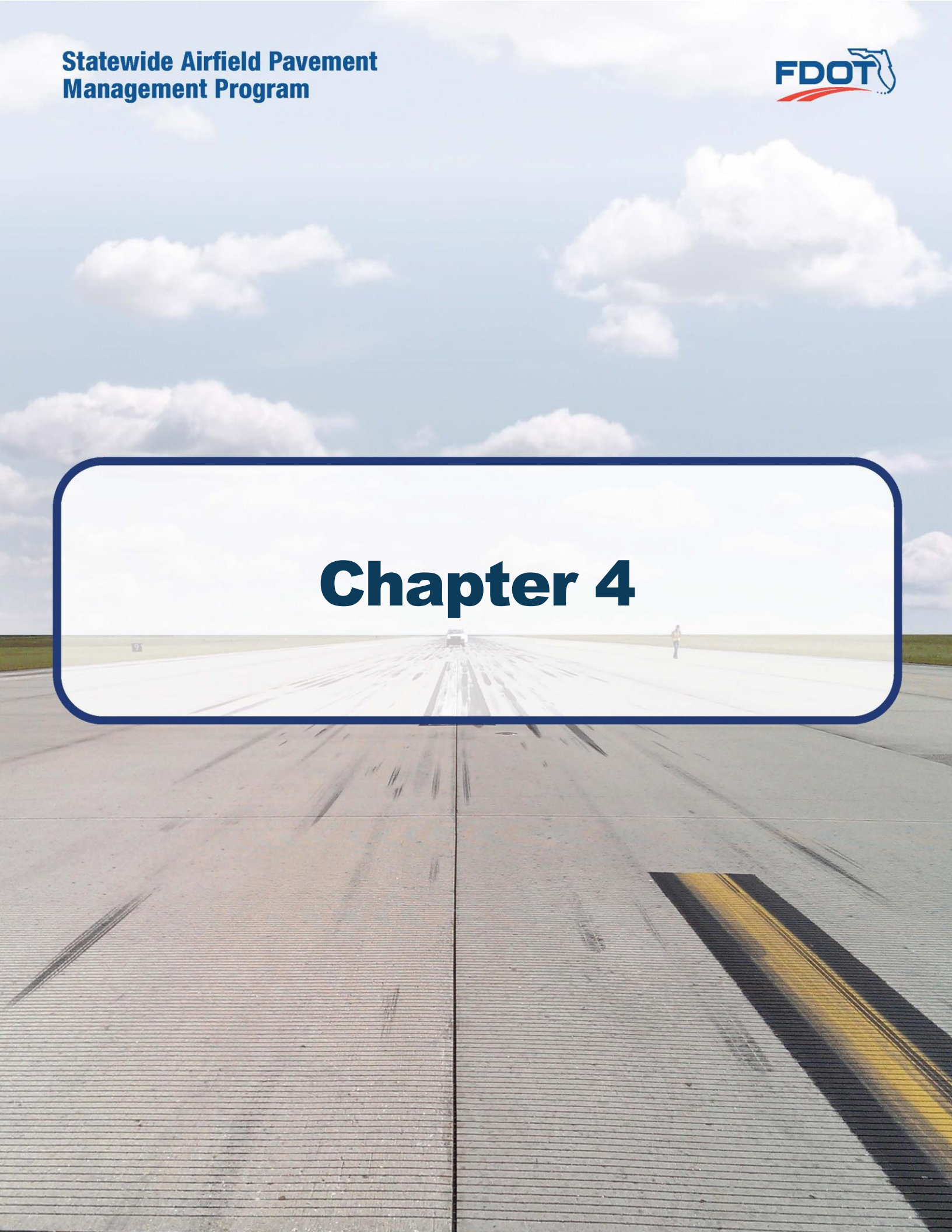


Table 3.1.5 Pavement System Inventory Details

Network ID	Branch Name	Branch ID	Branch Use	Section ID	Length (FT)	Width (FT)	Area (SF)	Surface Type	Est. Last Construction Date
X26	E RUN UP APRON	AP RU E	APRON	5510	200	50	13,002	AC	1/1/2004
X26	SW RUN UP APRON	AP RU SW	APRON	5405	195	100	19,824	AC	1/1/2005
X26	SOUTHEAST APRON	AP SE	APRON	5605	700	150	100,723	AC	1/1/1943
X26	SOUTHEAST APRON	AP SE	APRON	5610	200	150	21,960	AC	1/1/2005
X26	SOUTHEAST APRON	AP SE	APRON	5615	105	100	10,290	AC	1/1/2009
X26	APRON TERMINAL	AP TERM	APRON	5705	200	100	32,590	AC	1/1/2005
X26	APRON TERMINAL	AP TERM	APRON	5710	60	60	3,600	PCC	1/1/2008
X26	T-HANGAR APRON AREA	AP T-HANG	APRON	5305	1000	20	28,960	AC	1/1/2003
X26	WEST APRON	AP W	APRON	5105	1200	100	133,925	AC	1/1/2005
X26	WEST APRON	AP W	APRON	5115	290	50	31,900	AC	1/1/1943
X26	WEST APRON	AP W	APRON	5120	400	50	20,635	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6305	1800	75	134,512	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6310	575	75	44,362	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6315	613	75	45,750	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6320	213	75	15,376	AC	1/1/2004
X26	RUNWAY 5-23	RW 5-23	RUNWAY	6205	2938	100	295,188	AAC	1/1/2003
X26	TAXIWAY ALPHA	TW A	TAXIWAY	405	1700	35	57,743	AAC	1/1/2005
X26	TAXIWAY ALPHA	TW A	TAXIWAY	415	410	40	16,504	AC	1/1/2005
X26	TAXIWAY ALPHA	TW A	TAXIWAY	420	1500	50	60,300	AC	1/1/2004
X26	TAXIWAY ALPHA	TW A	TAXIWAY	425	180	35	7,067	AC	1/1/2004
X26	TAXIWAY BRAVO	TW B	TAXIWAY	610	4770	25	119,314	AC	1/1/2004
X26	TAXIWAY CHARLIE	TW C	TAXIWAY	305	1020	50	51,193	AC	1/1/1943
X26	TAXIWAY CHARLIE	TW C	TAXIWAY	306	120	75	11,251	AC	1/1/1943
X26	TAXIWAY CONNECTOR	TW CONN	TAXIWAY	515	750	30	23,637	AC	1/1/2004
X26	TAXIWAY E	TW E	TAXIWAY	700	800	35	29,416	AC	1/1/2011



PAGE INTENTIONALLY LEFT BLANK



Chapter 4

Chapter 4 – Airfield Pavement Condition

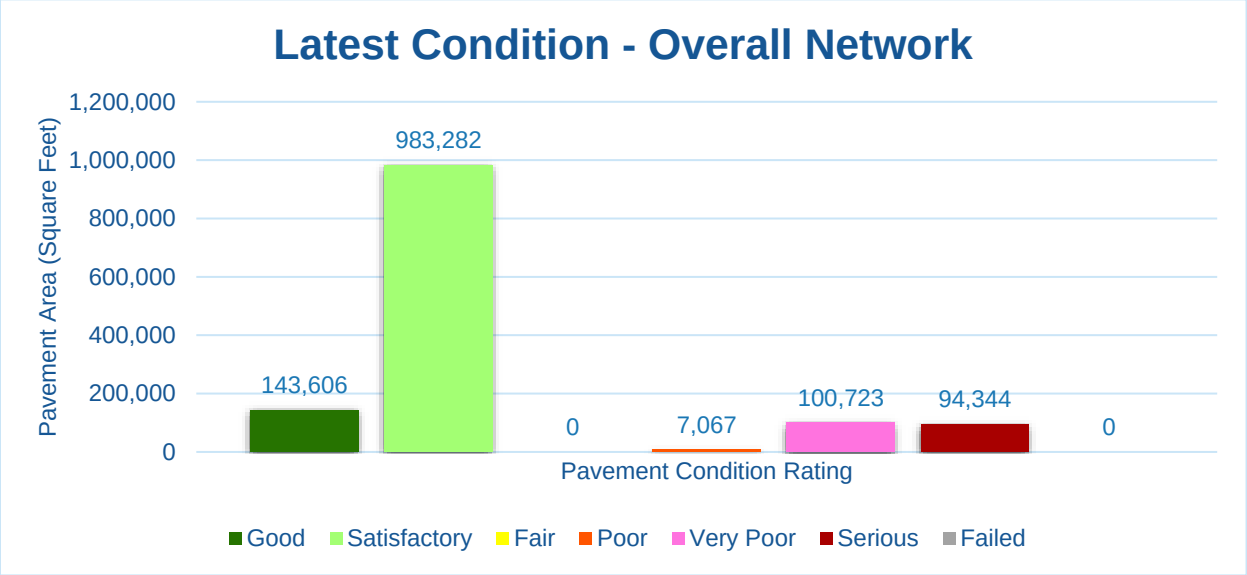
The examination of specific distress types (with causes attributed to load, climate, or other defined distress mechanism), determination of the severity of distress, and determination of the quantity of distress manifestation are required in the computation of a PCI value. The PCI provides valuable information that can be used to determine the existing condition of the pavement, possible cause of the pavement deterioration, and eventually aid in the planning of the rehabilitation of pavements. It should be noted that the PCI method of pavement condition evaluation is strictly a visual and functional evaluation. Further evaluation of the pavement condition may be necessary for design and/or project-level determination of pavement rehabilitation.

4.1 Airfield Pavement Condition Index (Latest Inspection)

4.1.1 Network-Level Analysis

The following **Figure 4.1.1** summarizes the network-level pavement condition analysis based on the most recent PCI Survey inspection results.

Figure 4.1.1 Latest Condition – Overall Network



4.1.2 Branch-Level Analysis

The following **Figures 4.1.2 (a) through (c)** summarize the branch-level pavement condition analysis based on the most recent PCI Survey inspection results; the following Figures provide overall branch-level conditions by branch use.

Figure 4.1.2 (a) Latest Condition – Runway Pavements

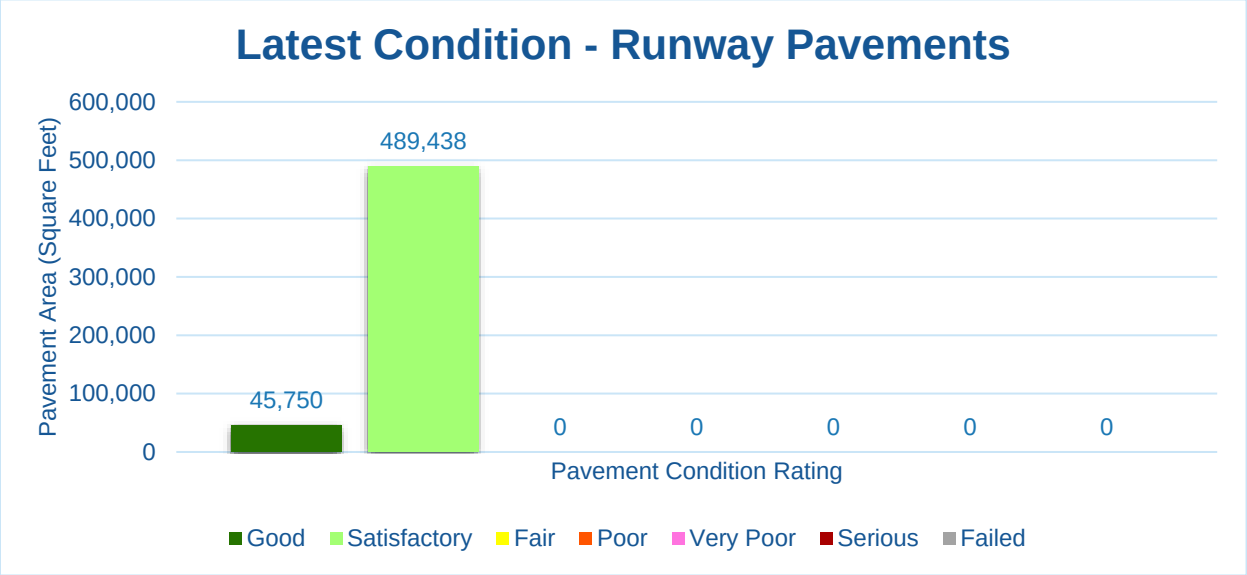


Figure 4.1.2 (b) Latest Condition – Taxiway Pavements

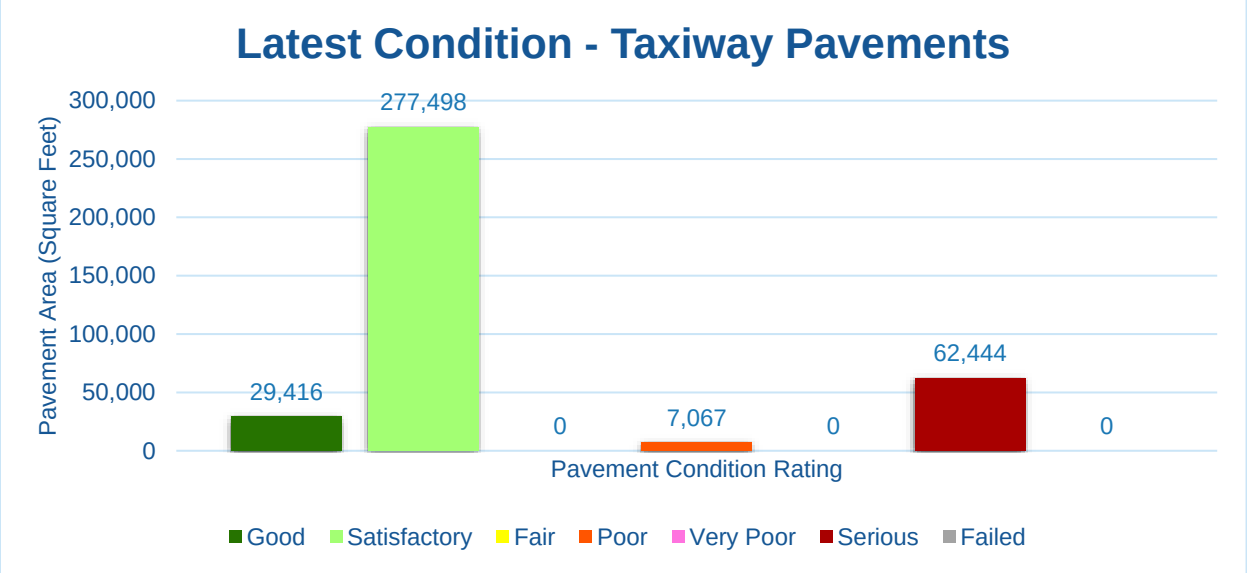
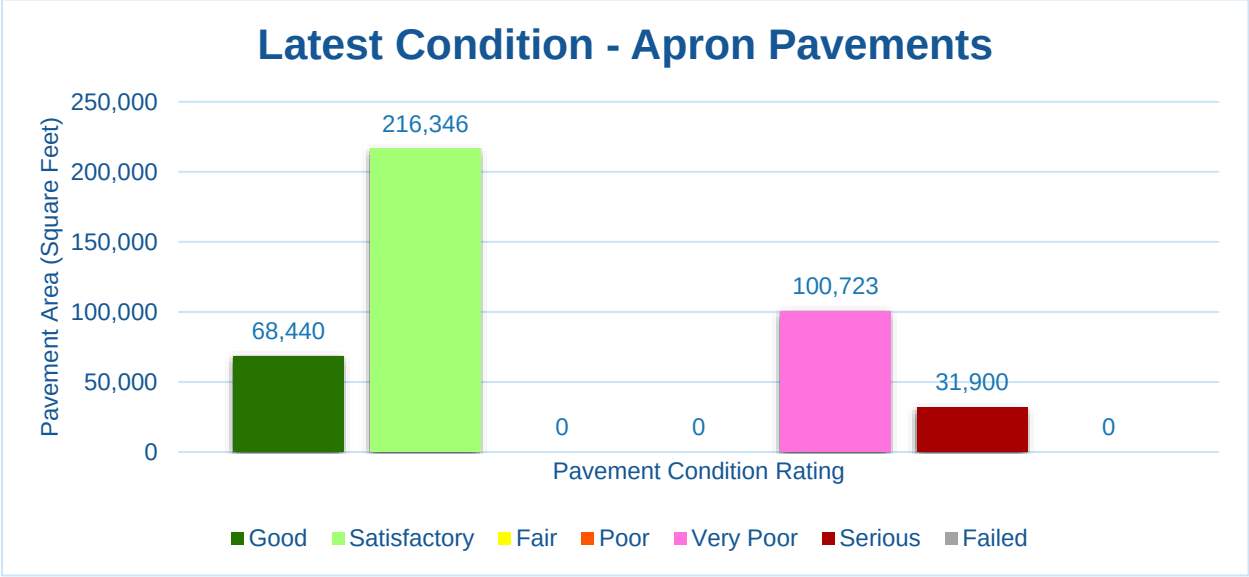




Figure 4.1.2 (c) Latest Condition – Apron Pavements





4.1.3 Section-Level Analysis

The following **Table 4.1.3** provides details for each pavement section of its area-weighted average PCI and the percent of distress which is related to load, climate, or other factors. The amount of distress attributed to the various causes provides insight into maintenance, repair, and rehabilitation needs. Load-related distress indicates that pavements are reaching the end of their structural design life, and for those pavements exhibiting a significant amount of these distress types, rehabilitation should be planned to strengthen or reconstruct the pavement. **Appendix C Technical Exhibits** provides a technical exhibit that graphically depicts the PCI values and ratings determined from this SAPMP System Update.

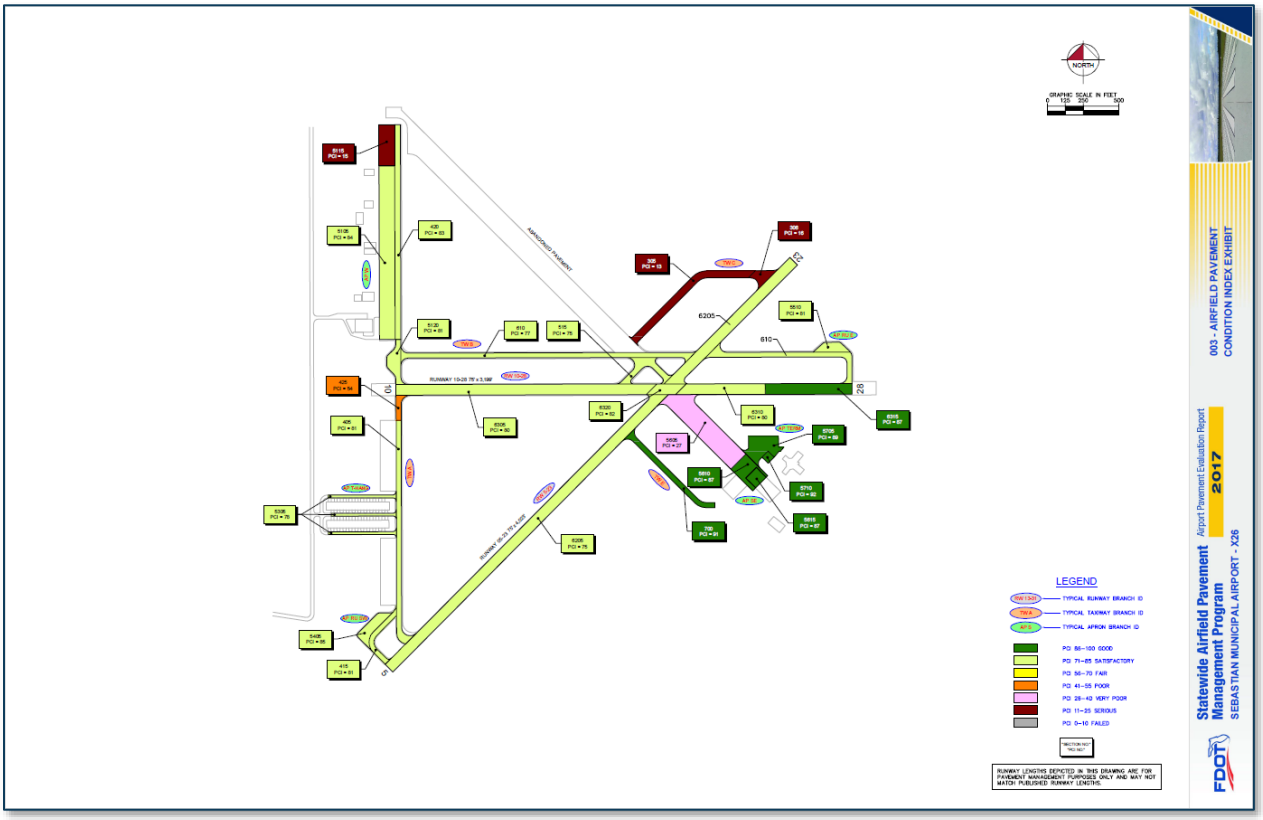
Any pavement facilities subject to pavement construction within the past 2 years or anticipated for construction within the next year may have been omitted from inspection. Pavement subject to major rehabilitation will be set to a PCI of 100.

Table 4.1.3 Latest Pavement Condition Index Summary

Network ID	Branch ID	Branch Name	Branch Use	Section ID	Area (SF)	Surface	PCI	PCI Rating	PCI Pct Climate	PCI Pct Load	PCI Pct Other	Sample Units Inspected	Total Sample Units in Section
X26	AP RU E	E RUN UP APRON	APRON	5510	13,002	AC	81	Satisfactory	100%	0%	0%	1	4
X26	AP RU SW	SW RUN UP APRON	APRON	5405	19,824	AC	85	Satisfactory	94%	0%	6%	1	4
X26	AP SE	SOUTHEAST APRON	APRON	5605	100,723	AC	27	Very Poor	51%	45%	4%	3	20
X26	AP SE	SOUTHEAST APRON	APRON	5610	21,960	AC	87	Good	44%	0%	56%	1	5
X26	AP SE	SOUTHEAST APRON	APRON	5615	10,290	AC	87	Good	84%	0%	16%	1	2
X26	AP TERM	APRON TERMINAL	APRON	5705	32,590	AC	89	Good	98%	0%	2%	1	6
X26	AP TERM	APRON TERMINAL	APRON	5710	3,600	PCC	92	Good	90%	0%	10%	1	1
X26	AP T-HANG	T-HANGAR APRON AREA	APRON	5305	28,960	AC	78	Satisfactory	70%	0%	30%	1	9
X26	AP W	WEST APRON	APRON	5105	133,925	AC	84	Satisfactory	98%	0%	2%	3	24
X26	AP W	WEST APRON	APRON	5115	31,900	AC	15	Serious	39%	60%	1%	1	6
X26	AP W	WEST APRON	APRON	5120	20,635	AC	81	Satisfactory	88%	0%	12%	1	4
X26	RW 10-28	Runway 10-28	RUNWAY	6305	134,512	AC	80	Satisfactory	100%	0%	0%	7	36
X26	RW 10-28	Runway 10-28	RUNWAY	6310	44,362	AC	80	Satisfactory	100%	0%	0%	2	12
X26	RW 10-28	Runway 10-28	RUNWAY	6315	45,750	AC	87	Good	100%	0%	0%	2	12
X26	RW 10-28	Runway 10-28	RUNWAY	6320	15,376	AC	82	Satisfactory	93%	0%	7%	1	4
X26	RW 5-23	RUNWAY 5-23	RUNWAY	6205	295,188	AAC	75	Satisfactory	100%	0%	0%	16	78
X26	TW A	TAXIWAY ALPHA	TAXIWAY	405	57,743	AAC	81	Satisfactory	100%	0%	0%	3	16
X26	TW A	TAXIWAY ALPHA	TAXIWAY	415	16,504	AC	81	Satisfactory	100%	0%	0%	1	4
X26	TW A	TAXIWAY ALPHA	TAXIWAY	420	60,300	AC	83	Satisfactory	100%	0%	0%	2	15
X26	TW A	TAXIWAY ALPHA	TAXIWAY	425	7,067	AC	54	Poor	56%	0%	44%	1	2
X26	TW B	TAXIWAY BRAVO	TAXIWAY	610	119,314	AC	77	Satisfactory	100%	0%	0%	4	32
X26	TW C	TAXIWAY CHARLIE	TAXIWAY	305	51,193	AC	13	Serious	55%	42%	3%	2	10
X26	TW C	TAXIWAY CHARLIE	TAXIWAY	306	11,251	AC	16	Serious	51%	47%	2%	1	2
X26	TW CONN	TAXIWAY CONNECTOR	TAXIWAY	515	23,637	AC	75	Satisfactory	84%	0%	16%	2	5
X26	TW E	TAXIWAY E	TAXIWAY	700	29,416	AC	91	Good	100%	0%	0%	1	8

Figure 4.1.3 is an inset view of the 2017 Airfield Pavement Condition Index Exhibit that visually represents the results of the latest PCI Survey inspection. A large format exhibit is located in **Appendix C Technical Exhibits.**

Figure 4.1.3 2017 Airfield Pavement Condition Index Exhibit



4.2 Summary of Pavement Condition Evaluation Results

4.2.1 Network-Level Observations

The field PCI Survey performed at Sebastian Municipal Airport (X26) started and completed on 09/15/2016. The resulting overall average area-weighted PCI value was 71 representing a condition rating of Satisfactory. Sebastian Municipal Airport is served by two runways; Runway 5-23 is 75-ft wide by 4,023-ft long and Runway 10-28 is 75-ft wide by 3,199-ft long.

Based on the FAA 5010 Report as of 06/12/2017 the Airport has reported 37,240 operations for 12 months ending 01/09/2016.

4.2.2 Branch-Level Observations

The following branch-level observations are intended to be an overall summary of select pavement facilities identified during the PCI Survey; further detail at the section and sample-level may be referenced for all pavements assessed as part of this System Update. The branch-level observations discussed are limited to select branches based on use and condition.

Runway 10-28

Runway 10-28 consists of 4 sections constructed of AC. The last construction year for Runway 10-28 was 2004. The average area-weighted PCI for Runway 10-28 is 81 representing a Satisfactory condition rating. The pavement distresses observed were related to Climate and Other distress classifications. Distresses observed in Runway 10-28 consist of Depression, Longitudinal & Transverse Cracking, Raveling, and Weathering. The isolated instance of a depression was observed in section 6320 at the intersection of Runway 05-23.

Runway 5-23

Runway 5-23 consists of 1 section constructed of AAC. The last construction year for Runway 5-23 was 2003. The average area-weighted PCI for Runway 5-23 is 75 representing a Satisfactory condition rating. The pavement distresses observed were related to Climate distress classifications. Distresses observed in Runway 5-23 consist of Longitudinal & Transverse Cracking, Patching, Raveling, and Weathering.

Taxiway A

Taxiway A consists of 4 sections constructed of AC and AAC. The last construction years vary from 2004 to 2005. The average area-weighted PCI for Taxiway A is 80 representing a Satisfactory condition rating. The pavement distresses observed were related to Climate and Other distress classifications. Distresses observed in Taxiway A consist of Depression, Longitudinal & Transverse Cracking, Raveling, and Weathering. Section 425 had a significant amount of depressions which contributed to its PCI value of 54, a condition rating of Poor.

Taxiway C

Taxiway C consists of 2 sections constructed of AC. The last construction year for Taxiway C was 1943. The average area-weighted PCI for Taxiway C is 13 representing a Serious condition rating. The pavement distresses observed were related to Climate, Load, and Other distress classifications. Distresses observed in Taxiway Charlie consist of Alligator Cracking, Block Cracking, Depression, Patching, Raveling, and Rutting.

Taxiway C is very old and appears to have exceeded its original design life. Taxiway C was frequently used for taxiing to Runway 23 and exhibited significant amounts of structural/load related distresses. Rutting and alligator cracking are both considered a major structural distress. A rut is a surface depression in the wheel path, and stems from a permanent deformation in any of the pavement layers or subgrade. Rutting is usually caused by consolidation or lateral movement of the materials due to traffic loads. Alligator cracking appears as a series of interconnecting cracks and is caused by fatigue failure of the asphalt concrete surface under repeated traffic loading.

Southeast Apron

Southeast Apron consists of 3 sections constructed of AC. The last construction years vary from 1943 to 2009. The average area-weighted PCI for Southeast Apron is 41 representing a Poor condition rating. The pavement distresses observed were related to Climate, Load, and Other distress classifications. Distresses observed in Southeast Apron consist of Alligator Cracking, Block Cracking, Depression, Longitudinal & Transverse Cracking, Patching, Raveling, and Weathering.

West Apron

West Apron consists of 3 sections constructed of AC. The last construction years vary from 1943 to 2005. The average area-weighted PCI for West Apron is 71 representing a Satisfactory condition rating. The pavement distresses observed were related to Climate, Load, and Other distress classifications. Distresses observed in West Apron consist of Alligator Cracking, Block Cracking, Depression, Longitudinal & Transverse Cracking, Patching, Raveling, Rutting, and Weathering.

Figure 4.2.2 Pavement Condition Summary by Facility Use

Facility Use	Average Area-Weighted PCI	Condition Rating
Runway	77	Satisfactory
Taxiway	68	Fair
Apron	65	Fair

4.3 Forecasted Pavement Conditions

4.3.1 Performance Models and Prediction Curves

Pavement Performance Models are developed from the distress data and historic construction records collected for the SAPMP. This data is consolidated in a database and organized by inspection/construction date, pavement type, age, and pavement use. The pavement Performance Models are used to develop broad Prediction Curves, alternatively known as deterioration curves or family curves. These Prediction Curves are utilized to developed forecasted PCI values based on historic trends and statistical models.

4.3.2 Branch-Level Pavement Condition Forecast

The following **Figures 4.3.2 (a) through (c)** depict the branch-level pavement condition forecast by Branch Use (Runway, Taxiway, and/or Apron). The forecasted conditions are for a 10-year duration starting in January 2018 through January 2027.

Figure 4.3.2 (a) Forecasted Runway Pavement Performance

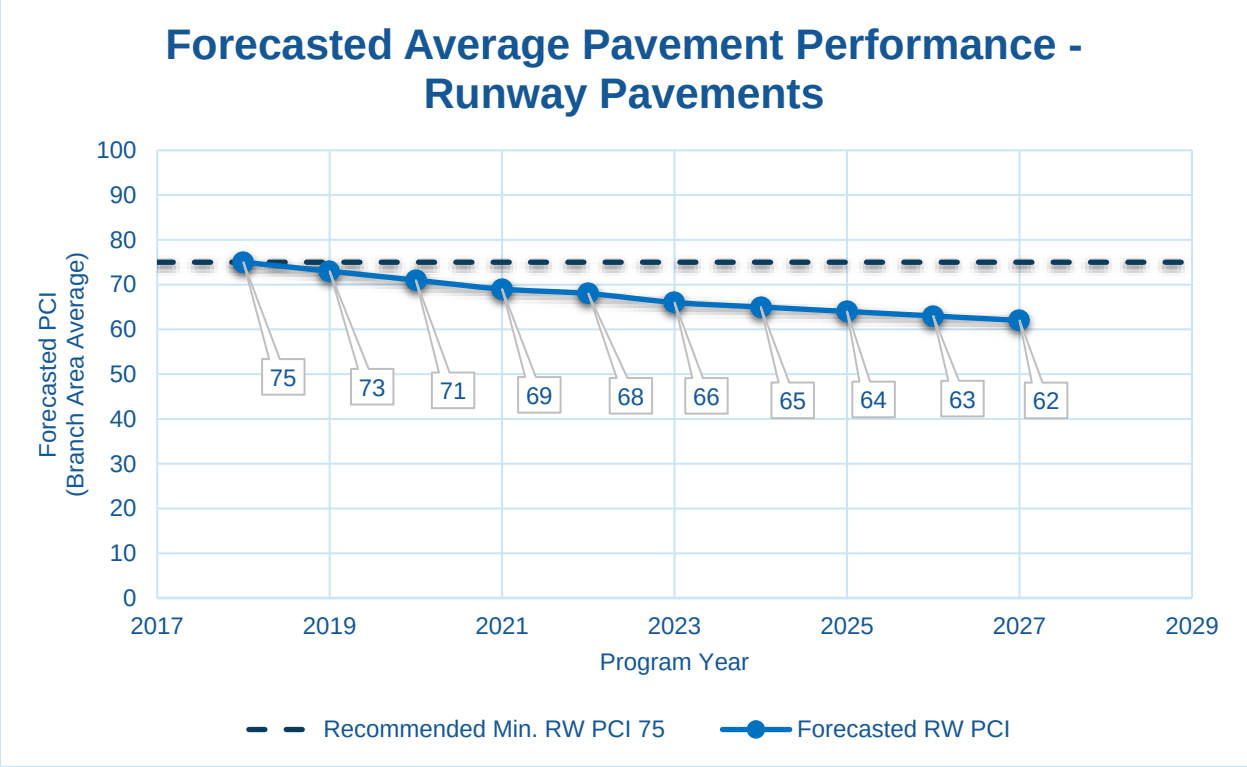


Figure 4.3.2 (b) Forecasted Taxiway Pavement Performance

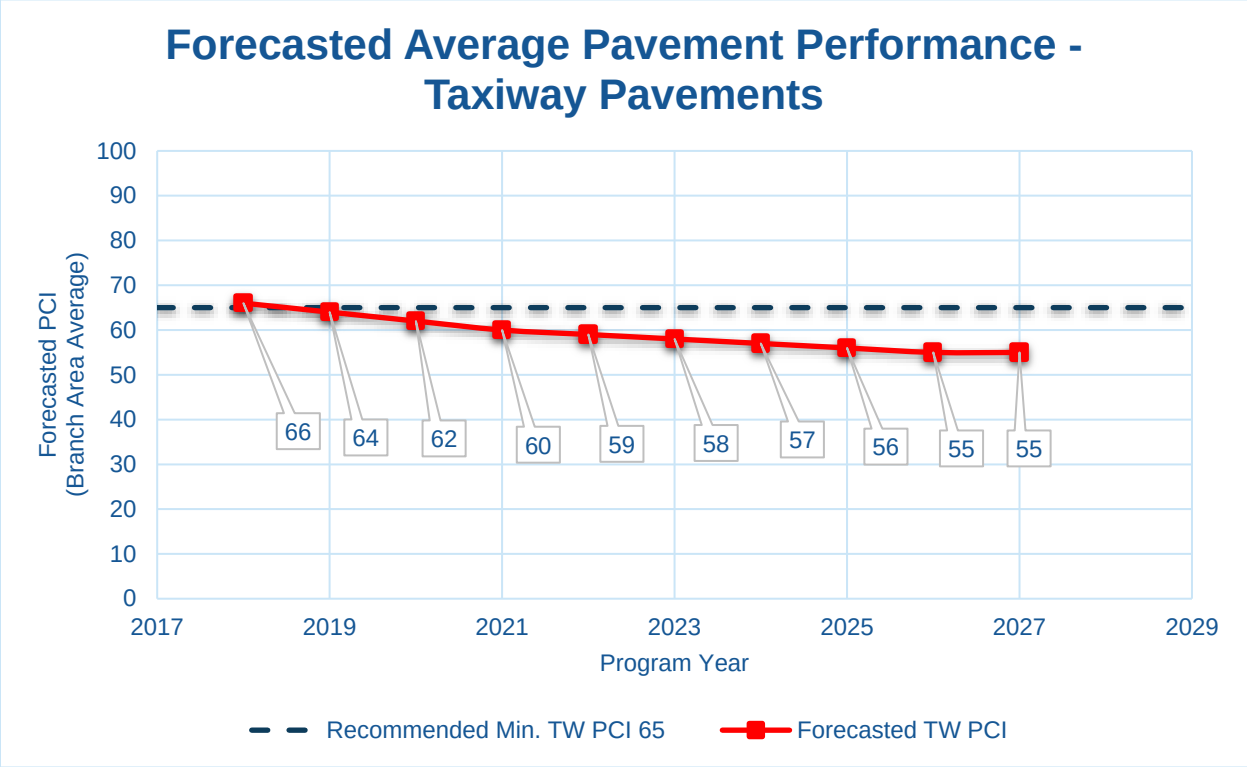
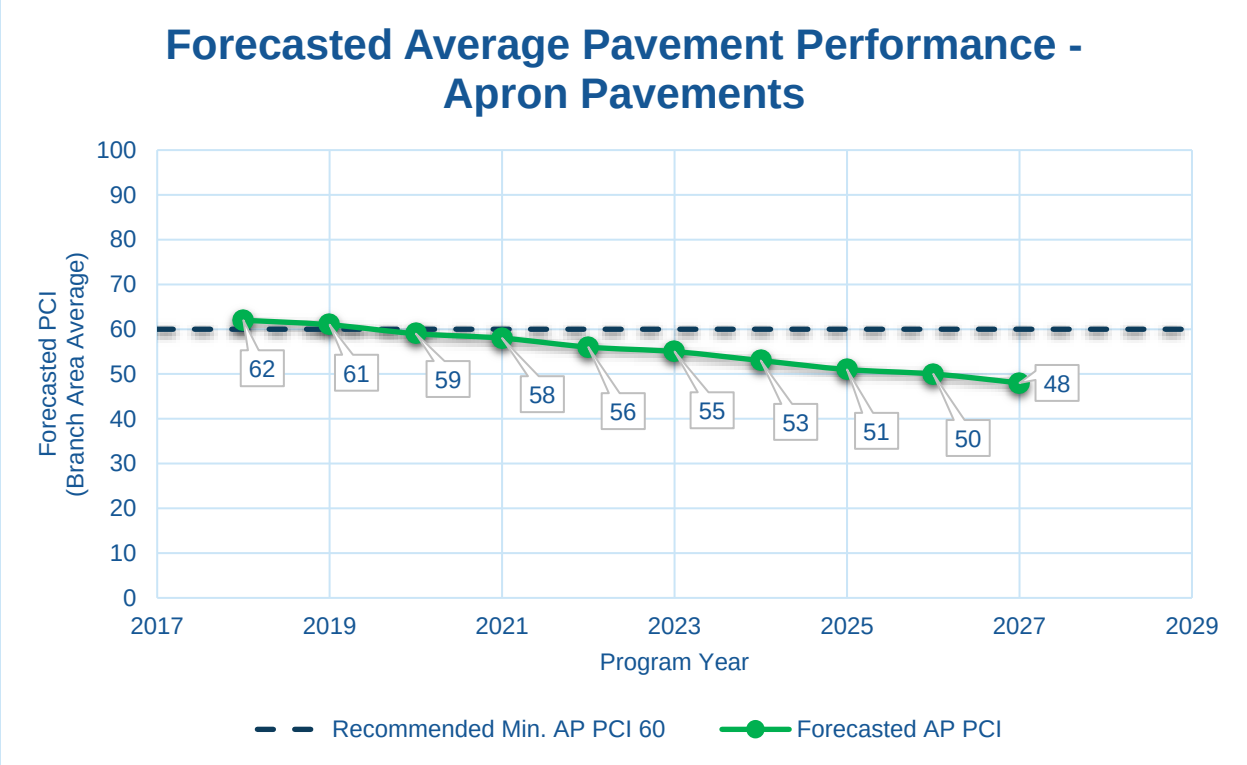


Figure 4.3.2 (c) Forecasted Apron Pavement Performance





4.3.3 Section-Level Pavement Condition Forecast

The following **Table 4.3.3** provides detail to the forecasted PCI values for each section inspected. Please note the forecasted Branch- and Section-Level PCI's are for planning purposes and are subject to the sensitivities in changes in traffic and maintenance frequency. Airport staff should perform annual visual condition assessments to maintain recent understanding of pavement conditions.



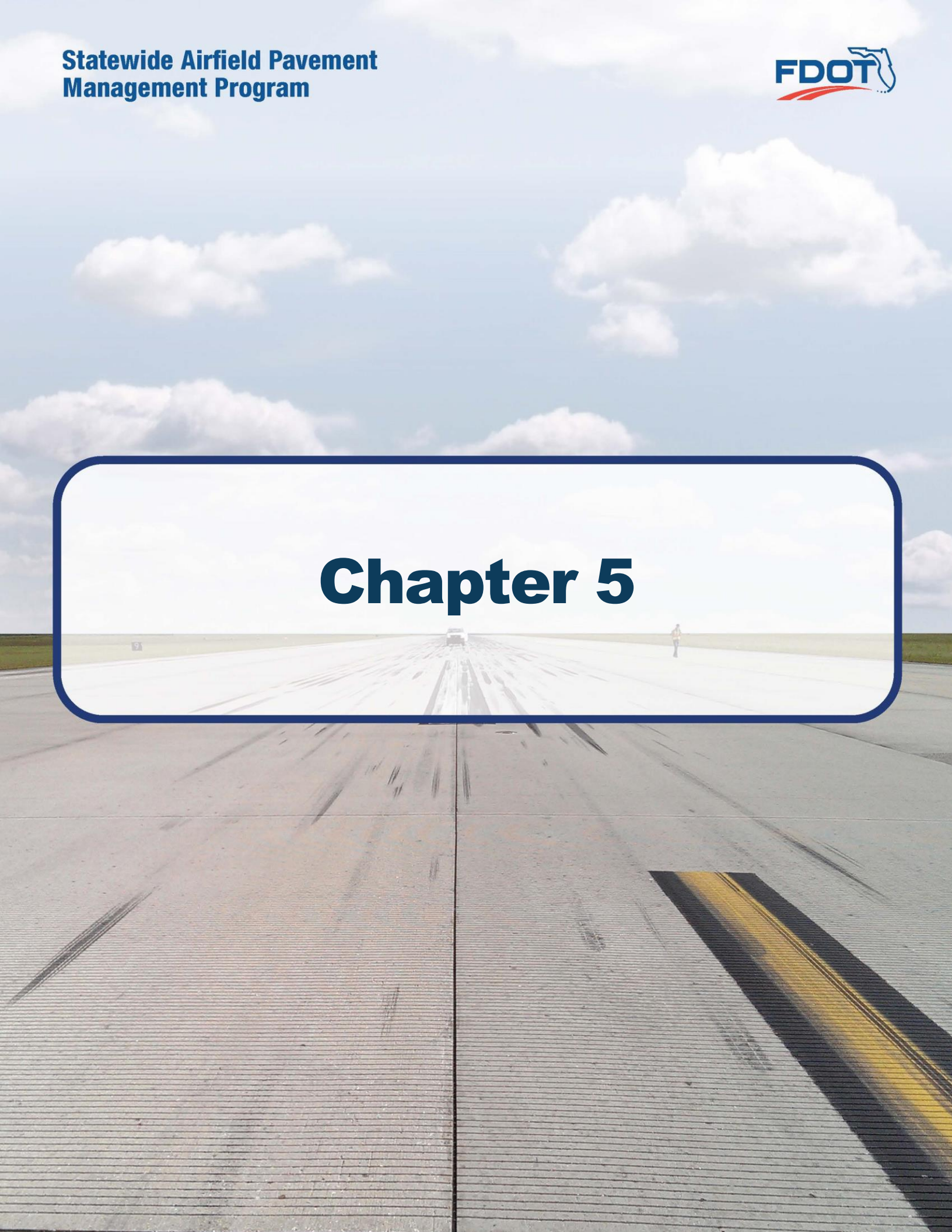
Table 4.3.3 Forecasted PCI 2018-2027

Network ID	Branch ID	Section ID	Last PCI	Forecasted PCI									
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
X26	AP RU E	5510	81	78	77	75	74	72	71	69	67	66	64
X26	AP RU SW	5405	85	82	81	79	78	76	75	73	71	70	68
X26	AP SE	5605	27	24	23	21	20	18	17	15	13	12	10
X26	AP SE	5610	87	84	83	81	80	78	77	75	73	72	70
X26	AP SE	5615	87	84	83	81	80	78	77	75	73	72	70
X26	AP TERM	5705	89	86	85	83	82	80	79	77	75	74	72
X26	AP TERM	5710	92	88	85	82	80	77	75	73	71	69	67
X26	AP T-HANG	5305	78	75	74	72	71	69	68	66	64	63	61
X26	AP W	5105	84	81	80	78	77	75	74	72	70	69	67
X26	AP W	5115	15	12	11	9	8	6	5	3	1	0	0
X26	AP W	5120	81	78	77	75	74	72	71	69	67	66	64
X26	RW 10-28	6305	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6310	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6315	87	84	83	81	80	78	76	75	73	71	70
X26	RW 10-28	6320	82	79	78	76	75	73	71	70	68	66	65
X26	RW 5-23	6205	75	72	69	67	66	64	63	62	61	61	60
X26	TW A	405	81	78	76	75	74	73	72	71	70	69	68
X26	TW A	415	81	78	76	74	73	71	70	69	68	67	66
X26	TW A	420	83	80	78	76	74	72	71	70	69	68	67
X26	TW A	425	54	52	50	48	47	45	44	42	40	39	37
X26	TW B	610	77	74	73	71	70	69	68	67	66	65	64
X26	TW C	305	13	9	6	4	1	0	0	0	0	0	0
X26	TW C	306	16	12	9	7	4	1	0	0	0	0	0
X26	TW CONN	515	75	72	71	70	69	68	67	66	65	64	63
X26	TW E	700	91	87	85	82	80	78	76	74	73	71	70



4.3.4 Forecasted PCI Considerations

As FDOT continues to update the SAPMP with future PCI Survey inspections and assembly of airfield pavement construction work history, the performance models will be further refined. With the refinement of additional PCI and work history data points, the forecasting of pavement conditions will continue to better reflect the performance trends of airfield pavements in the Florida Airports System. Forecasted or predicted pavement conditions for the airport are intended for planning purposes only. Design-level recommendations for pavement rehabilitation and/or reconstruction will require the appropriate application of the procedures defined in FAA ***AC 150/5320-6F Airport Pavement Design and Evaluation*** and ***AC 150/5370-11B Use of Nondestructive Testing in the Evaluation of Airport Pavements*** to determine structural and/or functional conditions at the time of project.



Chapter 5



Chapter 5 – Localized Maintenance and Repair Planning

General Maintenance and Rehabilitation (M&R) methods are characterized under three broad categories: localized maintenance and repair, global treatments, and major rehabilitation.

- **Localized Maintenance and Repair** includes patching and crack sealing.
- **Global Treatments** includes surface seals and rejuvenators (flexible pavements).
- **Major Rehabilitation** includes overlays, significant slab replacement, and reconstruction.

This chapter discusses the FDOT SAPMP Localized Maintenance and Repair Planning approach. Proactive localized maintenance and repair, specifically preservation, is highly recommended to the airports. However, it is certainly recognized that once pavements have deteriorated below a certain condition, the facility would benefit from a more substantial rehabilitation in lieu of localized efforts. Chapter 6 Major Rehabilitation Planning discusses the addressing of pavements through timely rehabilitation once it has deteriorated below a critical PCI where localized repairs may not be as cost effective.

5.1 Localized Maintenance and Repair

Localized maintenance and repair is best applied as a conservation measure and is oftentimes applied to slow the rate of deterioration of distress pavements; however, may be applied as a temporary corrective measure in isolated areas. Localized maintenance and repair can be applied either as a safety (“stopgap”) measure or preventive measure. Example distress types subject to localized preventive maintenance and repair may consist of low-severity longitudinal and transverse cracking and low-severity weathering. In many cases however, localized stopgap repair is applied as a safety measure to address high-severity distress manifestations when major rehabilitation is not funded for a given section with a PCI value below critical PCI. Some agencies may elect to define both types; preventative and stopgap, as localized maintenance.

Localized Stopgap/Safety Maintenance and Repair

Localized Stopgap or Safety Maintenance and Repair is defined as the localized distress repair needed to keep pavements operational in a safe condition. These activities are typically applied to high-severity distresses or distresses affecting operational activities. Typical pavement section PCIs will range from 0 to 65.

Localized Preventive Maintenance and Repair

Localized Preventive Maintenance and Repair is defined as distress maintenance activities performed with the primary objective of slowing the rate of deterioration. These activities typically include crack sealing and patching. Typical pavement section PCIs will be above 65.



5.2 Localized Maintenance and Repair Policy

The resulting Localized Maintenance and Repair recommendations are identified based on the policy defined in **Table 5.2.1** and **Table 5.2.2**, for flexible asphalt concrete and rigid Portland cement concrete pavements, respectively. The activities identified were based on the research of practical pavement treatments in consideration of the FAA ***AC 150/5380-6C "Guidelines and Procedures for Maintenance of Airport Pavements"*** and the ***FDOT Airfield Pavement Distress Repair Manual.*** Additionally, the ***Engineering Technical Letter (ETL) 14-3: Preventive Maintenance Plan (PMP) for Airfield Pavements*** was referenced for conservative application of pavement treatments. The Localized Maintenance and Repair Policy and associated planning-level unit costs were developed in consideration of a network-level analysis – it is strictly intended to provide a glimpse of the condition of the airport pavements with a limited PCI survey effort.

The developed Localized Maintenance and Repair Policy and associated planning-level unit costs were based on a statewide consideration of pavement treatments and review of state construction costs for both Airfield Pavements and from the FDOT Historical Cost Information archives. Furthermore, a consideration of limited repair quantities was factored in the determination of conservative planning-level unit costs. The identified Localized maintenance activities for both preventive and stopgap activities are based on a statewide network approach; project-specific evaluation and maintenance quantities should be developed prior to any construction.

Table 5.2-1 Localized Maintenance and Repair – Flexible Asphalt Concrete

Distress	Severity	Description	Code	Work Type	Work Unit
41	Low	ALLIGATOR CR	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
41	Medium	ALLIGATOR CR	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
41	High	ALLIGATOR CR	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
42	N/A	BLEEDING	FDOT-MO-PV	FDOT - MONITOR	N/A
43	Low	BLOCK CR	FDOT-MO-PV	FDOT - MONITOR	N/A
43	Medium	BLOCK CR	FDOT-CS-AC	FDOT - CRACK SEALING - AC	Ft
43	High	BLOCK CR	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
44	Low	CORRUGATION	FDOT-ML-AC	FDOT - MILLING - AC	SqFt
44	Medium	CORRUGATION	FDOT-ML-AC	FDOT - MILLING - AC	SqFt
44	High	CORRUGATION	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
45	Low	DEPRESSION	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
45	Medium	DEPRESSION	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
45	High	DEPRESSION	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
46	High	JET BLAST	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
46	N/A	JET BLAST	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
47	Low	JT REF. CR	FDOT-MO-PV	FDOT - MONITOR	N/A
47	Medium	JT REF. CR	FDOT-CS-AC	FDOT - CRACK SEALING - AC	Ft
47	High	JT REF. CR	FDOT-CS-AC	FDOT - CRACK SEALING - AC	Ft



Distress	Severity	Description	Code	Work Type	Work Unit
48	Low	L & T CR	FDOT-MO-PV	FDOT - MONITOR	N/A
48	Medium	L & T CR	FDOT-CS-AC	FDOT - CRACK SEALING - AC	Ft
48	High	L & T CR	FDOT-CS-AC	FDOT - CRACK SEALING - AC	Ft
49	N/A	OIL SPILLAGE	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
50	Low	PATCHING	FDOT-MO-PV	FDOT - MONITOR	N/A
50	Medium	PATCHING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
50	High	PATCHING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
51	N/A	POLISHED AG	FDOT-SS-LO	FDOT - SURFACE SEAL	SqFt
52	Low	RAVELING	FDOT-SS-LO	FDOT - SURFACE SEAL	SqFt
52	Medium	RAVELING	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
52	High	RAVELING	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
53	Low	RUTTING	FDOT-MO-PV	FDOT - MONITOR	N/A
53	Medium	RUTTING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
53	High	RUTTING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
54	Low	SHOVING	FDOT-MO-PV	FDOT - MONITOR	N/A
54	Medium	SHOVING	FDOT-ML-AC	FDOT - MILLING - AC	SqFt
54	High	SHOVING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
55	N/A	SLIPPAGE CR	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt
56	Low	SWELLING	FDOT-MO-PV	FDOT - MONITOR	N/A
56	Medium	SWELLING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
56	High	SWELLING	FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	SqFt
57	Low	WEATHERING	FDOT-MO-PV	FDOT - MONITOR	N/A
57	Medium	WEATHERING	FDOT-SS-LO	FDOT - SURFACE SEAL	SqFt
57	High	WEATHERING	FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	SqFt

Table 5.2-2 Localized Maintenance and Repair – Rigid Portland Cement Concrete

Distress	Severity	Description	Code	Work Type	Work Unit
61	Low	BLOW-UP	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
61	Medium	BLOW-UP	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
61	High	BLOW-UP	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt
62	Low	CORNER BREAK	FDOT-CS-PC	FDOT - CRACK SEALING - PCC	Ft
62	Medium	CORNER BREAK	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
62	High	CORNER BREAK	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
63	Low	LINEAR CR	FDOT-MO-PV	FDOT - MONITOR	N/A
63	Medium	LINEAR CR	FDOT-CS-PC	FDOT - CRACK SEALING - PCC	Ft
63	High	LINEAR CR	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt



Distress	Severity	Description	Code	Work Type	Work Unit
64	Low	DURABIL. CR	FDOT-MO-PV	FDOT - MONITOR	N/A
64	Medium	DURABIL. CR	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
64	High	DURABIL. CR	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt
65	Low	JT SEAL DMG	FDOT-JS-PC	FDOT - JOINT SEAL - PCC	Ft
65	Medium	JT SEAL DMG	FDOT-JS-PC	FDOT - JOINT SEAL - PCC	Ft
65	High	JT SEAL DMG	FDOT-JS-PC	FDOT - JOINT SEAL - PCC	Ft
66	Low	SMALL PATCH	FDOT-MO-PV	FDOT - MONITOR	N/A
66	Medium	SMALL PATCH	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
66	High	SMALL PATCH	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
67	Low	LARGE PATCH	FDOT-MO-PV	FDOT - MONITOR	N/A
67	Medium	LARGE PATCH	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
67	High	LARGE PATCH	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
68	N/A	POPOUTS	FDOT-PO-FL	FDOT - POPOUT FILLER	SqFt
69	N/A	PUMPING	FDOT-SB-PC	FDOT – SLAB STABILIZATION - PCC	SqFt
70	Low	SCALING	FDOT-MO-PV	FDOT - MONITOR	N/A
70	Medium	SCALING	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
70	High	SCALING	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt
71	Low	FAULTING	FDOT-MO-PV	FDOT - MONITOR	N/A
71	Medium	FAULTING	FDOT-GR-PP	FDOT - GRINDING (LOCALIZED)	Ft
71	High	FAULTING	FDOT-GR-PP	FDOT - GRINDING (LOCALIZED)	Ft
72	Low	SHAT. SLAB	FDOT-CS-PC	FDOT - CRACK SEALING - PCC	Ft
72	Medium	SHAT. SLAB	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt
72	High	SHAT. SLAB	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt
73	N/A	SHRINKAGE CR	FDOT-MO-PV	FDOT - MONITOR	N/A
74	Low	JOINT SPALL	FDOT-CS-PC	FDOT - CRACK SEALING - PCC	Ft
74	Medium	JOINT SPALL	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
74	High	JOINT SPALL	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
75	Low	CORNER SPALL	FDOT-CS-PC	FDOT - CRACK SEALING - PCC	Ft
75	Medium	CORNER SPALL	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
75	High	CORNER SPALL	FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	SqFt
76	Low	ASR	FDOT-MO-PV	FDOT - MONITOR	N/A
76	Medium	ASR	FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	SqFt
76	High	ASR	FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	SqFt



Table 5.2-3 (a) Localized Repair Planning-Level Unit Costs – Flexible Asphalt Concrete

Code	Name	Cost	Units
FDOT-SS-LO	FDOT - SURFACE SEAL	$0.55	SqFt
FDOT-ML-AC	FDOT - MILLING - AC	$2.00	SqFt
FDOT-GR-PP	FDOT - GRINDING (LOCALIZED)	$2.00	Ft
FDOT-CS-AC	FDOT - CRACK SEALING - AC	$3.00	Ft
FDOT-MO-PV	FDOT - MONITOR	$0.00	SqFt
FDOT-PA-AF	FDOT - PATCHING - AC FULL DEPTH	$6.00	SqFt
FDOT-PA-AP	FDOT - PATCHING - AC PARTIAL DEPTH	$3.00	SqFt

Table 5.2-3 (b) Localized M&R Planning-Level Unit Costs – Rigid Portland Cement Concrete

Code	Name	Cost	Units
FDOT-PA-PF	FDOT - PATCHING - PCC FULL DEPTH	$100.00	SqFt
FDOT-SL-PC	FDOT - SLAB REPLACEMENT - PCC	$30.00	SqFt
FDOT-SB-PC	FDOT - SLAB STABILIZATION - PCC	$30.00	SqFt
FDOT-PA-PP	FDOT - PATCHING - PCC PARTIAL DEPTH	$72.00	SqFt
FDOT-PO-FL	FDOT - POPOUT FILLER	$0.05	SqFt
FDOT-GR-PP	FDOT - GRINDING (LOCALIZED)	$2.00	Ft
FDOT-CS-PC	FDOT - CRACK SEALING - PCC	$4.25	Ft
FDOT-MO-PV	FDOT - MONITOR	$0.00	N/A
FDOT-JS-PC	FDOT - JOINT SEAL - PCC	$2.75	Ft

**PCC Patching (Full Depth and Partial Depth) consider high-early-strength and high-performing repair material.*



5.3 Localized Maintenance and Repair Analysis and Recommendations

The SAPMP provides a planning-level estimation of Localized Maintenance and Repair based on the results of the latest PCI Survey Inspection performed at the airport. Based on the limited sample units inspected, a statistical extrapolation of distresses at the section level is used to estimate the quantities of recommended repair activities based on the policies defined in **5.2 Localized M&R Policy**. The PCI Survey Inspections did not consist of 100% inspection of all sample units; therefore, the section-level distress quantities used to estimate the Localized Maintenance and Repair needs are for conceptual planning purposes. The accuracy of the extrapolated distresses, and therefore work quantities, is subject to the amount of sample units inspected and the concentration of distress types observed in sample units. **Appendix B** provides the estimated Localized Maintenance and Repair based on this SAPMP's PCI Survey Inspection efforts. Localized Preventive Maintenance and Repair is typically applied to pavements that are in a condition at or above the Critical PCI of 65. Localized Stopgap Maintenance and Repair is typically applied to pavements that are below the Critical PCI of 65. It is recommended that airport staff evaluate the application of Localized Maintenance and Repair in concert with the planning of Major Rehabilitation efforts identified in Chapter 6 Major Rehabilitation Planning. Pavements with Stopgap recommendations that are subject to near-term Major Rehabilitation efforts may remove the need to perform localized maintenance efforts.

The following **Table 5.3-1** summarizes the anticipated Localized Maintenance and Repair efforts based on the PCI Survey Inspection efforts performed at this airport as part of this SAPMP System Update. The following table depicts planning-level costs rounded to the nearest ten dollars.

Table 5.3-1 Summary of Airport Localized M&R Planning Cost and Quantity at Network Level

Work Description	Work Category	Rough Estimate of Work Quantity	Work Units	Planning Material Cost
FDOT - PATCHING - AC FULL DEPTH	PREVENTIVE	1,470	SqFt	$ 8,800.00
FDOT - SURFACE SEAL	PREVENTIVE	22,280	SqFt	$ 12,260.00
FDOT - JOINT SEAL - PCC	PREVENTIVE	530	Ft	$ 1,460.00
FDOT - PATCHING - AC FULL DEPTH	STOPGAP	43,175	SqFt	$ 259,030.00
FDOT - SURFACE SEAL	STOPGAP	183,435	SqFt	$ 100,890.00
FDOT - CRACK SEALING - AC	STOPGAP	21,945	Ft	$ 65,830.00
FDOT - PATCHING - AC PARTIAL DEPTH	STOPGAP	5,135	SqFt	$ 15,400.00

The following **Table 5.3-2** provides further breakdown of the anticipated planning-level cost at the section level for the pavements exhibiting distresses that would benefit from Localized M&R. The table shows the approximate improved "End Condition" of the section after the application of Localized M&R. The following table depicts planning-level costs rounded to the nearest ten dollars.

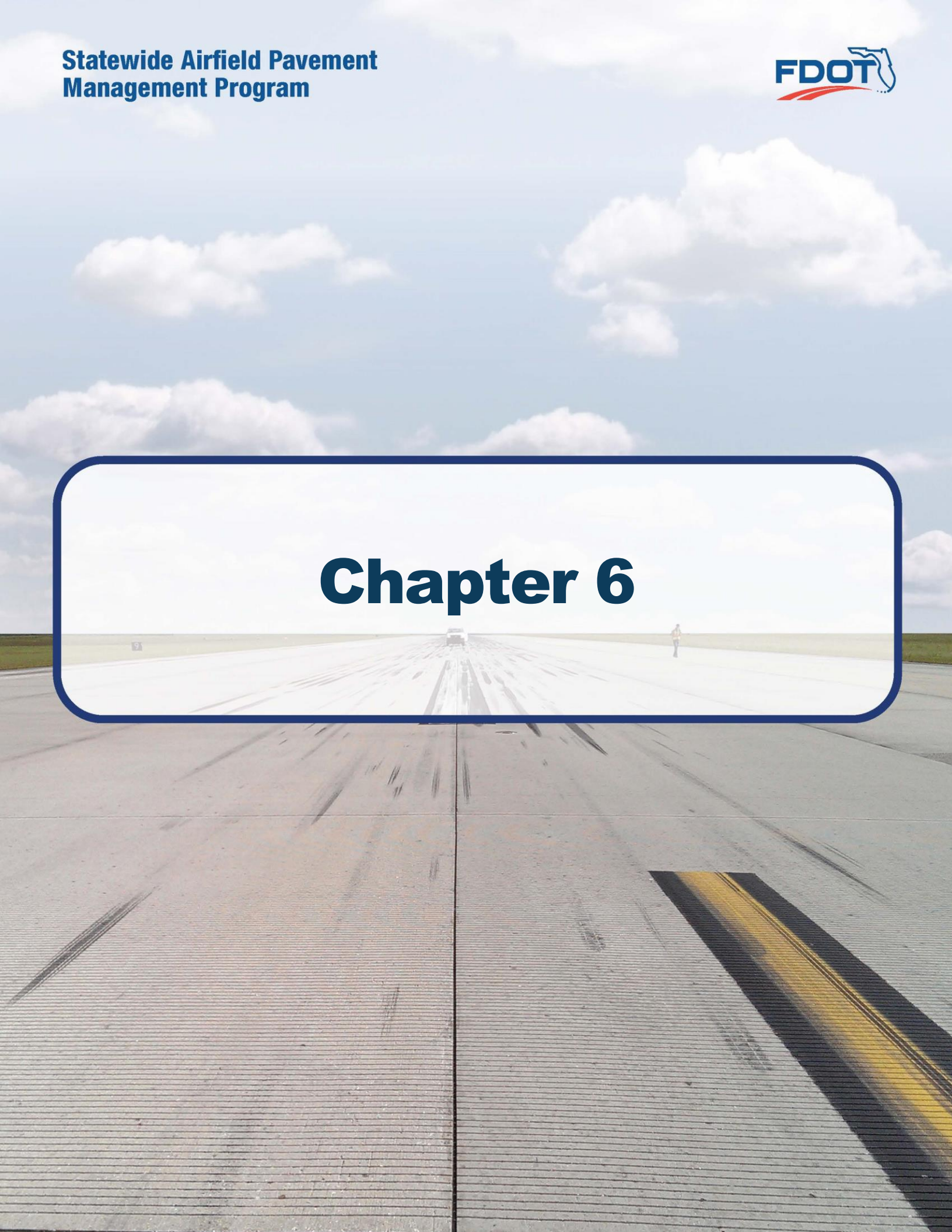
Table 5.3-2 Summary of Airport Localized M&R Planning Cost and Quantity at Section Level

Network ID	Branch ID	Section ID	Area (SF)	Start Condition	End Condition	Cost
X26	AP RU E	5510	13,002	81	81	$ -
X26	AP RU SW	5405	19,824	85	85	$ -
X26	AP SE	5605	100,723	27	61	$ 160,520.00
X26	AP SE	5610	21,960	87	90	$ 2,000.00
X26	AP SE	5615	10,290	87	87	$ 420.00
X26	AP TERM	5705	32,590	89	87	$ 310.00
X26	AP TERM	5710	3,600	92	99	$ 1,460.00
X26	AP T-HANG	5305	28,960	78	79	$ 2,560.00
X26	AP W	5105	133,925	84	87	$ 3,430.00
X26	AP W	5115	31,900	15	56	$ 70,340.00
X26	AP W	5120	20,635	81	85	$ 970.00
X26	RW 10-28	6305	134,512	80	83	$ 1,630.00
X26	RW 10-28	6310	44,362	80	83	$ 330.00
X26	RW 10-28	6315	45,750	87	89	$ 340.00
X26	RW 10-28	6320	15,376	82	82	$ 430.00
X26	RW 5-23	6205	295,188	75	79	$ 5,010.00
X26	TW A	405	57,743	81	81	$ -
X26	TW A	415	16,504	81	81	$ -
X26	TW A	420	60,300	83	83	$ -
X26	TW A	425	7,067	54	65	$ 6,880.00
X26	TW B	610	119,314	77	80	$ 1,290.00
X26	TW C	305	51,193	13	50	$ 170,190.00
X26	TW C	306	11,251	16	63	$ 33,320.00
X26	TW CONN	515	23,637	75	80	$ 2,410.00
X26	TW E	700	29,416	91	91	$ -

The following **Table 5.3-3** provides a summary of the anticipated planning-level costs for Localized Preventive Maintenance and Repair and Localized Stopgap Maintenance and Repair. The following table depicts planning-level costs rounded to the nearest ten dollars.

Table 5.3-3 Summary of Localized Maintenance

Work Category	Cost
Preventive	$ 22,520.00
Stopgap	$ 441,150.00
Planning-Level Localized M&R Needs =	***$ 463,670.00***



Chapter 6

Chapter 6 – Major Rehabilitation Planning

6.1 Major Rehabilitation

Major rehabilitation is recommended to correct or improve structural deficiencies and/or functional deterioration for pavement sections within a network. Often, when pavements are subject to significant changes in the aircraft fleet mix (frequency and type), major rehabilitation is required to provide a pavement section to meet the traffic demand. Major rehabilitation is recommended when a pavement section falls below the Critical PCI value that is defined during the system customization or if a pavement section has a significant observation of load-related distress. Observation of any load-related distress potentially indicates that the section may be structurally deficient or that the aircraft loads being applied to the pavement section are different than what the section was designed for. **Figures 6.1-1 and 6.1-2** depict the decision process for major rehabilitation project identification with the assumption of available funds. Should funding be unavailable for pavement sections in need of major rehabilitation, the airport may elect to apply the appropriate localized stopgap repair.

Figure 6.1-1 Major Rehabilitation Planning Decision Diagram, PCI ≤ Critical PCI

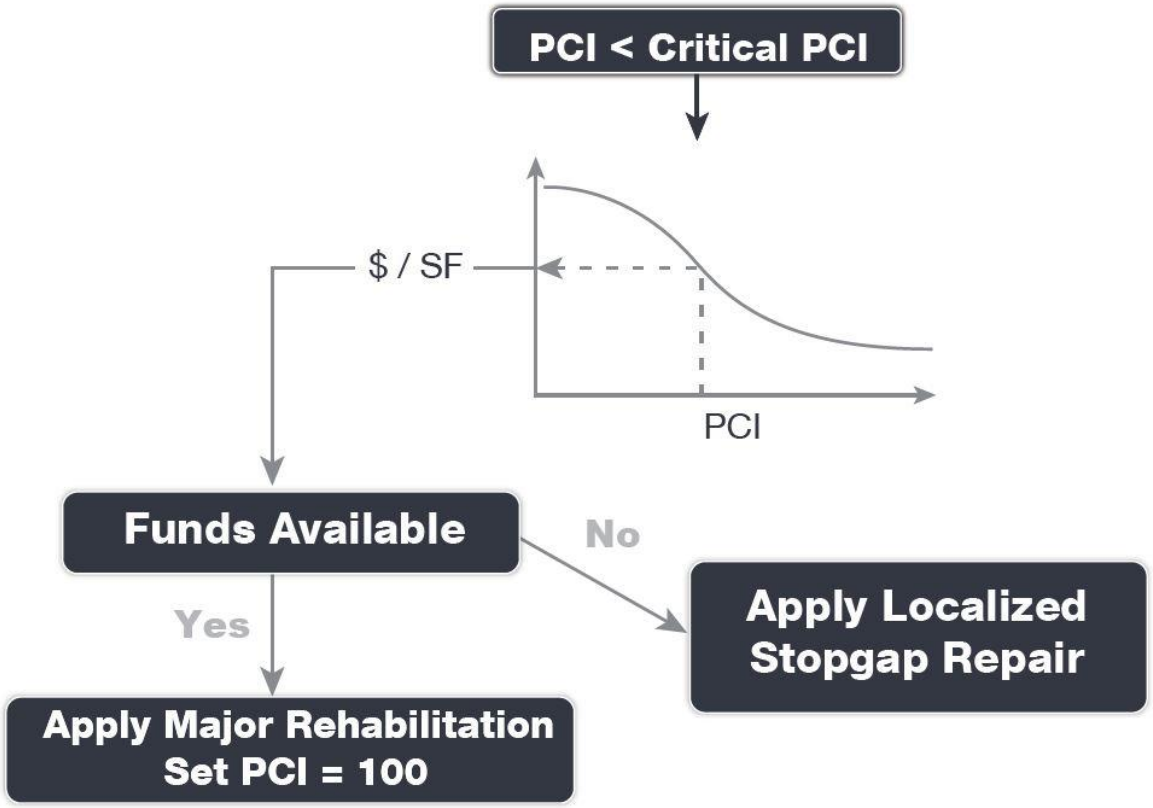
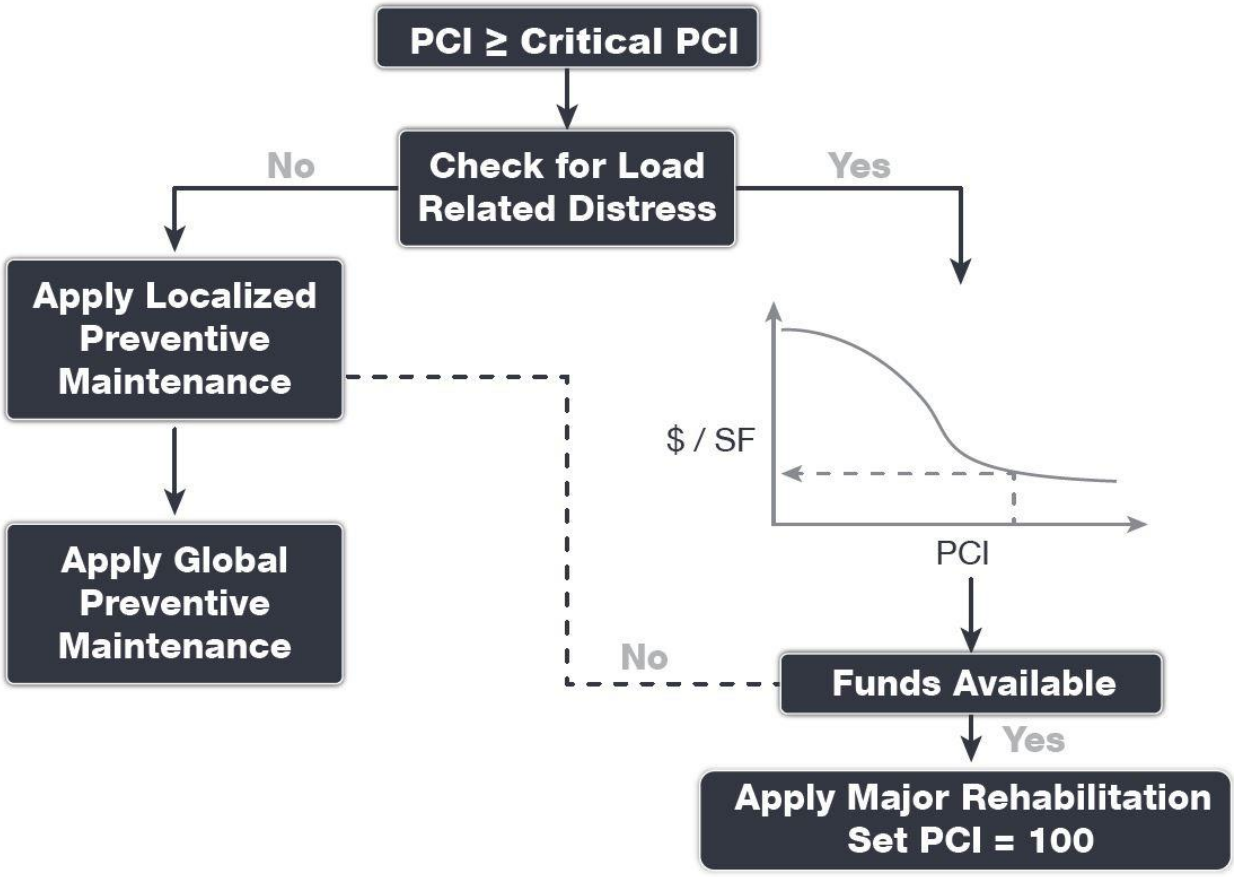


Figure 6.1-2 Major Rehabilitation Planning Decision Diagram, PCI > Critical PCI





6.1.1 Critical PCI

For the FDOT SAPMP the development of a major rehabilitation program is based on the Critical PCI concept. The ***Critical PCI*** concept assumes that it is more cost-effective to maintain pavements above, rather than below their critical PCI. It is assumed that once a pavement section deteriorates to the Critical PCI value that it is more cost-effective to complete a major rehabilitation project rather than continuing to apply preventive maintenance. This method includes defining the Critical PCI and introducing major rehabilitation work types.

Identification of annual and long-range Major Rehabilitation work plans are typically based on the Critical PCI concept. The Critical PCI is defined as the PCI value at which the rate of loss (deterioration) increases with time, or the cost of applying localized maintenance and repair increases or is not effective. A Critical PCI is usually within a range of 55 and 70; the following procedure is standard approach in developing a specific Critical PCI:

1. Develop a pavement performance model and refine a prediction model for the pavements considered.
2. Select a localized maintenance and repair policy to be used in developing a work plan.
3. Apply the selected localized policy to the pavement sections for a range of PCI.
4. Compute the unit cost per area for each PCI range.
5. Plot the cost versus the PCI.
6. Determine the Critical PCI based on the point where the cost is insignificant.

The FDOT SAPMP defines the Critical PCI at 65 – this is based on the historic trends in pavement performance and Statewide planning efforts.

6.1.2 FDOT Recommended Minimum Service-Level PCI

The FDOT has recommended ***Minimum Service-Level PCI*** for airports' airfield pavements based on the following characteristics; airport type within FDOT SAPMP, branch use, and expected aircraft operations. For the purposes of Major Rehabilitation, the Critical PCI is typically the threshold condition that triggers major construction, however it is recommended that the airports maintain the Minimum Service-Level PCI with a combination of Localized Maintenance and Repair and timely Major Rehabilitation. **Table 6.1.2** summarizes the FDOT Recommended Minimum Service-Level PCI.

Table 6.1.2 FDOT Recommended Minimum Service-Level PCI

Branch Use	FDOT Recommended PCI	Additional Consideration
Runway	75	Aircraft Fleet Mix Changes Primary Runway
Taxiway / Taxilane	65	Aircraft Fleet Mix Changes Expected Operations
Aprons / Run-Ups / Ramps	60	Ground Service Equipment Non-Aircraft Operations (e.g. fueling)

6.2 Major Rehabilitation Policy

6.2.1 Major Rehabilitation Pavement Section Development

The review of the existing as-built record documentation within the participating airports' archives was used as the basis of the conceptual pavement design sections. Refinement of the pavement section layers was performed in consideration of the FAA ***AC 150/ 5320-6F "Airport Pavement Design and Evaluation."*** It should be noted that no subsurface geotechnical investigation, ALTA/ACSM Survey, topographic survey, utilities survey, environmental, or site specific air traffic study(s) have been utilized in the development of the design criteria. No warranty or assurance is implied in this document for final design nor construction for any airfield pavements discussed within this report. The following **Tables 6.2.1 (a) and (b)** provide details on the conceptual pavement sections developed for this study.

Major rehabilitation is divided into two policy categories as part of this program: Full-Depth Reconstruction (Reconstruction) and Intermediate-Level Major Rehabilitation (Restoration). Based on the pavement type, the general categories are defined as AC Reconstruction and AC Restoration for AC, AAC, and APC flexible pavement types and PCC Reconstruction and PCC Restoration for PCC rigid pavement types. The pavement sections have been based on the average GA Airport Type requirements; no pavement design has been performed in accordance with AC 150/5320-6F for the determined conceptual sections.

Table 6.2.1 (a) Conceptual Pavement Section for Major Rehabilitation – Flexible Asphalt Concrete

Rehabilitation Type	General Aviation (GA) Airport
AC Restoration *Combination of asphalt pavement milling and overlay with 25% of the areas subject to full-depth reconstruction.* **PCI = 41 to 65**	**75% Mill and Overlay** P-101 AC Milling (2") P-603 Bituminous Tack P-401 (HMA) (2") **25% AC Reconstruction** P-101 Pavement Removal P-152 Subgrade (12") P-211 Base (6") P-602 Bituminous Prime P-603 Bituminous Tack P-401 HMA (2") *Excludes any paved shoulder features.*
AC Reconstruction *Full-depth asphalt pavement section reconstruction.* **PCI = 40 or less**	P-101 Pavement Removal P-152 Subgrade (12") P-211 Base (6") P-602 Bituminous Prime P-603 Bituminous Tack P-401 HMA (2") *Excludes any paved shoulder features.*

Table 6.2.1 (b) Conceptual Pavement Section for Major Rehabilitation – Rigid Portland Cement Concrete

Rehabilitation Type	General Aviation (GA) Airport
PCC Restoration *Restoration of PCC pavement with a combination of crack sealing, joint seal replacement, and replacement of 25% of slab panels.* **PCI = 41 to 65**	P-101 Pavement Removal P-605 Joint Seal Repair P-152 Subgrade (6”) P-211 Base (if needed, typical) (6”) P-501 Rigid PCC (10”) *Select Slabs (25%) **Crack Seal and Limited Patching
PCC Reconstruction *Full-depth rigid pavement section reconstruction.* **PCI = 40 or less**	P-101 Pavement Removal P-605 Joint Seal Repair P-152 Subgrade (6”) P-211 Base (6”) P-501 Rigid PCC (10”)

The identification of rehabilitation needs and conceptual pavement sections have been determined at the planning level. Design-level investigation is recommended prior to developing construction-level design documents and budgets.

In compliance with FAA Grant Assurances 11 and 19, the FDOT SAPMP provides airports with airfield pavement evaluation reports in accordance with **FAA AC 150/5380-7B Airport Pavement Management Program (PMP)** and **AC 150/5380-6C Guidelines and Procedures for Maintenance of Airport Pavements**. The application of the results of a PCI survey are for planning purposes and are limited to the visual observation of deteriorated pavements in limited sampling; design-level investigation is recommended in accordance with the FAA procedures defined in **AC 5320-6F Airport Pavement Design and Evaluation** and **AC 150/5370-11B Use of Nondestructive Testing in the Evaluation of Airport Pavements**. The aforementioned ACs provide the design-level material properties of in-situ pavement and subgrade layers for the determination of appropriate rehabilitation actions. The FDOT SAPMP is organized to provide airports with planning-level data and does not intend to preclude the responsible engineer in performing the appropriate level of investigation and analysis in determining the appropriate design details of a pavement rehabilitation. It would not be advisable to solely base design-level rehabilitation without the appropriate level of investigation and determination of pavement deterioration beyond that of a visual functional condition assessment.

6.2.2 Major Rehabilitation Planning-Level Unit Costs

Planning-level opinion of probable construction unit costs developed for this System Update was based on archived bid tabulations and records from airfield pavement projects provided by participating airports. A review of cost trends and cost factors have been incorporated to assist airports in planning for project budgets. Neither FDOT nor the Consultant Team has control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable construction costs

provided herein are based on the information known to FDOT at this time and represent only the Consultant Team's judgment as a design professional familiar with the construction industry. This report cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable construction costs.

Table 6.2.2 General Aviation Major Rehabilitation Planning-Level Unit Cost by Pavement Type

Rehabilitation Type	PCI Range	Flexible Asphalt Concrete Cost Per SF		Rigid Portland Cement Concrete Cost per SF	
Restoration	41 to 65	$	7.00	$	10.00
Reconstruction	0 to 40	$	9.00	$	15.00

Planning-level opinion of probable construction unit costs consider factors for non-pavement improvements, QA/QC testing, and administrative costs.

6.3 Major Rehabilitation Needs

The objective of the major pavement rehabilitation needs analysis is to provide planning-level projects within an airport's airfield pavement network. Major rehabilitation activities are recommended when a pavement section has deteriorated below the Critical PCI value, a point at which localized maintenance and repair activities may not be the most cost-effective solution. In addition, major rehabilitation is also recommended when the Section PCI is at or above the Critical PCI but the section has significant load-related PCI distresses. Identification of rehabilitation needs is done at the Airfield Pavement Network Definition's section level. This however does not limit the airport from further refining limits of project planning areas.

Major rehabilitation is identified within the FDOT SAPMP as major construction activity that would result in an improvement or resetting of the pavement section's PCI to a value of 100. Major rehabilitation recommendations (AC Restoration, AC Reconstruction, PCC Restoration, and PCC Reconstruction) should be considered as planning-level only. Additional design-level investigation in accordance to the FAA Advisory Circulars will be required. Recommendations identified within this planning document do not imply final design.

6.3.1 10-Year Unconstrained Budget Major Rehabilitation Needs

An unconstrained budget (unlimited budget) is performed for a 10-year duration to identify pavement rehabilitation needs based on current or forecasted PCI values deteriorating below the Critical PCI. FDOT recognizes airports are constrained by budgets and does not intend to convey an unrealistic approach of addressing pavement rehabilitation. The intent of the 10-Year Major Rehabilitation Needs analysis is to identify pavements that will warrant rehabilitation. It is highly recommended that airport staff utilize this information in support of the development of a practical Capital Improvement Program based on priorities, further design/project-level investigation, and budgetary constraints. The following **Table 6.3.1** summarizes all identified section-level major rehabilitation needs forecasted for the next 10-year period. It should be noted that the following table depicts planning-level costs and have been rounded for planning purposes.

Table 6.3.1 10-Year Major Rehabilitation Needs

Program Year	Network ID	Branch ID	Section ID	Surface	Area (SF)	PCI Before	Rehabilitation Type	Planning Cost
2018	**X26**	AP SE	5605	AC	100,723	24	AC Reconstruction	$ 907,000.00
2018	**X26**	AP W	5115	AC	31,900	12	AC Reconstruction	$ 288,000.00
2018	**X26**	TW A	425	AC	7,067	52	AC Restoration	$ 50,000.00
2018	**X26**	TW C	305	AC	51,193	9	AC Reconstruction	$ 461,000.00
2018	**X26**	TW C	306	AC	11,251	12	AC Reconstruction	$ 102,000.00
2022	**X26**	RW 5-23	6205	AAC	295,188	64	AC Restoration	$ 2,067,000.00
2025	**X26**	AP T-HANG	5305	AC	28,960	64	AC Restoration	$ 203,000.00
2026	**X26**	RW 10-28	6305	AC	134,512	64	AC Restoration	$ 942,000.00
2026	**X26**	RW 10-28	6310	AC	44,362	64	AC Restoration	$ 311,000.00
2026	**X26**	TW CONN	515	AC	23,637	64	AC Restoration	$ 166,000.00
2027	**X26**	AP RU E	5510	AC	13,002	64	AC Restoration	$ 92,000.00
2027	**X26**	AP W	5120	AC	20,635	64	AC Restoration	$ 145,000.00
2027	**X26**	TW B	610	AC	119,314	64	AC Restoration	$ 836,000.00

**All values have been rounded to the nearest thousand-dollar.*

The following **Figure 6.3.1-1** summarizes the section-level major rehabilitation needs for a 10-year period between 2018 and 2027. **Figure 6.3.1-2** provides an inset view of Airfield Pavement Major Rehabilitation Exhibit, a large format exhibit is located in **Appendix C Technical Exhibits**. The exhibit graphically depicts the Major Rehabilitation Needs with rounded costs.

Figure 6.3.1-1 10-Year Major Rehabilitation Needs by Program Year

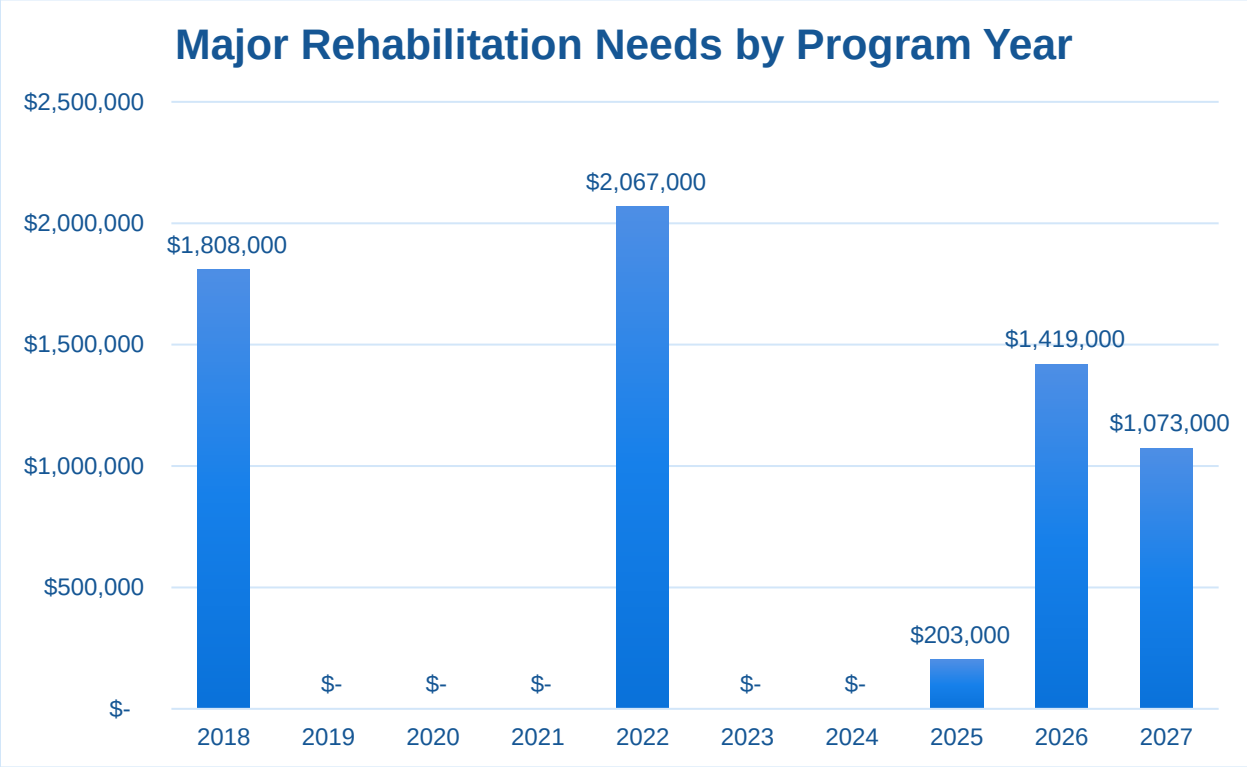
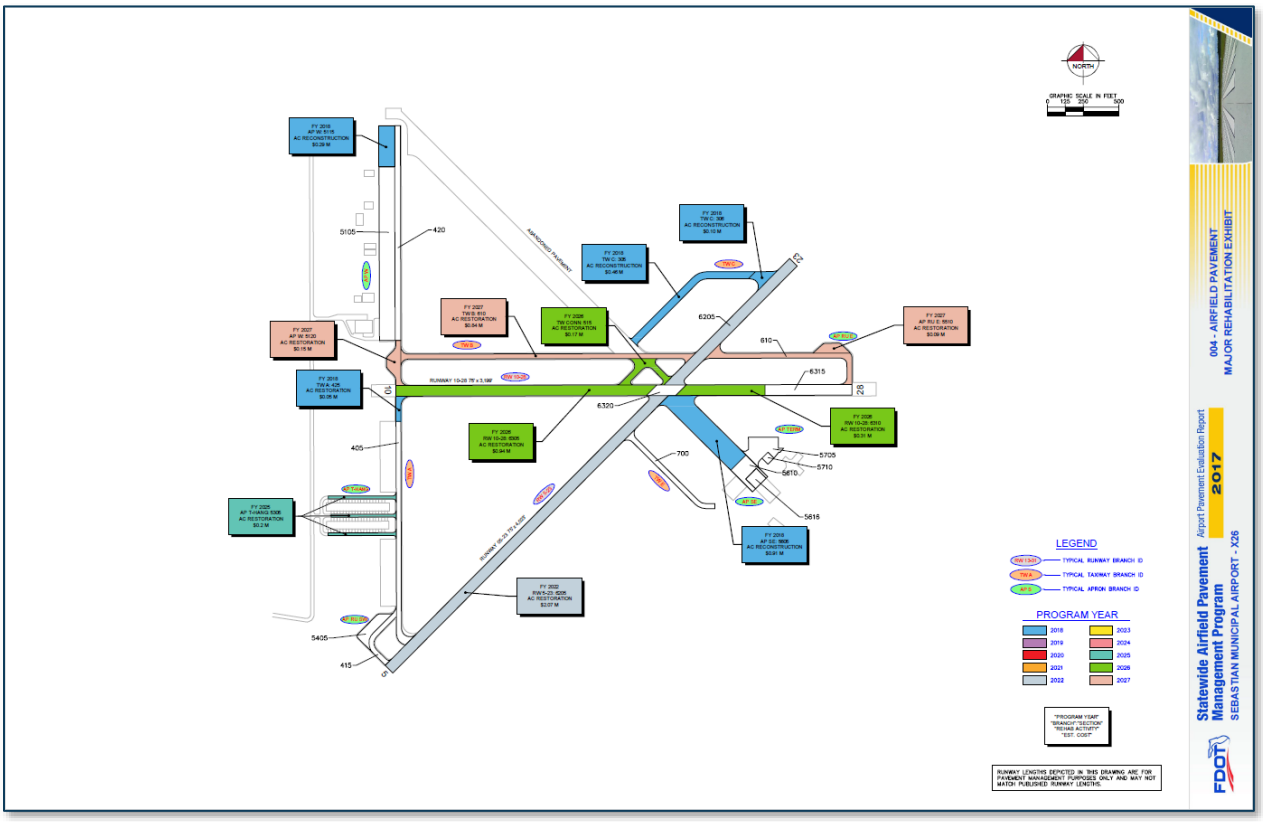
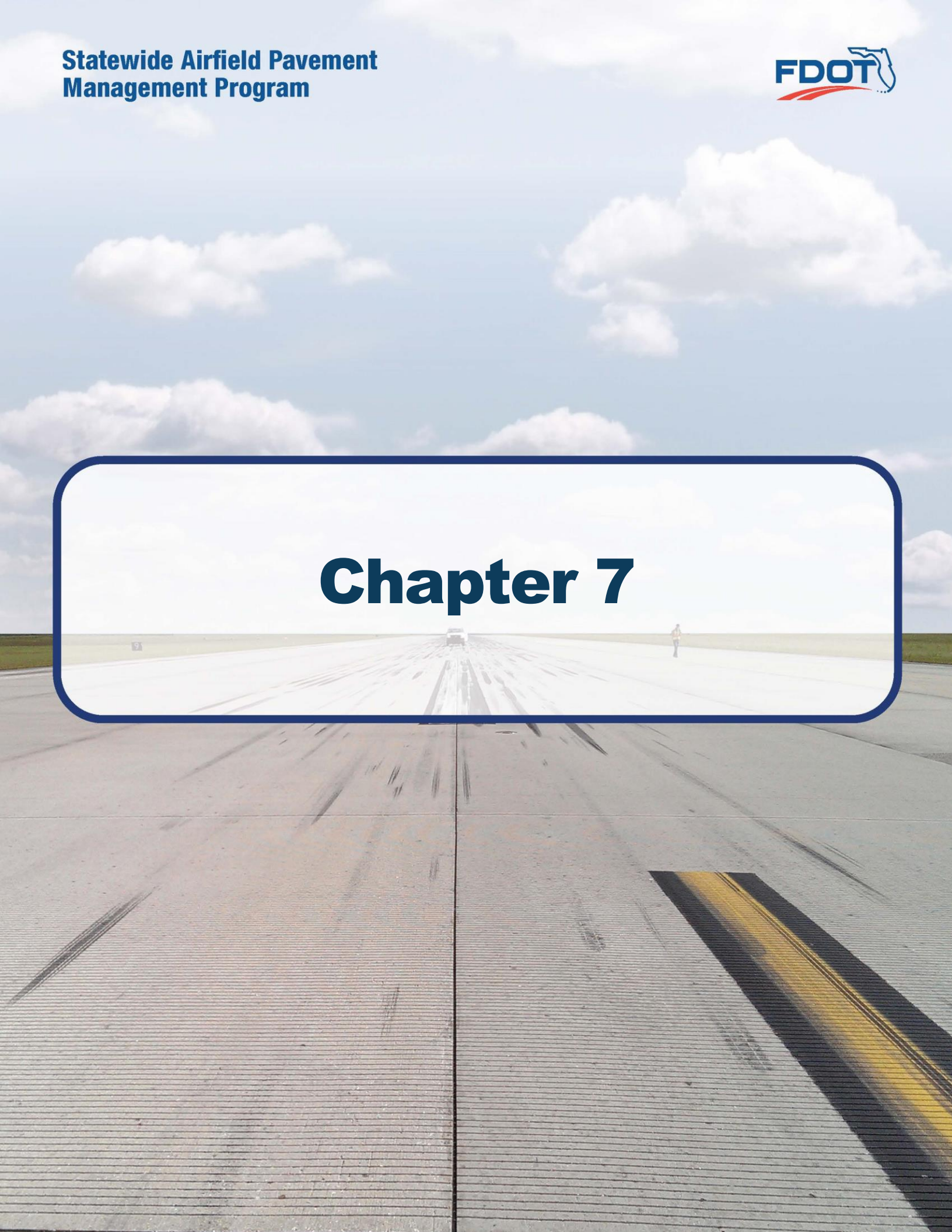


Figure 6.3.1-2 10-Year Major Rehabilitation Needs by Program Year Exhibit





Chapter 7

Chapter 7 – Conclusion

7.1 Recommendations

7.1.1 Continued PCI Survey Inspections

It is recommended that the airport continue to perform regularly scheduled PCI Survey inspections in accordance with the ASTM D5340-12 (or latest edition) to monitor the condition of the airfield pavement facilities.

A high priority should be considered for continuous maintenance record keeping and re-inspection of all the airport's maintained pavement facilities to ensure continued safe aircraft operations. A series of scheduled periodic inspections must be carried out for an effective maintenance program. Re-inspection of pavements should be scheduled in a timely manner to ensure that all areas, particularly those that may not come under day-to-day observation, are thoroughly evaluated and reported.

7.1.2 Localized Maintenance and Repair

While deterioration of the pavements due to usage and exposure to the environment cannot be completely prevented, applying timely and effective maintenance efforts can slow the anticipated rate of deterioration. Lack of adequate and timely maintenance is the significant factor in pavement deterioration.

It is recommended that airport sponsors coordinate with their respective Airport Maintenance staff and Airport Engineer when developing project-level maintenance and repair efforts.

7.1.3 Major Rehabilitation

Chapter 6 – Major Rehabilitation Planning identified major pavement rehabilitation project needs from 2018-2027. The identification of the rehabilitation needs was performed at the section level for manageable project areas with the assumption of an unconstrained budget scenario. Given the uncertainty in the airport-specific budget information and prioritization goals, the unconstrained budget scenario was performed to evaluate the worst-case scenario and identify all the inspected pavements' needs in a 10-year period. Certainly, it is understood that most airports are faced with constrained budgets; further evaluation of projects based on prioritization, operational criticality, funding availability, and practicality is recommended.

7.1.4 Pavement Management System

The following recommendations are made to fully implement an effective pavement management program for the airport:

- Develop a detailed preventive maintenance program for the airport.
- Further refine and implement the identified 10-year major rehabilitation needs.
- Maintain detailed records on pavement maintenance, construction, and inspection.
- Maintain records on major pavement construction projects (year, scope, cost, and construction documents).

7.2 Supporting Documents

001 – Airfield Pavement Network Definition Exhibit

The Airfield Pavement Network Definition Exhibit is located in **Appendix C Technical Exhibits**. The exhibit depicts the airfield layout in a manner that defines the airfield pavement infrastructure as branches, sections, and sample units in accordance with the ASTM D5340-12. The exhibit is intended for planning purposes only – further detail on facilities can be found on the Airport's adopted Airport Layout Plan. Detailed characteristics are tabulated in **Appendix A Pavement Analysis Tables.**

002 – Airfield Pavement System Inventory Exhibit

The Airfield Pavement System Inventory Exhibit in is located in **Appendix C Technical Exhibits**. The exhibit depicts any recent and/or anticipated construction activity within the airfield pavement facilities reported by airport staff. The exhibit is intended to schematically identify the pavement limits of works and general work description. The information reported on the ***Airport Response Form*** provided by each participating airport was used as the basis of the changes; furthermore, changes are confirmed at the airport with airport staff during the in-brief and debrief meeting.

003 – Airfield Pavement Condition Index Exhibit

The Airfield Pavement Condition Index Exhibit is located in **Appendix C Technical Exhibits**. The exhibit is a visual summary of the latest conditions calculated from the results of the PCI Survey performed at the airport. The analysis of the distresses surveyed in accordance with the ASTM D5340-12 (referenced in **Appendix E Inspection Distress Details**) were analyzed using PAVER™ software to determine PCI values. The PCI values are identified in the exhibit and graphically represented using the standard ASTM D5340-12 colors for condition rating categories.

004 – Airfield Pavement Major Rehabilitation Exhibit

The Airfield Pavement Major Rehabilitation Exhibit is located in **Appendix C Technical Exhibits**. The exhibit has been prepared based on the section condition analysis, pavement condition forecasts, and major rehabilitation needs analysis. The exhibit graphically depicts the inventory with the associated rehabilitation type activity, program year, and the planning-level costs. The area limits, rehabilitation type, and planning-level costs should not be considered a design-level recommendation. A tabulation of the 10-Year Major Rehabilitation is located in **Appendix B Airfield Pavement Localized Maintenance and Repair and Major Rehabilitation.**

Inspection Photograph Documentation

Representative field conditions from the PCI Survey are documented with digital photographs located in **Appendix D Inspection Photograph Documentation.** Select photographs are provided with limited caption on the distresses observed – the Appendix does not contain photographs for every sample unit.



7.3 Conclusion

The FDOT SAPMP Update Phase 1 2016-2017 was completed for the airport on behalf of the FDOT ASO in accordance with the Advisory Circulars ***150/5380-7B "Airport Pavement Management Program (PMP)"*** and ***150/5380-6C "Guidelines and Procedures for Maintenance of Airport Pavements."*** FDOT's implementation of the SAPMP has assisted public airports with this requirement in performing PCI survey inspections and analysis in accordance with the ASTM ***D5340-12*** "***Standard Test Method for Airport Pavement Condition Index Surveys."***



Appendix A

Airfield Pavement Analysis Tables



Table A-1 Pavement System Inventory Details

Network ID	Branch Name	Branch ID	Branch Use	Section ID	Length (FT)	Width (FT)	Area (SF)	Surface Type	Est. Last Construction Date
X26	E RUN UP APRON	AP RU E	APRON	5510	200	50	13,002	AC	1/1/2004
X26	SW RUN UP APRON	AP RU SW	APRON	5405	195	100	19,824	AC	1/1/2005
X26	SOUTHEAST APRON	AP SE	APRON	5605	700	150	100,723	AC	1/1/1943
X26	SOUTHEAST APRON	AP SE	APRON	5610	200	150	21,960	AC	1/1/2005
X26	SOUTHEAST APRON	AP SE	APRON	5615	105	100	10,290	AC	1/1/2009
X26	APRON TERMINAL	AP TERM	APRON	5705	200	100	32,590	AC	1/1/2005
X26	APRON TERMINAL	AP TERM	APRON	5710	60	60	3,600	PCC	1/1/2008
X26	T-HANGAR APRON AREA	AP T-HANG	APRON	5305	1000	20	28,960	AC	1/1/2003
X26	WEST APRON	AP W	APRON	5105	1200	100	133,925	AC	1/1/2005
X26	WEST APRON	AP W	APRON	5115	290	50	31,900	AC	1/1/1943
X26	WEST APRON	AP W	APRON	5120	400	50	20,635	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6305	1800	75	134,512	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6310	575	75	44,362	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6315	613	75	45,750	AC	1/1/2004
X26	Runway 10-28	RW 10-28	RUNWAY	6320	213	75	15,376	AC	1/1/2004
X26	RUNWAY 5-23	RW 5-23	RUNWAY	6205	2938	100	295,188	AAC	1/1/2003
X26	TAXIWAY ALPHA	TW A	TAXIWAY	405	1700	35	57,743	AAC	1/1/2005
X26	TAXIWAY ALPHA	TW A	TAXIWAY	415	410	40	16,504	AC	1/1/2005
X26	TAXIWAY ALPHA	TW A	TAXIWAY	420	1500	50	60,300	AC	1/1/2004
X26	TAXIWAY ALPHA	TW A	TAXIWAY	425	180	35	7,067	AC	1/1/2004
X26	TAXIWAY BRAVO	TW B	TAXIWAY	610	4770	25	119,314	AC	1/1/2004
X26	TAXIWAY CHARLIE	TW C	TAXIWAY	305	1020	50	51,193	AC	1/1/1943
X26	TAXIWAY CHARLIE	TW C	TAXIWAY	306	120	75	11,251	AC	1/1/1943
X26	TAXIWAY CONNECTOR	TW CONN	TAXIWAY	515	750	30	23,637	AC	1/1/2004
X26	TAXIWAY E	TW E	TAXIWAY	700	800	35	29,416	AC	1/1/2011



Table A-2 Pavement Condition Index Summary (Last Inspection) – Section Level

Network ID	Branch Name	Branch Use	Section ID	Area (SF)	PCI	Condition Rating
X26	RUNWAY 5-23	RUNWAY	6205	295,188	75	Satisfactory
X26	Runway 10-28	RUNWAY	6305	134,512	80	Satisfactory
X26	Runway 10-28	RUNWAY	6310	44,362	80	Satisfactory
X26	Runway 10-28	RUNWAY	6315	45,750	87	Good
X26	Runway 10-28	RUNWAY	6320	15,376	82	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	405	57,743	81	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	415	16,504	81	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	420	60,300	83	Satisfactory
X26	TAXIWAY ALPHA	TAXIWAY	425	7,067	54	Poor
X26	TAXIWAY BRAVO	TAXIWAY	610	119,314	77	Satisfactory
X26	TAXIWAY CHARLIE	TAXIWAY	305	51,193	13	Serious
X26	TAXIWAY CHARLIE	TAXIWAY	306	11,251	16	Serious
X26	TAXIWAY CONNECTOR	TAXIWAY	515	23,637	75	Satisfactory
X26	TAXIWAY E	TAXIWAY	700	29,416	91	Good
X26	WEST APRON	APRON	5105	133,925	84	Satisfactory
X26	WEST APRON	APRON	5115	31,900	15	Serious
X26	WEST APRON	APRON	5120	20,635	81	Satisfactory
X26	T-HANGAR APRON AREA	APRON	5305	28,960	78	Satisfactory
X26	SW RUN UP APRON	APRON	5405	19,824	85	Satisfactory
X26	E RUN UP APRON	APRON	5510	13,002	81	Satisfactory
X26	SOUTHEAST APRON	APRON	5605	100,723	27	Very Poor
X26	SOUTHEAST APRON	APRON	5610	21,960	87	Good
X26	SOUTHEAST APRON	APRON	5615	10,290	87	Good
X26	APRON TERMINAL	APRON	5705	32,590	89	Good
X26	APRON TERMINAL	APRON	5710	3,600	92	Good



Table A-3 Forecasted PCI 2018-2027

Network ID	Branch ID	Section ID	Last PCI	Forecasted PCI									
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
X26	AP RU E	5510	81	78	77	75	74	72	71	69	67	66	64
X26	AP RU SW	5405	85	82	81	79	78	76	75	73	71	70	68
X26	AP SE	5605	27	24	23	21	20	18	17	15	13	12	10
X26	AP SE	5610	87	84	83	81	80	78	77	75	73	72	70
X26	AP SE	5615	87	84	83	81	80	78	77	75	73	72	70
X26	AP TERM	5705	89	86	85	83	82	80	79	77	75	74	72
X26	AP TERM	5710	92	88	85	82	80	77	75	73	71	69	67
X26	AP T-HANG	5305	78	75	74	72	71	69	68	66	64	63	61
X26	AP W	5105	84	81	80	78	77	75	74	72	70	69	67
X26	AP W	5115	15	12	11	9	8	6	5	3	1	0	0
X26	AP W	5120	81	78	77	75	74	72	71	69	67	66	64
X26	RW 10-28	6305	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6310	80	77	76	74	73	71	69	68	66	64	63
X26	RW 10-28	6315	87	84	83	81	80	78	76	75	73	71	70
X26	RW 10-28	6320	82	79	78	76	75	73	71	70	68	66	65
X26	RW 5-23	6205	75	72	69	67	66	64	63	62	61	61	60
X26	TW A	405	81	78	76	75	74	73	72	71	70	69	68
X26	TW A	415	81	78	76	74	73	71	70	69	68	67	66
X26	TW A	420	83	80	78	76	74	72	71	70	69	68	67
X26	TW A	425	54	52	50	48	47	45	44	42	40	39	37
X26	TW B	610	77	74	73	71	70	69	68	67	66	65	64
X26	TW C	305	13	9	6	4	1	0	0	0	0	0	0
X26	TW C	306	16	12	9	7	4	1	0	0	0	0	0
X26	TW CONN	515	75	72	71	70	69	68	67	66	65	64	63
X26	TW E	700	91	87	85	82	80	78	76	74	73	71	70

Network: SEBASTIAN MUNIC **Branch:** AP RU E E RUN UP APRO **Section:** 5510 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** APRON **Rank:** T **Length:** 200.00 (Ft) **Width:** 50.00 (Ft) **True Area:** 13,002.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2001	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** AP RU SW SW RUN UP APR **Section:** 5405 **Surface:** AC
L.C.D.: 1/1/2005 **Use:** APRON **Rank:** T **Length:** 195.00 (Ft) **Width:** 100.00 (Ft) **True Area:** 19,824.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	NU-IN	New Construction - Initial	0.00	2.00	☑	2" AC/4" Shell Rock Base/12" Stabilizat

Network: SEBASTIAN MUNIC **Branch:** AP SE SOUTHEAST AP **Section:** 5605 **Surface:** AC
L.C.D.: 1/1/1943 **Use:** APRON **Rank:** P **Length:** 700.00 (Ft) **Width:** 150.00 (Ft) **True Area:** 100,723.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/1943	NU-IN	New Construction - Initial	0.00	0.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** AP SE SOUTHEAST AP **Section:** 5610 **Surface:** AC
L.C.D.: 1/1/2005 **Use:** APRON **Rank:** P **Length:** 200.00 (Ft) **Width:** 150.00 (Ft) **True Area:** 21,960.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	NU-IN	New Construction - Initial	0.00	0.00	☑	ESTIMATED CONSTRUCTION

Network: SEBASTIAN MUNIC **Branch:** AP SE SOUTHEAST AP **Section:** 5615 **Surface:** AC
L.C.D.: 1/1/2009 **Use:** APRON **Rank:** P **Length:** 105.00 (Ft) **Width:** 100.00 (Ft) **True Area:** 10,290.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2009	NU-IN	New Construction - Initial	0.00	0.00	☑	ESTIMATED CONSTRUCTION

Network: SEBASTIAN MUNIC **Branch:** AP TERM APRON TERMIN **Section:** 5705 **Surface:** AC
L.C.D.: 1/1/2005 **Use:** APRON **Rank:** P **Length:** 200.00 (Ft) **Width:** 100.00 (Ft) **True Area:** 32,590.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	NU-IN	New Construction - Initial	0.00	0.00	☑	ESTIMATED CONSTRUCTION

Network: SEBASTIAN MUNIC **Branch:** AP TERM APRON TERMIN **Section:** 5710 **Surface:** PCC
L.C.D.: 1/1/2008 **Use:** APRON **Rank:** P **Length:** 60.00 (Ft) **Width:** 60.00 (Ft) **True Area:** 3,600.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2008	NU-IN	New Construction - Initial	0.00	0.00	☑	ESTIMATED CONSTRUCTION

Network: SEBASTIAN MUNIC **Branch:** AP T-HANG T-HANGAR APR **Section:** 5305 **Surface:** AC
L.C.D.: 1/1/2003 **Use:** APRON **Rank:** T **Length:** 1,000.00 (Ft) **Width:** 20.00 (Ft) **True Area:** 28,960.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2003	NU-IN	New Construction - Initial	0.00	2.00	☑	2"AC/4" Limerock/6" Stabilization

Network: SEBASTIAN MUNIC **Branch:** AP W WEST APRON **Section:** 5105 **Surface:** AC

L.C.D.: 1/1/2005 **Use:** APRON **Rank:** P **Length:** 1,200.00 (Ft) **Width:** 100.00 (Ft) **True Area:** 133,925.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	CR-AC	Complete Reconstruction - AC	0.00	2.00	☑	2"AC/4" Shell Rock Base/4" Stabilizatio
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** AP W WEST APRON **Section:** 5115 **Surface:** AC

L.C.D.: 1/1/1943 **Use:** APRON **Rank:** P **Length:** 290.00 (Ft) **Width:** 50.00 (Ft) **True Area:** 31,900.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/1943	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** AP W WEST APRON **Section:** 5120 **Surface:** AC

L.C.D.: 1/1/2004 **Use:** APRON **Rank:** P **Length:** 400.00 (Ft) **Width:** 50.00 (Ft) **True Area:** 20,635.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** RW 10-28 Runway 10-28 **Section:** 6305 **Surface:** AC

L.C.D.: 1/1/2004 **Use:** RUNWAY **Rank:** P **Length:** 1,800.00 (Ft) **Width:** 75.00 (Ft) **True Area:** 134,512.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	2" AC/4" Shell Rock/12" Stab
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** RW 10-28 Runway 10-28 **Section:** 6310 **Surface:** AC

L.C.D.: 1/1/2004 **Use:** RUNWAY **Rank:** P **Length:** 575.00 (Ft) **Width:** 75.00 (Ft) **True Area:** 44,362.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	2" AC/4" Shell Rock/12" Stab
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2"' BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** RW 10-28 Runway 10-28 **Section:** 6315 **Surface:** AC

L.C.D.: 1/1/2004 **Use:** RUNWAY **Rank:** P **Length:** 613.00 (Ft) **Width:** 75.00 (Ft) **True Area:** 45,750.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	2.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** RW 10-28 Runway 10-28 **Section:** 6320 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** RUNWAY **Rank:** P **Length:** 213.00 (Ft) **Width:** 75.00 (Ft) **True Area:** 15,376.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/1943	NU-IN	New Construction - Initial	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** RW 5-23 RUNWAY 5-23 **Section:** 6205 **Surface:** AAC
L.C.D.: 1/1/2003 **Use:** RUNWAY **Rank:** P **Length:** 2,938.00 (Ft) **Width:** 100.00 (Ft) **True Area:** 295,188.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2003	ML-OV	MILL and OVERLAY	0.00	0.00	☑	
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8"' SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** TW A TAXIWAY ALPH **Section:** 405 **Surface:** AAC
L.C.D.: 1/1/2005 **Use:** TAXIWAY **Rank:** P **Length:** 1,700.00 (Ft) **Width:** 35.00 (Ft) **True Area:** 57,743.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	OL-AS	Overlay - AC Structural	0.00	2.00	☑	2" AC/4" Shell Rock Base/4" Stabilizati
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** TW A TAXIWAY ALPH **Section:** 415 **Surface:** AC
L.C.D.: 1/1/2005 **Use:** TAXIWAY **Rank:** P **Length:** 410.00 (Ft) **Width:** 40.00 (Ft) **True Area:** 16,504.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2005	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** TW A TAXIWAY ALPH **Section:** 420 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** TAXIWAY **Rank:** P **Length:** 1,500.00 (Ft) **Width:** 50.00 (Ft) **True Area:** 60,300.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** TW A TAXIWAY ALPH **Section:** 425 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** TAXIWAY **Rank:** P **Length:** 180.00 (Ft) **Width:** 35.00 (Ft) **True Area:** 7,067.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	HI-AG	New Construction	0.00	0.00	☑	
1/1/1943	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** TW B TAXIWAY BRAV **Section:** 610 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** TAXIWAY **Rank:** P **Length:** 4,770.00 (Ft) **Width:** 25.00 (Ft) **True Area:** 119,314.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	2" AC/4" Shell Rock/12" Stab

Network: SEBASTIAN MUNIC **Branch:** TW C TAXIWAY CHAR **Section:** 305 **Surface:** AC
L.C.D.: 1/1/1943 **Use:** TAXIWAY **Rank:** P **Length:** 1,020.00 (Ft) **Width:** 50.00 (Ft) **True Area:** 51,193.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** TW C TAXIWAY CHAR **Section:** 306 **Surface:** AC
L.C.D.: 1/1/1943 **Use:** TAXIWAY **Rank:** P **Length:** 120.00 (Ft) **Width:** 75.00 (Ft) **True Area:** 11,251.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/1943	IMPORTED	BUILT	0.00	2.00	☑	1943 2" BIT 6-8" SHELL BASE

Network: SEBASTIAN MUNIC **Branch:** TW CONN TAXIWAY CON **Section:** 515 **Surface:** AC
L.C.D.: 1/1/2004 **Use:** TAXIWAY **Rank:** P **Length:** 750.00 (Ft) **Width:** 30.00 (Ft) **True Area:** 23,637.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2004	NC-AC	New Construction - AC	0.00	0.00	☑	
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	2" AC/4" Shell Rock/12" Stab
1/1/2000	NU-IN	New Construction - Initial	0.00	0.00	☑	

Network: SEBASTIAN MUNIC **Branch:** TW E TAXIWAY E **Section:** 700 **Surface:** AC
L.C.D.: 1/1/2011 **Use:** TAXIWAY **Rank:** P **Length:** 800.00 (Ft) **Width:** 35.00 (Ft) **True Area:** 29,416.00 (SqFt)

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
1/1/2011	NU-IN	New Construction - Initial	0.00	0.00	☑	ESTIMATED CONSTRUCTION

Summary:

Work Description	Section Count	Area Total (SqFt)	Thickness Avg (in)	Thickness STD (in)
BUILT	7	728,174.00	2.00	0.00
Complete Reconstruction - AC	1	133,925.00	2.00	0.00
MILL and OVERLAY	1	295,188.00	0.00	0.00
New Construction	1	7,067.00	0.00	0.00
New Construction - AC	9	476,888.00	0.22	0.63
New Construction - Initial	21	803,359.00	0.29	0.70
Overlay - AC Structural	1	57,743.00	2.00	0.00

Branch Condition Report

Pavement Database: FDOT

Branch ID	Number of Sections	Sum Section Length (Ft)	Avg Section Width (Ft)	True Area (SqFt)	Use	Average PCI	Standard Deviation PCI	Weighted Average PCI
AP RU E	1	200.00	50.00	13,002.00	APRON	81.00	0.00	81.00
AP RU SW	1	195.00	100.00	19,824.00	APRON	85.00	0.00	85.00
AP SE	3	1,005.00	133.33	132,973.00	APRON	67.00	28.28	41.55
AP TERM	2	260.00	80.00	36,190.00	APRON	90.50	1.50	89.30
AP T-HAN	1	1,000.00	20.00	28,960.00	APRON	78.00	0.00	78.00
AP W	3	1,890.00	66.67	186,460.00	APRON	60.00	31.84	71.86
RW 10-28	4	3,201.00	75.00	240,000.00	RUNWAY	82.25	2.86	81.46
RW 5-23	1	2,938.00	100.00	295,188.00	RUNWAY	75.00	0.00	75.00
TW A	4	3,790.00	40.00	141,614.00	TAXIWAY	74.75	12.01	80.50
TW B	1	4,770.00	25.00	119,314.00	TAXIWAY	77.00	0.00	77.00
TW C	2	1,140.00	62.50	62,444.00	TAXIWAY	14.50	1.50	13.54
TW CONN	1	750.00	30.00	23,637.00	TAXIWAY	75.00	0.00	75.00
TW E	1	800.00	35.00	29,416.00	TAXIWAY	91.00	0.00	91.00

Pavement Database: FDOT

Use Category	Number of Sections	Total Area (SqFt)	Arithmetic Average PCI	Average STD PCI	Weighted Average PCI
APRON	11	417409.000007189	73.27	25.06	65.05
RUNWAY	5	535188	80.80	3.87	77.90
TAXIWAY	9	376425.000020693	63.44	27.81	68.76
ALL	25	1329022.00002788	71.24	24.49	71.28

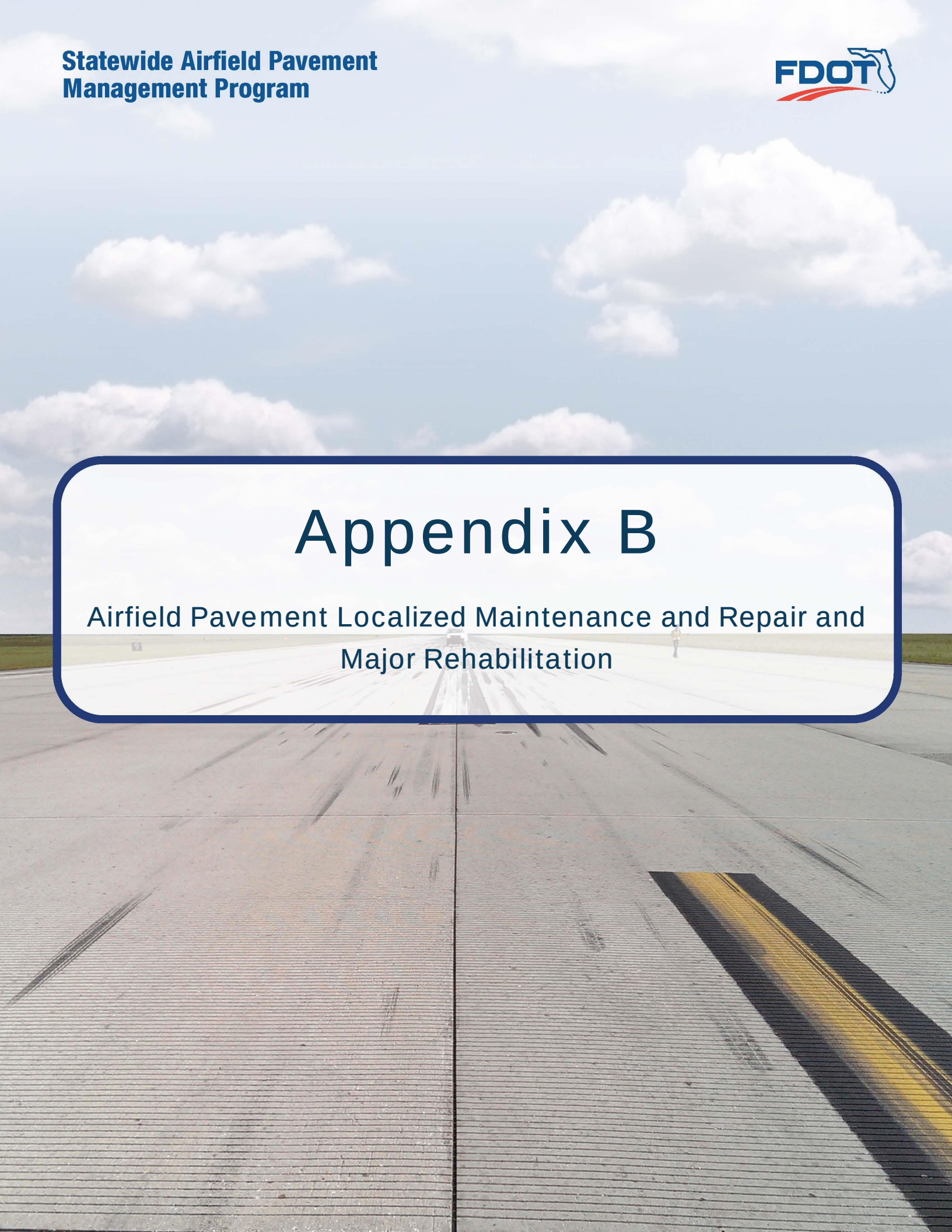
Pavement Database: FDOT ***NetworkId: X26***

Branch ID	Section ID	Last Const. Date	Surface	Use	Rank	Lanes	True Area (SqFt)	Last Inspection Date	Age At Inspection	PCI
AP RU E	5510	1/1/2004	AC	APRON	T	0	13,002.00	9/15/2016	12	81
AP RU SW	5405	1/1/2005	AC	APRON	T	0	19,824.00	9/15/2016	11	85
AP SE	5605	1/1/1943	AC	APRON	P	0	100,723.00	9/15/2016	73	27
AP SE	5610	1/1/2005	AC	APRON	P	0	21,960.00	9/15/2016	11	87
AP SE	5615	1/1/2009	AC	APRON	P	0	10,290.00	9/15/2016	7	87
AP TERM	5705	1/1/2005	AC	APRON	P	0	32,590.00	9/15/2016	11	89
AP TERM	5710	1/1/2008	PCC	APRON	P	0	3,600.00	9/15/2016	8	92
AP T-HANG	5305	1/1/2003	AC	APRON	T	0	28,960.00	9/15/2016	13	78
AP W	5105	1/1/2005	AC	APRON	P	0	133,925.00	9/15/2016	11	84
AP W	5115	1/1/1943	AC	APRON	P	0	31,900.00	9/15/2016	73	15
AP W	5120	1/1/2004	AC	APRON	P	0	20,635.00	9/15/2016	12	81
RW 10-28	6305	1/1/2004	AC	RUNWAY	P	0	134,512.00	9/15/2016	12	80
RW 10-28	6310	1/1/2004	AC	RUNWAY	P	0	44,362.00	9/15/2016	12	80
RW 10-28	6315	1/1/2004	AC	RUNWAY	P	0	45,750.00	9/15/2016	12	87
RW 10-28	6320	1/1/2004	AC	RUNWAY	P	0	15,376.00	9/15/2016	12	82
RW 5-23	6205	1/1/2003	AAC	RUNWAY	P	0	295,188.00	9/15/2016	13	75
TW A	405	1/1/2005	AAC	TAXIWAY	P	0	57,743.00	9/15/2016	11	81
TW A	415	1/1/2005	AC	TAXIWAY	P	0	16,504.00	9/15/2016	11	81
TW A	420	1/1/2004	AC	TAXIWAY	P	0	60,300.00	9/15/2016	12	83
TW A	425	1/1/2004	AC	TAXIWAY	P	0	7,067.00	9/15/2016	12	54
TW B	610	1/1/2004	AC	TAXIWAY	P	0	119,314.00	9/15/2016	12	77
TW C	305	1/1/1943	AC	TAXIWAY	P	0	51,193.00	9/15/2016	73	13
TW C	306	1/1/1943	AC	TAXIWAY	P	0	11,251.00	9/15/2016	73	16
TW CONN	515	1/1/2004	AC	TAXIWAY	P	0	23,637.00	9/15/2016	12	75
TW E	700	1/1/2011	AC	TAXIWAY	P	0	29,416.00	9/15/2016	5	91

Section Condition Report (Summary)

Pavement Database: FDOT

Age Category	Average Age at Inspection	Total Area (SqFt)	Number of Sections	Arithmetic Average PCI	Standard Deviation PCI	Weighted Average PCI
03-05	5	29,416.00	1	91.00	0.00	91.00
06-10	8	13,890.00	2	89.50	2.50	88.30
11-15	12	1,090,649.00	18	80.00	7.36	79.57
ALL	21	1,329,022.00	25	71.24	24.49	71.28
Over 50	73	195,067.00	4	17.75	5.45	20.73



Appendix B

Airfield Pavement Localized Maintenance and Repair and Major Rehabilitation



Table B-1 Localized Maintenance and Repair Needs based on Current Condition

Network ID	Branch ID	Section ID	Distress Code	Description	Severity	Distress Qty	Distress Unit	Percent Distress	Work Description	Work Qty	Work Unit	Unit Cost	Work Cost
X26	AP SE	5605	41	ALLIGATOR CR	Low	2692.7	SqFt	2.7%	FDOT - PATCHING - AC FULL DEPTH	2905.18	SqFt	$ 6.00	$ 17,440.00
X26	AP SE	5605	41	ALLIGATOR CR	Medium	8783.03	SqFt	8.7%	FDOT - PATCHING - AC FULL DEPTH	9164.39	SqFt	$ 6.00	$ 54,990.00
X26	AP SE	5605	45	DEPRESSION	Low	308.92	SqFt	0.3%	FDOT - PATCHING - AC FULL DEPTH	383.2	SqFt	$ 6.00	$ 2,310.00
X26	AP SE	5605	45	DEPRESSION	Medium	26.91	SqFt	0.0%	FDOT - PATCHING - AC FULL DEPTH	51.67	SqFt	$ 6.00	$ 320.00
X26	AP SE	5605	50	PATCHING	Medium	4915.23	SqFt	4.9%	FDOT - PATCHING - AC FULL DEPTH	5201.12	SqFt	$ 6.00	$ 31,210.00
X26	AP SE	5605	50	PATCHING	High	214.85	SqFt	0.2%	FDOT - PATCHING - AC FULL DEPTH	277.71	SqFt	$ 6.00	$ 1,670.00
X26	AP SE	5605	52	RAVELING	Low	95592.89	SqFt	94.9%	FDOT - SURFACE SEAL	95593.21	SqFt	$ 0.55	$ 52,580.00
X26	AP SE	5610	45	DEPRESSION	Low	263.5	SqFt	1.2%	FDOT - PATCHING - AC FULL DEPTH	332.6	SqFt	$ 6.00	$ 2,000.00
X26	AP SE	5615	45	DEPRESSION	Low	39.18	SqFt	0.4%	FDOT - PATCHING - AC FULL DEPTH	68.89	SqFt	$ 6.00	$ 420.00
X26	AP TERM	5705	45	DEPRESSION	Low	26.05	SqFt	0.1%	FDOT - PATCHING - AC FULL DEPTH	50.59	SqFt	$ 6.00	$ 310.00
X26	AP TERM	5710	65	JT SEAL DMG	Medium	29	Slabs	100.0%	FDOT - JOINT SEAL - PCC	527.89	Ft	$ 2.75	$ 1,460.00
X26	AP T-HANG	5305	45	DEPRESSION	Low	347.57	SqFt	1.2%	FDOT - PATCHING - AC FULL DEPTH	426.25	SqFt	$ 6.00	$ 2,560.00
X26	AP W	5105	45	DEPRESSION	Low	113.67	SqFt	0.1%	FDOT - PATCHING - AC FULL DEPTH	160.38	SqFt	$ 6.00	$ 970.00
X26	AP W	5105	52	RAVELING	Low	4464.12	SqFt	3.3%	FDOT - SURFACE SEAL	4463.79	SqFt	$ 0.55	$ 2,460.00
X26	AP W	5115	41	ALLIGATOR CR	Low	614.83	SqFt	1.9%	FDOT - PATCHING - AC FULL DEPTH	719.03	SqFt	$ 6.00	$ 4,320.00
X26	AP W	5115	41	ALLIGATOR CR	Medium	3334.98	SqFt	10.5%	FDOT - PATCHING - AC FULL DEPTH	3571.47	SqFt	$ 6.00	$ 21,430.00
X26	AP W	5115	41	ALLIGATOR CR	High	104.41	SqFt	0.3%	FDOT - PATCHING - AC FULL DEPTH	149.62	SqFt	$ 6.00	$ 900.00
X26	AP W	5115	43	BLOCK CR	Medium	27520.95	SqFt	86.3%	FDOT - CRACK SEALING - AC	8388.45	Ft	$ 3.00	$ 25,170.00
X26	AP W	5115	45	DEPRESSION	Low	139.18	SqFt	0.4%	FDOT - PATCHING - AC FULL DEPTH	190.52	SqFt	$ 6.00	$ 1,150.00
X26	AP W	5115	52	RAVELING	Low	31575.18	SqFt	99.0%	FDOT - SURFACE SEAL	31574.85	SqFt	$ 0.55	$ 17,370.00
X26	AP W	5120	45	DEPRESSION	Low	81.16	SqFt	0.4%	FDOT - PATCHING - AC FULL DEPTH	121.63	SqFt	$ 6.00	$ 730.00
X26	AP W	5120	52	RAVELING	Low	419.15	SqFt	2.0%	FDOT - SURFACE SEAL	418.72	SqFt	$ 0.55	$ 240.00
X26	RW 10-28	6305	52	RAVELING	Low	2951.57	SqFt	2.2%	FDOT - SURFACE SEAL	2951.46	SqFt	$ 0.55	$ 1,630.00
X26	RW 10-28	6310	52	RAVELING	Low	591.48	SqFt	1.3%	FDOT - SURFACE SEAL	592.02	SqFt	$ 0.55	$ 330.00
X26	RW 10-28	6315	52	RAVELING	Low	609.99	SqFt	1.3%	FDOT - SURFACE SEAL	610.31	SqFt	$ 0.55	$ 340.00
X26	RW 10-28	6320	45	DEPRESSION	Low	41.01	SqFt	0.3%	FDOT - PATCHING - AC FULL DEPTH	71.04	SqFt	$ 6.00	$ 430.00
X26	RW 5-23	6205	52	RAVELING	Low	9097.01	SqFt	3.1%	FDOT - SURFACE SEAL	9096.58	SqFt	$ 0.55	$ 5,010.00
X26	TW A	425	45	DEPRESSION	Low	969.18	SqFt	13.7%	FDOT - PATCHING - AC FULL DEPTH	1099	SqFt	$ 6.00	$ 6,600.00
X26	TW A	425	52	RAVELING	Low	504.83	SqFt	7.1%	FDOT - SURFACE SEAL	504.83	SqFt	$ 0.55	$ 280.00
X26	TW B	610	52	RAVELING	Low	2343.63	SqFt	2.0%	FDOT - SURFACE SEAL	2343.3	SqFt	$ 0.55	$ 1,290.00
X26	TW C	305	41	ALLIGATOR CR	Medium	13490.3	SqFt	26.4%	FDOT - PATCHING - AC FULL DEPTH	13961.87	SqFt	$ 6.00	$ 83,780.00
X26	TW C	305	43	BLOCK CR	Medium	36153.18	SqFt	70.6%	FDOT - CRACK SEALING - AC	11019.36	Ft	$ 3.00	$ 33,060.00
X26	TW C	305	45	DEPRESSION	Low	441.32	SqFt	0.9%	FDOT - PATCHING - AC FULL DEPTH	529.58	SqFt	$ 6.00	$ 3,180.00
X26	TW C	305	50	PATCHING	High	1549.57	SqFt	3.0%	FDOT - PATCHING - AC FULL DEPTH	1711.46	SqFt	$ 6.00	$ 10,280.00
X26	TW C	305	52	RAVELING	Low	44510.28	SqFt	87.0%	FDOT - SURFACE SEAL	44509.85	SqFt	$ 0.55	$ 24,490.00
X26	TW C	305	52	RAVELING	Medium	5133.2	SqFt	10.0%	FDOT - PATCHING - AC PARTIAL DEPTH	5133.31	SqFt	$ 3.00	$ 15,400.00
X26	TW C	306	41	ALLIGATOR CR	Medium	2943.07	SqFt	26.2%	FDOT - PATCHING - AC FULL DEPTH	3165.67	SqFt	$ 6.00	$ 19,000.00
X26	TW C	306	43	BLOCK CR	Medium	8307.91	SqFt	73.8%	FDOT - CRACK SEALING - AC	2532.15	Ft	$ 3.00	$ 7,600.00



Network ID	Branch ID	Section ID	Distress Code	Description	Severity	Distress Qty	Distress Unit	Percent Distress	Work Description	Work Qty	Work Unit	Unit Cost	Work Cost
X26	TW C	306	45	DEPRESSION	Low	54.47	SqFt	0.5%	FDOT - PATCHING - AC FULL DEPTH	88.26	SqFt	$ 6.00	$ 530.00
X26	TW C	306	52	RAVELING	Low	11250.98	SqFt	100.0%	FDOT - SURFACE SEAL	11251.52	SqFt	$ 0.55	$ 6,190.00
X26	TW CONN	515	45	DEPRESSION	Low	177.28	SqFt	0.8%	FDOT - PATCHING - AC FULL DEPTH	234.65	SqFt	$ 6.00	$ 1,410.00
X26	TW CONN	515	52	RAVELING	Low	1801.66	SqFt	7.6%	FDOT - SURFACE SEAL	1801.88	SqFt	$ 0.55	$ 1,000.00



Table B-2 10-Year Major Rehabilitation Planning Needs at Section Level

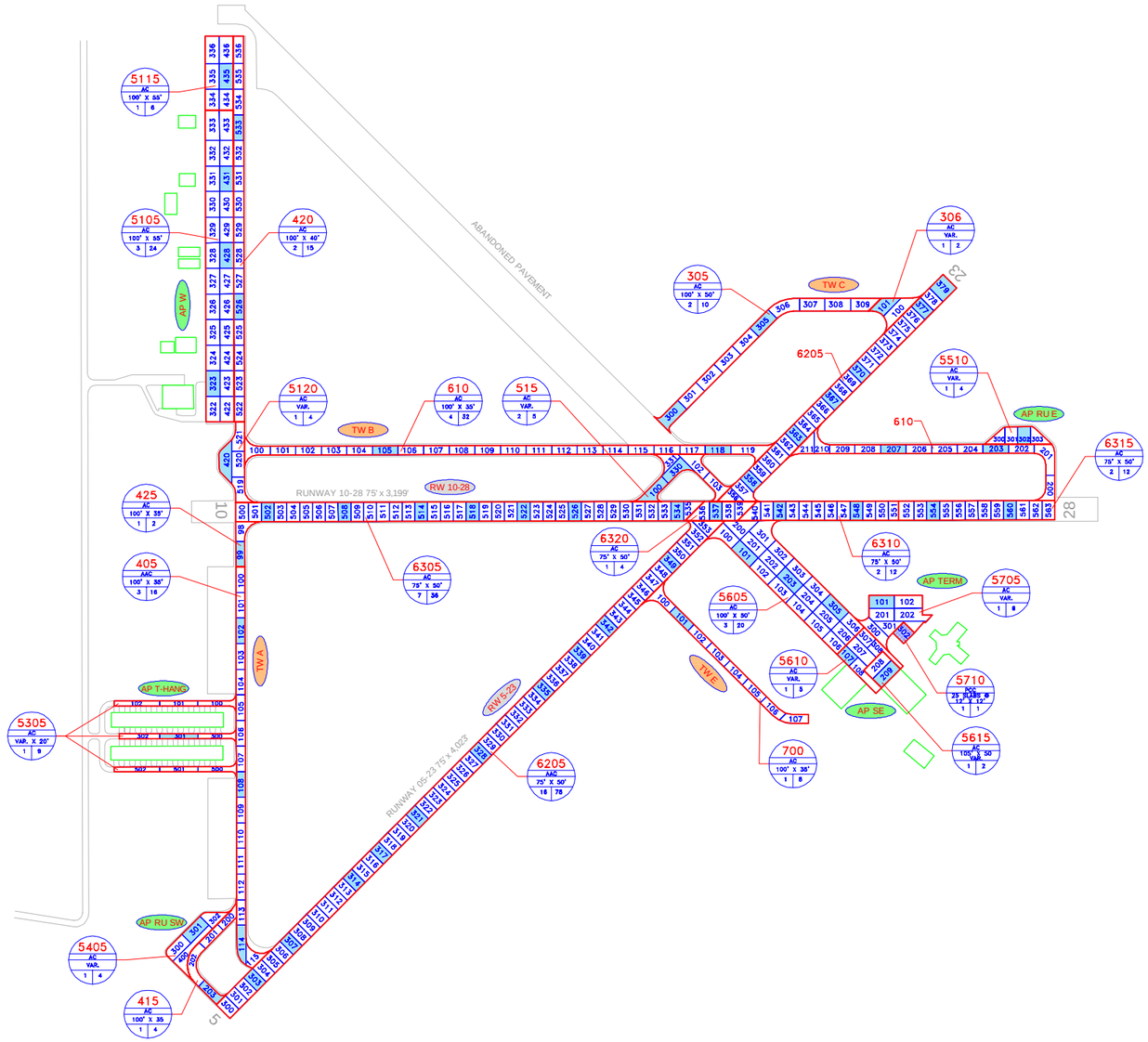
Program Year	Network ID	Branch ID	Section ID	Surface	Area (SF)	PCI Before	Rehabilitation Type	Planning Cost
2018	**X26**	AP SE	5605	AC	100,723	24	AC Reconstruction	$ 907,000.00
2018	**X26**	AP W	5115	AC	31,900	12	AC Reconstruction	$ 288,000.00
2018	**X26**	TW A	425	AC	7,067	52	AC Restoration	$ 50,000.00
2018	**X26**	TW C	305	AC	51,193	9	AC Reconstruction	$ 461,000.00
2018	**X26**	TW C	306	AC	11,251	12	AC Reconstruction	$ 102,000.00
2022	**X26**	RW 5-23	6205	AAC	295,188	64	AC Restoration	$ 2,067,000.00
2025	**X26**	AP T-HANG	5305	AC	28,960	64	AC Restoration	$ 203,000.00
2026	**X26**	RW 10-28	6305	AC	134,512	64	AC Restoration	$ 942,000.00
2026	**X26**	RW 10-28	6310	AC	44,362	64	AC Restoration	$ 311,000.00
2026	**X26**	TW CONN	515	AC	23,637	64	AC Restoration	$ 166,000.00
2027	**X26**	AP RU E	5510	AC	13,002	64	AC Restoration	$ 92,000.00
2027	**X26**	AP W	5120	AC	20,635	64	AC Restoration	$ 145,000.00
2027	**X26**	TW B	610	AC	119,314	64	AC Restoration	$ 836,000.00

Statewide Airfield Pavement Management Program



Appendix C

Technical Exhibits



TOTAL SAMPLES INSPECTED = 60
AC: 59 PCC: 1

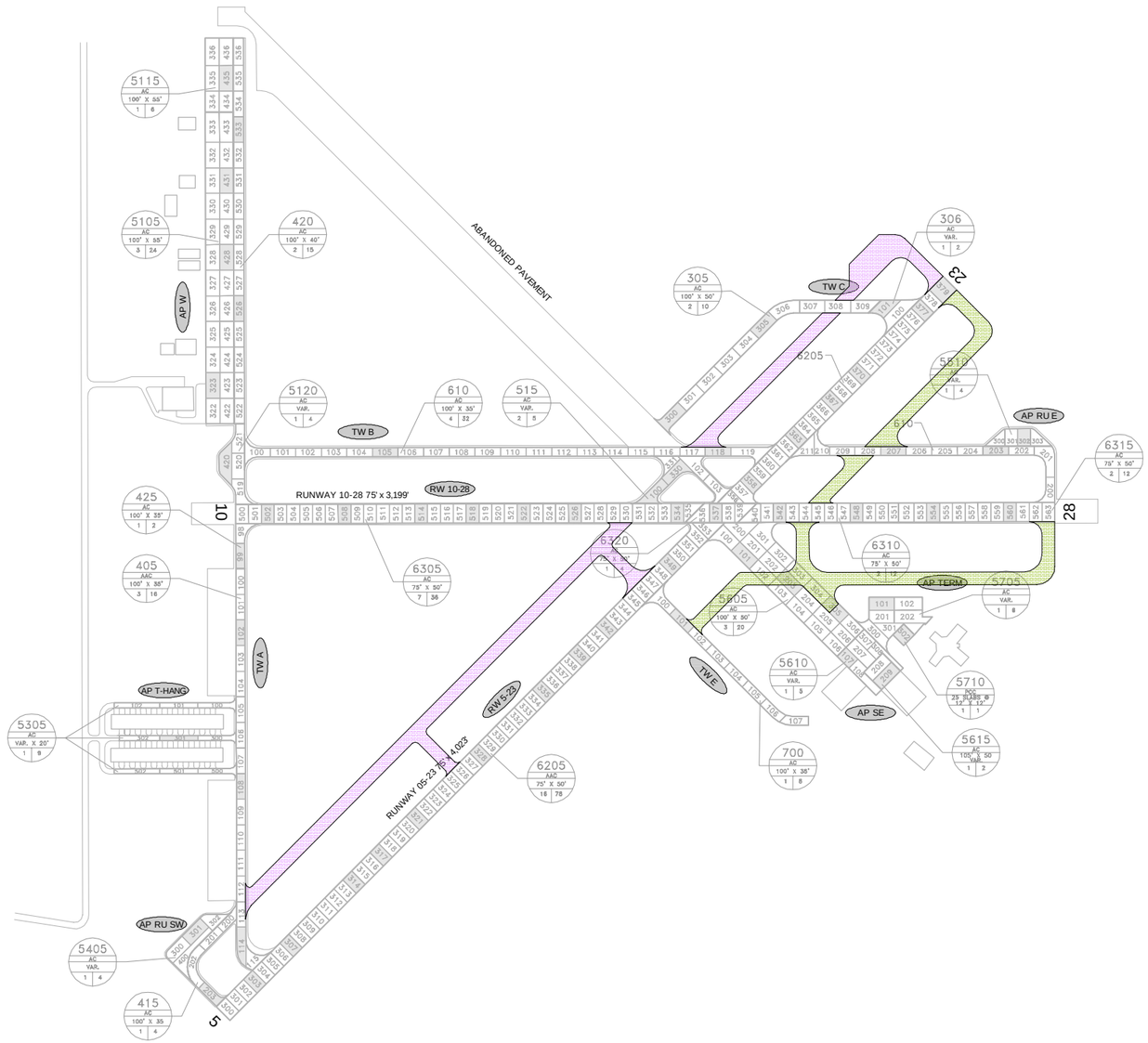
RUNWAY LENGTHS DEPICTED IN THIS DRAWING ARE FOR PAVEMENT MANAGEMENT PURPOSES ONLY AND MAY NOT MATCH PUBLISHED RUNWAY LENGTHS.



001 - AIRFIELD PAVEMENT
NETWORK DEFINITION EXHIBIT

Statewide Airfield Pavement Management Program
Airport Pavement Evaluation Report
2017
SEBASTIAN MUNICIPAL AIRPORT - X26

FDOT



CONSTRUCTION SINCE LAST INSPECTION & ANTICIPATED CONSTRUCTION ACTIVITY

CONSTRUCTION YEAR	LOCATION	WORK TYPE / PAVEMENT SECTION
2017	TAXIWAYS D & E	NEW CONSTRUCTION
2018	TAXIWAY C	NEW CONSTRUCTION

LEGEND

- PROJECTS YEAR 2013
- PROJECTS YEAR 2014
- PROJECTS YEAR 2015
- PROJECTS YEAR 2016
- PROJECTS YEAR 2017
- PROJECTS YEAR 2018
- PROJECTS YEAR 2019
- PROJECTS YEAR 2020
- PROJECTS YEAR 2021
- PROJECTS YEAR 2022

RUNWAY LENGTHS DEPICTED IN THIS DRAWING ARE FOR PAVEMENT MANAGEMENT PURPOSES ONLY AND MAY NOT MATCH PUBLISHED RUNWAY LENGTHS.



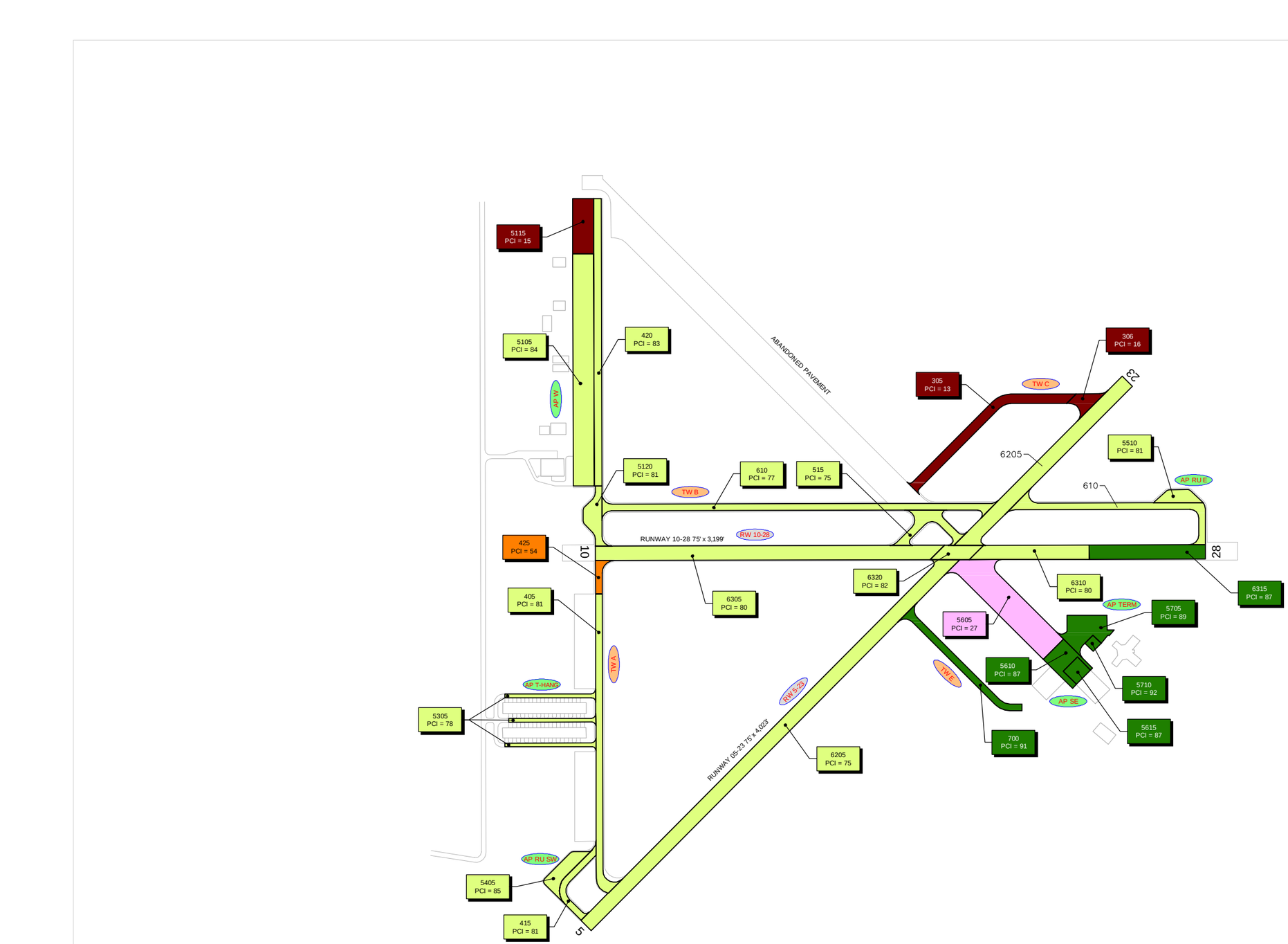
002 - AIRFIELD PAVEMENT
SYSTEM INVENTORY EXHIBIT

Airport Pavement Evaluation Report
2017

Statewide Airfield Pavement Management Program

SEBASTIAN MUNICIPAL AIRPORT - X26

FDOT



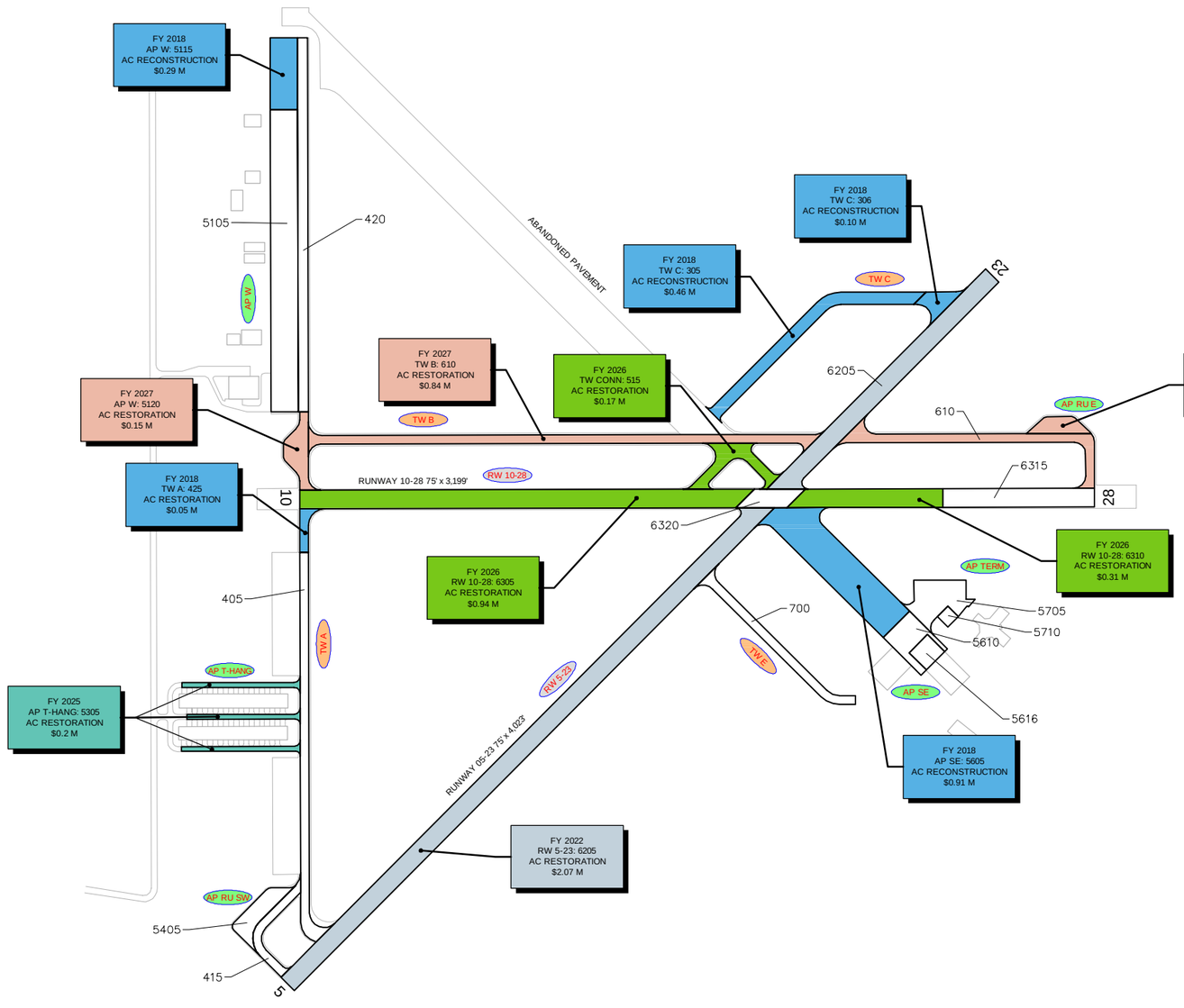
003 - AIRFIELD PAVEMENT CONDITION INDEX EXHIBIT

Airport Pavement Evaluation Report 2017

Statewide Airfield Pavement Management Program

SEBASTIAN MUNICIPAL AIRPORT - X26

FDOT



NORTH

GRAPHIC SCALE IN FEET
0 125 250 500

LEGEND

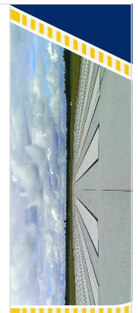
- RW 13-31 — TYPICAL RUNWAY BRANCH ID
- TW A — TYPICAL TAXIWAY BRANCH ID
- AP S — TYPICAL APRON BRANCH ID

PROGRAM YEAR

2018	2023
2019	2024
2020	2025
2021	2026
2022	2027

"PROGRAM YEAR"
"BRANCH":"SECTION"
"REHAB ACTIVITY"
"EST. COST"

RUNWAY LENGTHS DEPICTED IN THIS DRAWING ARE FOR PAVEMENT MANAGEMENT PURPOSES ONLY AND MAY NOT MATCH PUBLISHED RUNWAY LENGTHS.



004 - AIRFIELD PAVEMENT
MAJOR REHABILITATION EXHIBIT

Airport Pavement Evaluation Report
2017

Statewide Airfield Pavement Management Program

SEBASTIAN MUNICIPAL AIRPORT - X26

FDOT



Appendix D

Inspection Photograph Documentation



Runway 5-23, Section 6205, Sample Unit 379 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (50) Patching, Low Severity (57) Weathering



Runway 5-23, Section 6205, Sample Unit 379 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (50) Patching, Low Severity (57) Weathering, Low Severity (52) Raveling



Runway 10-28, Section 6305, Sample Unit 514 – Low Severity (52) Raveling



Taxiway C, Section 305, Sample Unit 300 – Medium Severity (41) Alligator Cracking, Medium Severity (52) Raveling



Taxiway C, Section 305, Sample Unit 305 – Medium Severity (43) Block Cracking, Medium Severity (41) Alligator Cracking, Low Severity (53) Rutting, Low Severity (52) Raveling



Taxiway C, Section 305, Sample Unit 305 – Medium Severity (41) Alligator Cracking, Low Severity (53) Rutting, Low Severity (52) Raveling



Taxiway A, Section 425, Sample Unit 99 – Low Severity (45) Depression, Low Severity (52) Raveling, Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (57) Weathering



Taxiway A, Section 425, Sample Unit 99 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (57) Weathering, Low Severity (52) Raveling



Taxiway CONN, Section 515, Sample Unit 100 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (57) Weathering, Low Severity (52) Raveling



Taxiway B, Section 610, Sample Unit 105 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (52) Raveling, Low Severity (57) Weathering



Taxiway E, Section 700, Sample Unit 101 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (57) Weathering



Apron W, Section 5115, Sample Unit 435 – Medium Severity (43) Block Cracking, Low Severity (50) Patching, Low Severity (52) Raveling



Apron SE, Section 5605, Sample Unit 101 – Low Severity (43) Block Cracking, Medium Severity (50) Patching, Medium Severity (41) Alligator Cracking, Low Severity (52) Raveling



Apron SE, Section 5605, Sample Unit 101 – Low Severity (52) Raveling and Medium Severity (41) Alligator Cracking



Apron SE, Section 5605, Sample Unit 203 – Low Severity (41) Alligator Cracking, Low Severity (43) Block Cracking, Low Severity (52) Raveling



Apron SE, Section 5605, Sample Unit 305 – Low Severity (41) Alligator Cracking and Low Severity (50) Patching, Low Severity (52) Raveling



Apron T-Hang, Section 5305, Sample Unit 301 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (45) Depression, Low Severity (57) Weathering



Apron RU E, Section 5510, Sample Unit 302 – Low Severity (50) Patching and Low Severity (57) Weathering



Apron RU SW, Section 5405, Sample Unit 301 – Low Severity (48) Longitudinal and Transverse Cracking, Low Severity (57) Weathering



Apron Term, Section 5705, Sample Unit 101 – Low Severity (45) Depression, Low Severity (57) Weathering

Statewide Airfield Pavement Management Program



Appendix E

Inspection Distress Details

Re-Inspection Report

FDOT
Generated Date 6/2/2017

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP RU E **Name:** E RUN UP APRON **Use:** APRON **Area:** 13,002 SqFt

Section: 5510 of 1 **From:** **To:** **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** T

Area: 13,002 SqFt **Length:** 200 Ft **Width:** 50 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2001 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 4 **Surveyed:** 1

Conditions: **PCI:** 81

Inspection Comments:

Sample Number: 302 **Type:** R **Area:** 3450.00 SqFt **PCI:** 81

Sample Comments:

48	L & T CR	L	38.00	Ft
50	PATCHING	L	143.00	SqFt
57	WEATHERING	L	3307.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP RU SW **Name:** SW RUN UP APRON **Use:** APRON **Area:** 19,824 SqFt

Section: 5405 of 1 **From:** **To:** **Last Const.:** 1/1/2005

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** T

Area: 19,824 SqFt **Length:** 195 Ft **Width:** 100 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2005 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 4 **Surveyed:** 1

Conditions: **PCI:** 85

Inspection Comments:

Sample Number: 301 **Type:** R **Area:** 5000.00 SqFt **PCI:** 85

Sample Comments:

48	L & T CR	L	126.00	Ft
57	WEATHERING	L	5000.00	SqFt
56	SWELLING	L	1.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP SE **Name:** SOUTHEAST APRON **Use:** APRON **Area:** 132,973 SqFt

Section: 5605 of 3 **From:** - **To:** - **Last Const.:** 1/1/1943

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 100,723 SqFt **Length:** 700 Ft **Width:** 150 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 20 **Surveyed:** 3

Conditions: **PCI:** 27

Inspection Comments:

Sample Number: 101 **Type:** R **Area:** 5000.00 SqFt **PCI:** 18

Sample Comments:

41	ALLIGATOR CR	L	36.00	SqFt
41	ALLIGATOR CR	M	716.00	SqFt
50	PATCHING	M	724.00	SqFt
45	DEPRESSION	L	45.00	SqFt
45	DEPRESSION	M	4.00	SqFt
50	PATCHING	H	32.00	SqFt
43	BLOCK CR	L	3492.00	SqFt
52	RAVELING	L	4244.00	SqFt

Sample Number: 203 **Type:** R **Area:** 5000.00 SqFt **PCI:** 37

Sample Comments:

45	DEPRESSION	L	1.00	SqFt
41	ALLIGATOR CR	L	365.00	SqFt
52	RAVELING	L	5000.00	SqFt
43	BLOCK CR	L	4635.00	SqFt

Sample Number: 305 **Type:** R **Area:** 5000.00 SqFt **PCI:** 25

Sample Comments:

50	PATCHING	M	8.00	SqFt
41	ALLIGATOR CR	M	592.00	SqFt
43	BLOCK CR	L	4400.00	SqFt
52	RAVELING	L	4992.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP SE **Name:** SOUTHEAST APRON **Use:** APRON **Area:** 132,973 SqFt

Section: 5610 of 3 **From:** - **To:** - **Last Const.:** 1/1/2005

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 21,960 SqFt **Length:** 200 Ft **Width:** 150 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2005 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 5 **Surveyed:** 1

Conditions: **PCI:** 87

Inspection Comments:

Sample Number: 107 **Type:** R **Area:** 3250.00 SqFt **PCI:** 87

Sample Comments:

45	DEPRESSION	L	39.00	SqFt
57	WEATHERING	L	3250.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP SE **Name:** SOUTHEAST APRON **Use:** APRON **Area:** 132,973 SqFt

Section: 5615 of 3 **From:** - **To:** - **Last Const.:** 1/1/2009

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 10,290 SqFt **Length:** 105 Ft **Width:** 100 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2009 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 2 **Surveyed:** 1

Conditions: **PCI:** 87

Inspection Comments:

Sample Number: 209 **Type:** R **Area:** 5250.00 SqFt **PCI:** 87

Sample Comments:

48	L & T CR	L	74.00	Ft
57	WEATHERING	L	5250.00	SqFt
45	DEPRESSION	L	20.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP TERM **Name:** APRON TERMINAL **Use:** APRON **Area:** 36,190 SqFt

Section: 5705 of 2 **From:** - **To:** - **Last Const.:** 1/1/2005

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 32,590 SqFt **Length:** 200 Ft **Width:** 100 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2005 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 6 **Surveyed:** 1

Conditions: **PCI:** 89

Inspection Comments:

Sample Number: 101 **Type:** R **Area:** 5000.00 SqFt **PCI:** 89

Sample Comments:

48	L & T CR	L	76.00	Ft
45	DEPRESSION	L	4.00	SqFt
57	WEATHERING	L	5000.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP TERM **Name:** APRON TERMINAL **Use:** APRON **Area:** 36,190 SqFt

Section: 5710 of 2 **From:** - **To:** - **Last Const.:** 1/1/2008

Surface: PCC **Family:** C9N59-GA-AP-PCC **Zone:** **Category:** **Rank:** P

Area: 3,600 SqFt **Length:** 60 Ft **Width:** 60 Ft

Slabs: 29 **Slab Length:** 10 Ft **Slab Width:** 13 Ft **Joint Length:** 528 Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2008 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 1 **Surveyed:** 1

Conditions: **PCI:** 92

Inspection Comments:

Sample Number: 302 **Type:** R **Area:** 29.00 Slabs **PCI:** 92

Sample Comments:

73	SHRINKAGE CR	N	1.00	Slabs
65	JT SEAL DMG	M	29.00	Slabs

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP T-HANG **Name:** T-HANGAR APRON AREA **Use:** APRON **Area:** 28,960 SqFt

Section: 5305 of 1 **From:** **To:** **Last Const.:** 1/1/2003

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** T

Area: 28,960 SqFt **Length:** 1,000 Ft **Width:** 20 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2003 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 9 **Surveyed:** 1

Conditions: **PCI:** 78

Inspection Comments:

Sample Number: 301 **Type:** R **Area:** 3000.00 SqFt **PCI:** 78

Sample Comments:

48	L & T CR	L	116.00	Ft
45	DEPRESSION	L	36.00	SqFt
57	WEATHERING	L	3000.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP W **Name:** WEST APRON **Use:** APRON **Area:** 186,460 SqFt

Section: 5105 of 3 **From:** - **To:** - **Last Const.:** 1/1/2005

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 133,925 SqFt **Length:** 1,200 Ft **Width:** 100 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Work Date: 1/1/2005 **Work Type:** Complete Reconstruction - AC **Code:** CR-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 24 **Surveyed:** 3

Conditions: **PCI:** 84

Inspection Comments:

Sample Number: 323 **Type:** R **Area:** 5500.00 SqFt **PCI:** 88

Sample Comments:

45	DEPRESSION	L	14.00	SqFt
48	L & T CR	L	50.00	Ft
57	WEATHERING	L	5500.00	SqFt

Sample Number: 428 **Type:** R **Area:** 5500.00 SqFt **PCI:** 83

Sample Comments:

48	L & T CR	L	96.00	Ft
52	RAVELING	L	275.00	SqFt
57	WEATHERING	L	5225.00	SqFt

Sample Number: 431 **Type:** R **Area:** 5500.00 SqFt **PCI:** 80

Sample Comments:

48	L & T CR	L	161.00	Ft
52	RAVELING	L	275.00	SqFt
57	WEATHERING	L	5225.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP W **Name:** WEST APRON **Use:** APRON **Area:** 186,460 SqFt

Section: 5115 of 3 **From:** - **To:** - **Last Const.:** 1/1/1943

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 31,900 SqFt **Length:** 290 Ft **Width:** 50 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 6 **Surveyed:** 1

Conditions: **PCI:** 15

Inspection Comments:

Sample Number: 435 **Type:** R **Area:** 5500.00 SqFt **PCI:** 15

Sample Comments:

41	ALLIGATOR CR	L	106.00	SqFt
45	DEPRESSION	L	24.00	SqFt
41	ALLIGATOR CR	H	18.00	SqFt
41	ALLIGATOR CR	M	575.00	SqFt
53	RUTTING	L	30.00	SqFt
50	PATCHING	L	56.00	SqFt
43	BLOCK CR	M	4745.00	SqFt
52	RAVELING	L	5444.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: AP W **Name:** WEST APRON **Use:** APRON **Area:** 186,460 SqFt

Section: 5120 of 3 **From:** **To:** **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-AP-AC **Zone:** **Category:** **Rank:** P

Area: 20,635 SqFt **Length:** 400 Ft **Width:** 50 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2000 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 4 **Surveyed:** 1

Conditions: **PCI:** 81

Inspection Comments:

Sample Number: 420 **Type:** R **Area:** 6105.00 SqFt **PCI:** 81

Sample Comments:

48	L & T CR	L	120.00	Ft
45	DEPRESSION	L	24.00	SqFt
52	RAVELING	L	124.00	SqFt
57	WEATHERING	L	5981.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: RW 10-28 **Name:** Runway 10-28 **Use:** RUNWAY **Area:** 240,000 SqFt

Section: 6305 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-RW-AC **Zone:** **Category:** **Rank:** P

Area: 134,512 SqFt **Length:** 1,800 Ft **Width:** 75 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Work Date: 1/1/2000 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 36 **Surveyed:** 7

Conditions: **PCI:** 80

Inspection Comments:

Sample Number: 502 **Type:** R **Area:** 3750.00 SqFt **PCI:** 78

Sample Comments:

48	L & T CR	L	144.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Sample Number: 508 **Type:** R **Area:** 3750.00 SqFt **PCI:** 83

Sample Comments:

48	L & T CR	L	54.00	Ft
52	RAVELING	L	188.00	SqFt
57	WEATHERING	L	3562.00	SqFt

Sample Number: 514 **Type:** R **Area:** 3750.00 SqFt **PCI:** 74

Sample Comments:

48	L & T CR	L	215.00	Ft
52	RAVELING	L	188.00	SqFt
57	WEATHERING	L	3562.00	SqFt

Sample Number: 518 **Type:** R **Area:** 3750.00 SqFt **PCI:** 85

Sample Comments:

48	L & T CR	L	106.00	Ft
57	WEATHERING	L	3750.00	SqFt

Sample Number: 522 **Type:** R **Area:** 3750.00 SqFt **PCI:** 83

Sample Comments:

48	L & T CR	L	140.00	Ft
57	WEATHERING	L	3750.00	SqFt

Sample Number: 526 **Type:** R **Area:** 3750.00 SqFt **PCI:** 80

Sample Comments:

48	L & T CR	L	195.00	Ft
57	WEATHERING	L	3750.00	SqFt

Sample Number: 534 **Type:** R **Area:** 3750.00 SqFt **PCI:** 78

Sample Comments:

48	L & T CR	L	153.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: RW 10-28 **Name:** Runway 10-28 **Use:** RUNWAY **Area:** 240,000 SqFt

Section: 6310 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-RW-AC **Zone:** **Category:** **Rank:** P

Area: 44,362 SqFt **Length:** 575 Ft **Width:** 75 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943	**Work Type:** BUILT	**Code:** IMPORTED	**Is Major M&R:** True
Work Date: 1/1/2000	**Work Type:** New Construction - Initial	**Code:** NU-IN	**Is Major M&R:** True
Work Date: 1/1/2004	**Work Type:** New Construction - AC	**Code:** NC-AC	**Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 12 **Surveyed:** 2

Conditions: **PCI:** 80

Inspection Comments:

Sample Number: 542 **Type:** R **Area:** 3750.00 SqFt **PCI:** 79

Sample Comments:

48	L & T CR	L	135.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Sample Number: 548 **Type:** R **Area:** 3750.00 SqFt **PCI:** 82

Sample Comments:

48	L & T CR	L	158.00	Ft
57	WEATHERING	L	3750.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: RW 10-28 **Name:** Runway 10-28 **Use:** RUNWAY **Area:** 240,000 SqFt

Section: 6315 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-RW-AC **Zone:** **Category:** **Rank:** P

Area: 45,750 SqFt **Length:** 613 Ft **Width:** 75 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2000 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 12 **Surveyed:** 2

Conditions: **PCI:** 87

Inspection Comments:

Sample Number: 554 **Type:** R **Area:** 3750.00 SqFt **PCI:** 84

Sample Comments:

48	L & T CR	L	59.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Sample Number: 560 **Type:** R **Area:** 3750.00 SqFt **PCI:** 90

Sample Comments:

48	L & T CR	L	27.00	Ft
57	WEATHERING	L	3750.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: RW 10-28 **Name:** Runway 10-28 **Use:** RUNWAY **Area:** 240,000 SqFt

Section: 6320 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-RW-AC **Zone:** **Category:** **Rank:** P

Area: 15,376 SqFt **Length:** 213 Ft **Width:** 75 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 4 **Surveyed:** 1

Conditions: **PCI:** 82

Inspection Comments:

Sample Number: 537 **Type:** R **Area:** 3750.00 SqFt **PCI:** 82

Sample Comments:

48	L & T CR	L	130.00	Ft
57	WEATHERING	L	3750.00	SqFt
45	DEPRESSION	L	10.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: RW 5-23 **Name:** RUNWAY 5-23 **Use:** RUNWAY **Area:** 295,188 SqFt

Section: 6205 of 1 **From:** - **To:** - **Last Const.:** 1/1/2003

Surface: AAC **Family:** C9N59-GA-RW-AC **Zone:** **Category:** **Rank:** P

Area: 295,188 SqFt **Length:** 2,938 Ft **Width:** 100 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Work Date: 1/1/2003 **Work Type:** MILL and OVERLAY **Code:** ML-OV **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 78 **Surveyed:** 16

Conditions: **PCI:** 75

Inspection Comments:

Sample Number: 303 **Type:** R **Area:** 3750.00 SqFt **PCI:** 71

Sample Comments:

48	L & T CR	L	275.00	Ft
52	RAVELING	L	125.00	SqFt
57	WEATHERING	L	3625.00	SqFt

Sample Number: 307 **Type:** R **Area:** 3750.00 SqFt **PCI:** 71

Sample Comments:

48	L & T CR	L	267.00	Ft
52	RAVELING	L	188.00	SqFt
57	WEATHERING	L	3562.00	SqFt

Sample Number: 314 **Type:** R **Area:** 3750.00 SqFt **PCI:** 72

Sample Comments:

48	L & T CR	L	302.00	Ft
52	RAVELING	L	38.00	SqFt
57	WEATHERING	L	3712.00	SqFt

Sample Number: 317 **Type:** R **Area:** 3750.00 SqFt **PCI:** 79

Sample Comments:

48	L & T CR	L	182.00	Ft
52	RAVELING	L	18.00	SqFt
57	WEATHERING	L	3732.00	SqFt

Sample Number: 321 **Type:** R **Area:** 3750.00 SqFt **PCI:** 76

Sample Comments:

48	L & T CR	L	233.00	Ft
52	RAVELING	L	15.00	SqFt
57	WEATHERING	L	3735.00	SqFt

Sample Number: 328 **Type:** R **Area:** 3750.00 SqFt **PCI:** 76

Sample Comments:

48	L & T CR	L	212.00	Ft
52	RAVELING	L	43.00	SqFt
57	WEATHERING	L	3707.00	SqFt

Sample Number: 335 **Type:** R **Area:** 3750.00 SqFt **PCI:** 74

Sample Comments:

48	L & T CR	L	219.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Sample Number: 339 **Type:** R **Area:** 3750.00 SqFt **PCI:** 75

Sample Comments:

48	L & T CR	L	220.00	Ft
52	RAVELING	L	58.00	SqFt
57	WEATHERING	L	3692.00	SqFt

Sample Number: 342 **Type:** R **Area:** 3750.00 SqFt **PCI:** 76

Sample Comments:

48	L & T CR	L	173.00	Ft
52	RAVELING	L	125.00	SqFt
57	WEATHERING	L	3625.00	SqFt

Sample Number: 349 **Type:** R **Area:** 3750.00 SqFt **PCI:** 83

Sample Comments:

48	L & T CR	L	72.00	Ft
52	RAVELING	L	188.00	SqFt
57	WEATHERING	L	3562.00	SqFt

Sample Number: 358 **Type:** R **Area:** 3755.00 SqFt **PCI:** 80

Sample Comments:

48	L & T CR	L	117.00	Ft
52	RAVELING	L	188.00	SqFt
57	WEATHERING	L	3567.00	SqFt

Sample Number: 363 **Type:** R **Area:** 3750.00 SqFt **PCI:** 75

Sample Comments:

48	L & T CR	L	234.00	Ft
52	RAVELING	L	44.00	SqFt
57	WEATHERING	L	3706.00	SqFt

Sample Number: 367 **Type:** R **Area:** 3750.00 SqFt **PCI:** 79

Sample Comments:

48	L & T CR	L	164.00	Ft
52	RAVELING	L	42.00	SqFt
57	WEATHERING	L	3708.00	SqFt

Sample Number: 370 **Type:** R **Area:** 3750.00 SqFt **PCI:** 75

Sample Comments:

48	L & T CR	L	199.00	Ft
52	RAVELING	L	250.00	SqFt
57	WEATHERING	L	3500.00	SqFt

Sample Number: 377 **Type:** R **Area:** 3750.00 SqFt **PCI:** 72

Sample Comments:

48	L & T CR	L	244.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3650.00	SqFt

Sample Number: 379 **Type:** R **Area:** 5625.00 SqFt **PCI:** 70

Sample Comments:

48	L & T CR	L	337.00	Ft
50	PATCHING	L	35.00	SqFt
52	RAVELING	L	385.00	SqFt
57	WEATHERING	L	5205.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW A **Name:** TAXIWAY ALPHA **Use:** TAXIWAY **Area:** 141,614 SqFt

Section: 405 of 4 **From:** - **To:** - **Last Const.:** 1/1/2005

Surface: AAC **Family:** C9N59-GA-TW-AAC-APC **Zone:** **Category:** **Rank:** P

Area: 57,743 SqFt **Length:** 1,700 Ft **Width:** 35 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Work Date: 1/1/2005 **Work Type:** Overlay - AC Structural **Code:** OL-AS **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 16 **Surveyed:** 3

Conditions: **PCI:** 81

Inspection Comments:

Sample Number: 102 **Type:** R **Area:** 3500.00 SqFt **PCI:** 85

Sample Comments:

48	L & T CR	L	109.00	Ft
57	WEATHERING	L	3500.00	SqFt

Sample Number: 108 **Type:** R **Area:** 3500.00 SqFt **PCI:** 79

Sample Comments:

48	L & T CR	L	194.00	Ft
57	WEATHERING	L	3500.00	SqFt

Sample Number: 114 **Type:** R **Area:** 4787.00 SqFt **PCI:** 79

Sample Comments:

48	L & T CR	L	265.00	Ft
57	WEATHERING	L	4787.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW A **Name:** TAXIWAY ALPHA **Use:** TAXIWAY **Area:** 141,614 SqFt

Section: 415 of 4 **From:** - **To:** - **Last Const.:** 1/1/2005

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 16,504 SqFt **Length:** 410 Ft **Width:** 40 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2005 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 4 **Surveyed:** 1

Conditions: **PCI:** 81

Inspection Comments:

Sample Number: 203 **Type:** R **Area:** 3634.00 SqFt **PCI:** 81

Sample Comments:

48	L & T CR	L	177.00	Ft
57	WEATHERING	L	3634.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW A **Name:** TAXIWAY ALPHA **Use:** TAXIWAY **Area:** 141,614 SqFt

Section: 420 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 60,300 SqFt **Length:** 1,500 Ft **Width:** 50 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2000 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 15 **Surveyed:** 2

Conditions: **PCI:** 83

Inspection Comments:

Sample Number: 526 **Type:** R **Area:** 4000.00 SqFt **PCI:** 80

Sample Comments:

48	L & T CR	L	210.00	Ft
57	WEATHERING	L	4000.00	SqFt

Sample Number: 533 **Type:** R **Area:** 4000.00 SqFt **PCI:** 86

Sample Comments:

48	L & T CR	L	105.00	Ft
57	WEATHERING	L	4000.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW A **Name:** TAXIWAY ALPHA **Use:** TAXIWAY **Area:** 141,614 SqFt

Section: 425 of 4 **From:** - **To:** - **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 7,067 SqFt **Length:** 180 Ft **Width:** 35 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction **Code:** HI-AG **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 2 **Surveyed:** 1

Conditions: **PCI:** 54

Inspection Comments:

Sample Number: 99 **Type:** R **Area:** 3500.00 SqFt **PCI:** 54

Sample Comments:

48	L & T CR	L	384.00	Ft
45	DEPRESSION	L	480.00	SqFt
52	RAVELING	L	250.00	SqFt
57	WEATHERING	L	3250.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW B **Name:** TAXIWAY BRAVO **Use:** TAXIWAY **Area:** 119,314 SqFt

Section: 610 of 1 **From:** **To:** **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 119,314 SqFt **Length:** 4,770 Ft **Width:** 25 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2000 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Work Date: 1/1/2004 **Work Type:** New Construction - AC **Code:** NC-AC **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 32 **Surveyed:** 4

Conditions: **PCI:** 77

Inspection Comments:

Sample Number: 105 **Type:** R **Area:** 3500.00 SqFt **PCI:** 66

Sample Comments:

48	L & T CR	L	365.00	Ft
52	RAVELING	L	175.00	SqFt
57	WEATHERING	L	3325.00	SqFt

Sample Number: 118 **Type:** R **Area:** 3500.00 SqFt **PCI:** 77

Sample Comments:

48	L & T CR	L	147.00	Ft
52	RAVELING	L	100.00	SqFt
57	WEATHERING	L	3400.00	SqFt

Sample Number: 203 **Type:** R **Area:** 3500.00 SqFt **PCI:** 83

Sample Comments:

48	L & T CR	L	137.00	Ft
57	WEATHERING	L	3500.00	SqFt

Sample Number: 207 **Type:** R **Area:** 3500.00 SqFt **PCI:** 84

Sample Comments:

42	BLEEDING	N	12.00	SqFt
48	L & T CR	L	88.00	Ft
57	WEATHERING	L	3500.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW C **Name:** TAXIWAY CHARLIE **Use:** TAXIWAY **Area:** 62,444 SqFt

Section: 305 of 2 **From:** - **To:** - **Last Const.:** 1/1/1943

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 51,193 SqFt **Length:** 1,020 Ft **Width:** 50 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 10 **Surveyed:** 2

Conditions: **PCI:** 13

Inspection Comments:

Sample Number: 300 **Type:** R **Area:** 5671.00 SqFt **PCI:** 11

Sample Comments:

52	RAVELING	M	1070.00	SqFt
50	PATCHING	H	323.00	SqFt
53	RUTTING	L	298.00	SqFt
41	ALLIGATOR CR	M	1872.00	SqFt
43	BLOCK CR	M	3476.00	SqFt
45	DEPRESSION	L	68.00	SqFt
52	RAVELING	L	4278.00	SqFt

Sample Number: 305 **Type:** R **Area:** 5000.00 SqFt **PCI:** 15

Sample Comments:

41	ALLIGATOR CR	M	940.00	SqFt
45	DEPRESSION	L	24.00	SqFt
53	RUTTING	L	140.00	SqFt
43	BLOCK CR	M	4060.00	SqFt
52	RAVELING	L	5000.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW C **Name:** TAXIWAY CHARLIE **Use:** TAXIWAY **Area:** 62,444 SqFt

Section: 306 of 2 **From:** - **To:** - **Last Const.:** 1/1/1943

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 11,251 SqFt **Length:** 120 Ft **Width:** 75 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/1943 **Work Type:** BUILT **Code:** IMPORTED **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 2 **Surveyed:** 1

Conditions: **PCI:** 16

Inspection Comments:

Sample Number: 101 **Type:** R **Area:** 4339.00 SqFt **PCI:** 16

Sample Comments:

45	DEPRESSION	L	21.00	SqFt
41	ALLIGATOR CR	M	1135.00	SqFt
52	RAVELING	L	4339.00	SqFt
43	BLOCK CR	M	3204.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW CONN **Name:** TAXIWAY CONNECTOR **Use:** TAXIWAY **Area:** 23,637 SqFt

Section: 515 of 1 **From:** **To:** **Last Const.:** 1/1/2004

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 23,637 SqFt **Length:** 750 Ft **Width:** 30 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2000	**Work Type:** New Construction - Initial	**Code:** NU-IN	**Is Major M&R:** True
Work Date: 1/1/2000	**Work Type:** New Construction - Initial	**Code:** NU-IN	**Is Major M&R:** True
Work Date: 1/1/2004	**Work Type:** New Construction - AC	**Code:** NC-AC	**Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 5 **Surveyed:** 2

Conditions: **PCI:** 75

Inspection Comments:

Sample Number: 100 **Type:** R **Area:** 5254.00 SqFt **PCI:** 72

Sample Comments:

45	DEPRESSION	L	75.00	SqFt
48	L & T CR	L	218.00	Ft
52	RAVELING	L	525.00	SqFt
57	WEATHERING	L	4729.00	SqFt

Sample Number: 330 **Type:** R **Area:** 4743.00 SqFt **PCI:** 77

Sample Comments:

48	L & T CR	L	191.00	Ft
52	RAVELING	L	237.00	SqFt
57	WEATHERING	L	4506.00	SqFt

Network: X26 **Name:** SEBASTIAN MUNICIPAL AIRPORT

Branch: TW E **Name:** TAXIWAY E **Use:** TAXIWAY **Area:** 29,416 SqFt

Section: 700 of 1 **From:** - **To:** - **Last Const.:** 1/1/2011

Surface: AC **Family:** C9N59-GA-TW-AC **Zone:** **Category:** **Rank:** P

Area: 29,416 SqFt **Length:** 800 Ft **Width:** 35 Ft

Slabs: **Slab Length:** Ft **Slab Width:** Ft **Joint Length:** Ft

Shoulder: **Street Type:** **Grade:** 0 **Lanes:** 0

Section Comments:

Work Date: 1/1/2011 **Work Type:** New Construction - Initial **Code:** NU-IN **Is Major M&R:** True

Last Insp. Date: 9/15/2016 **TotalSamples:** 8 **Surveyed:** 1

Conditions: **PCI:** 91

Inspection Comments:

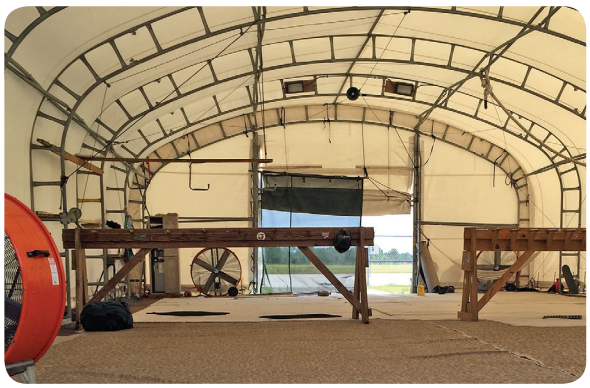
Sample Number: 101 **Type:** R **Area:** 3500.00 SqFt **PCI:** 91

Sample Comments:

48	L & T CR	L	8.00	Ft
57	WEATHERING	L	3500.00	SqFt












EXTRA

