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PAVEMENT MANAGEMENT GROUP

PAVEMENT MANAGEMENT FINAL PROJECT REPORT

CITY OF SEBASTIAN, OH

Tuesday, January 08, 2019

Pavement Management Group

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EXECUTIVE SUMMARY

The City of Sebastian contracted with Pavement Management Group (PMG) to provide a turn-key Pavement Management Program (PMP). The backbone of PMG's turn-key PMP is the PAVER Pavement Management System (PMS) which provides specific tools such as pavement modeling, maintenance decision trees and budget/target driven scenarios maximizing the return on investment from available maintenance and rehabilitation funds; generating a prioritized plan; and identifying specific areas in need of maintenance and rehabilitation.

- Verify and setup any the pavement network inventory
- Provide an HD video of each pavement section
- Determine total samples to inspect per section
- Identify all distress types, severity levels and quantities within through ASTM D6433-11
- Calculate the Pavement Condition Index (PCI) for each pavement section
- Assign all pavement management data to GIS
- Create GIS current condition map
- Create a Google Earth KMZ file of street conditions with HD video streaming link
- Provide a complete inventory and condition listing of each pavement section
- Provide a final report of findings
- Provide continued support services

2018 STREET NETWORK SUMMARY

- 148 centerline miles
- 290 lane miles (lane = 12 feet wide)
- 15,312,918 square feet
- 1,413 management sections
- Average network PCI is 75
- Average network condition category of Good

INTRODUCTION

PMG was contracted by the City of Sebastian to provide pavement management services for their 148-centerline mile (290 lane mile) roadway network. Through these services a field inventory setup of any new streets, an inventory review and inspections were performed on all 1,413 management sections within the network. All inventory items were added or updated within the PMS database and a PCI was calculated for each section. HD videos were taken at each section location (from beginning to end of section). This provides for a virtual, high definition account of the street network, and provides value in a variety of ways such as condition review and network level decision making from the office. This report provides a thorough definition of the inspection process performed as well as the condition results of our project.

ASTM INSPECTION PROCESS

The PAVER™ PMS defines the pavement network in terms of "Branches" and "Sections". The City of Sebastian street network consists of all maintained roadways within the agency, each street broken down into management sections on a block by block basis.

Within each management section, the total number of possible sample locations is first determined, and then approximately 10% of these samples are inspected following ASTM D6433-11. The trained inspector analyzes the HD video using a state-of-the-art HD monitor system, virtually walking the entire section and identifies all distress information for that sample in a representative location. The information is then recorded into the PAVER™ database for Pavement Condition Index (PCI) calculation. The result is a PCI score for each management section.

SAMPLE DEFINITION

Following ASTM D6433-11 a sample unit size must be between 1,000 and 3,500 sf for proper PCI calculation. To maintain consistent procedure, each sample size was determined to be 100' long x the width of the pavement section. If the section width was over 35' wide, the sample size was half the width x 100'. If the section area was less than 1,000 sf in area size, the entire section was sampled.

DISTRESS DEFINITION

There are 20 possible distress types that can occur within asphalt based surfaces and 19 possible distress types that can occur within a concrete surface. The U.S. Army Corps of Engineers publishes the Asphalt and Parking Lots Inspection Manuals. This manual provides a description of each distress type, the criteria to determine each severity level (low, medium, high) and how to measure each. The asphalt distress types and correlating classification are highlighted below in Figure 1.

01 – Alligator Cracking	06 – Depression	11 – Patch/Utility Cut	16 – Shoving
02 – Bleeding	07 – Edge Cracking	12 – Polished Aggregate	17 – Slippage Cracking
03 – Block Cracking	08 – Joint Reflection	13 – Pothole	18 – Swell
04 – Bumps and Sags	09 – Lane/Shoulder Drop	14 – Railroad Crossing	19 – Raveling
05 - Corrugation	10 – L&T Cracking	15 – Rutting	20 – Weathering

LOAD ASSOCIATED DISTRESS	CLIMATE BASED DISTRESS	OTHER DISTRESS

Figure 1. Asphalt Distresses

PCI AND CONDITION CATEGORY DEFINITION

The PCI is on a scale of 0 – 100 with 0 being the worst and 100 being the best. It is calculated by *PAVER*™ through the input of distress type, severity and quantity information. Figure 2 illustrates the factors that go into the PCI as well as the 7 condition categories of the PCI.

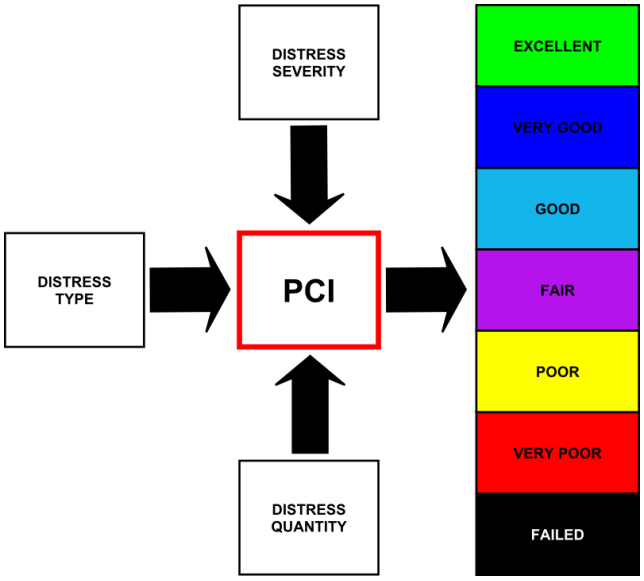

Figure. 2 Factors Determining PCI Value

To further simplify the PCI, the following condition categories along with the recommended maintenance action for each has been created by PMG:

CONDITION CATEGORY	MAINTENANCE ACTION	LOW PCI VALUE	HIGH PCI VALUE
EXCELLENT	REJUVENATOR/DO NOTHING	92	100
VERY GOOD	DO NOTHING/CRACK SEAL	82	91
GOOD	CRACK SEAL/MICROSURFACING	68	151
FAIR	CAPE SEAL/MILL & OVERLAY	50	67
POOR	MILL & OVERLAY	35	49
VERY POOR	IN PLACE RECYCLING	20	34
FAILED	FULL DEPTH RECLAMATION	0	19

Table 1. Condition Category Values

DIGITAL IMAGES

During the inspection process, high resolution video was captured for each management section. A snapshot from several videos have been chosen to provide as documentation for this report of the inspected section location and serves as visual identification as to what types of distresses are occurring within the pavement section. The following 2018 images of pavements from within the Roadway Network provide a sense of what various PCI levels look like:

DIGITAL IMAGES – EXCELLENT CONDITION CATEGORY

INDIAN RIVER DR | SECTION 02 | PCI 100

DIGITAL IMAGES – VERY GOOD CONDITION CATEGORY

BROOKEDGE TER | SECTION 02 | PCI 89

DIGITAL IMAGES – GOOD CONDITION CATEGORY

COLUMBIA AVE | SECTION 02 | PCI 71

DIGITAL IMAGES – FAIR CONDITION CATEGORY

SPRING VALLEY AVE | SECTION 02 | PCI 55

DIGITAL IMAGES – POOR CONDITION CATEGORY

DOLPHIN AVE | SECTION 01 | PCI 38

DIGITAL IMAGES – VERY POOR CONDITION CATEGORY

OCEAN COVE ST | SECTION 02 | PCI 28

NETWORK CONDITION RESULTS

After completion of the 2018 pavement management project, PMG has determined that the average PCI for the City of Sebastian's 290 lane mile (148 Centerline Mile) street network is a 75 and considered to be in Good condition. Table 2 displays the condition summary data by category across the network while Figures 3, 4, and 5 further illustrate the condition breakdown in graph form. A complete Inventory and Condition Report in Excel spreadsheet was provided as a part of this project deliverable.

CONDITION CATEGORY	WEIGHTED AVERAGE CONDITION	PAVEMENT AREA	LANE MILES	SECTIONS	PERCENT AREA
FAILED	0	0	0	0	0%
VERY POOR	31	99,219	2	9	1%
POOR	42	384,925	7	35	3%
FAIR	59	3,002,863	57	271	20%
GOOD	76	6,480,845	123	627	42%
VERY GOOD	84	4,168,324	79	379	27%
EXCELLENT	96	1,176,742	22	92	8%
TOTALS		**15,312,918**	**290**	**1413**	**100**

Table 2. Condition Summary

CONDITION GRAPHS

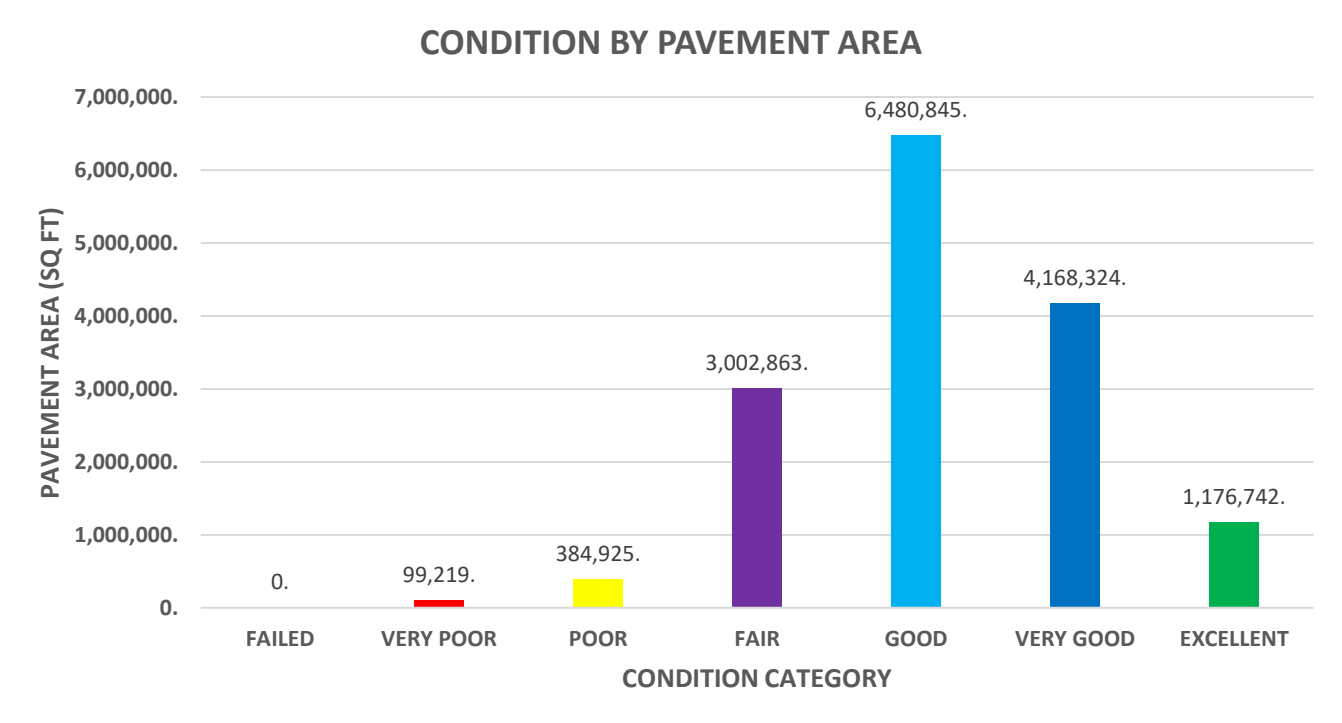

Figure 3. Pavement Area by Condition Category

CONDITION GRAPHS

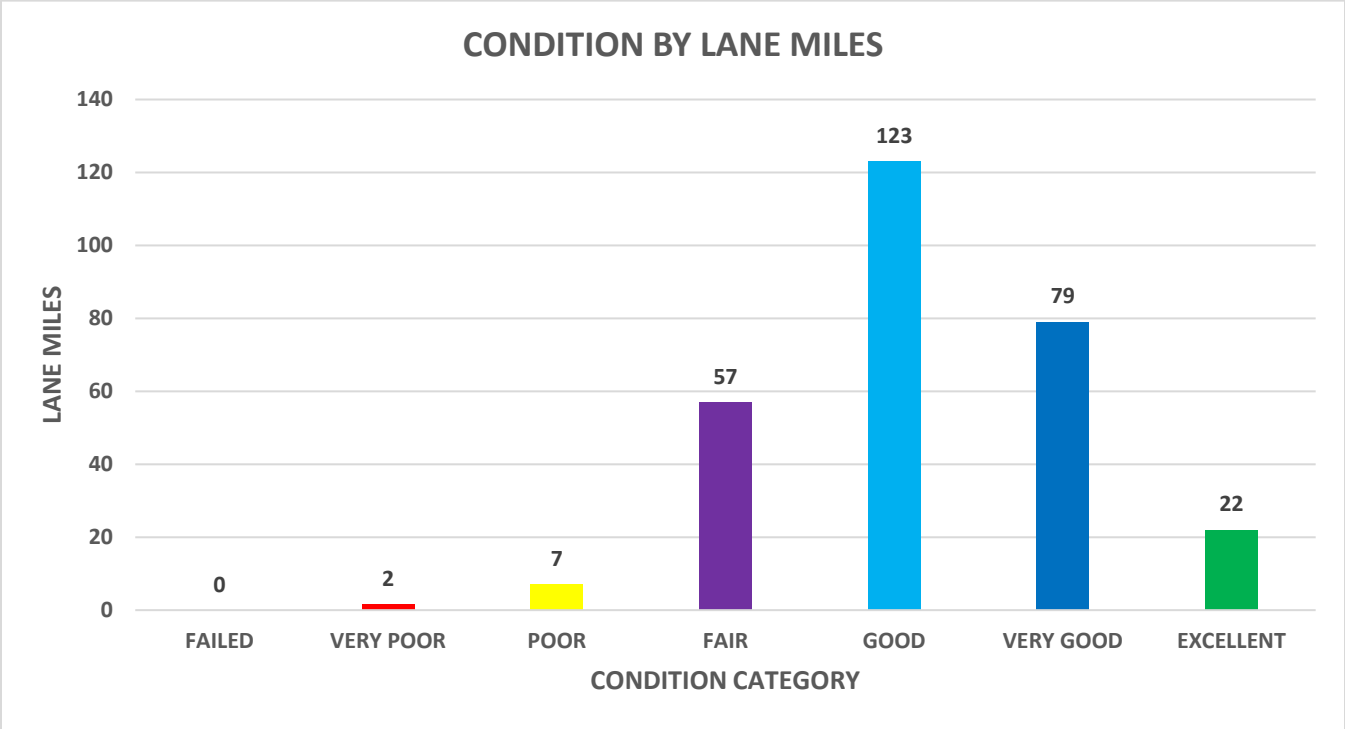

Figure 4. Lane Miles by Condition Category

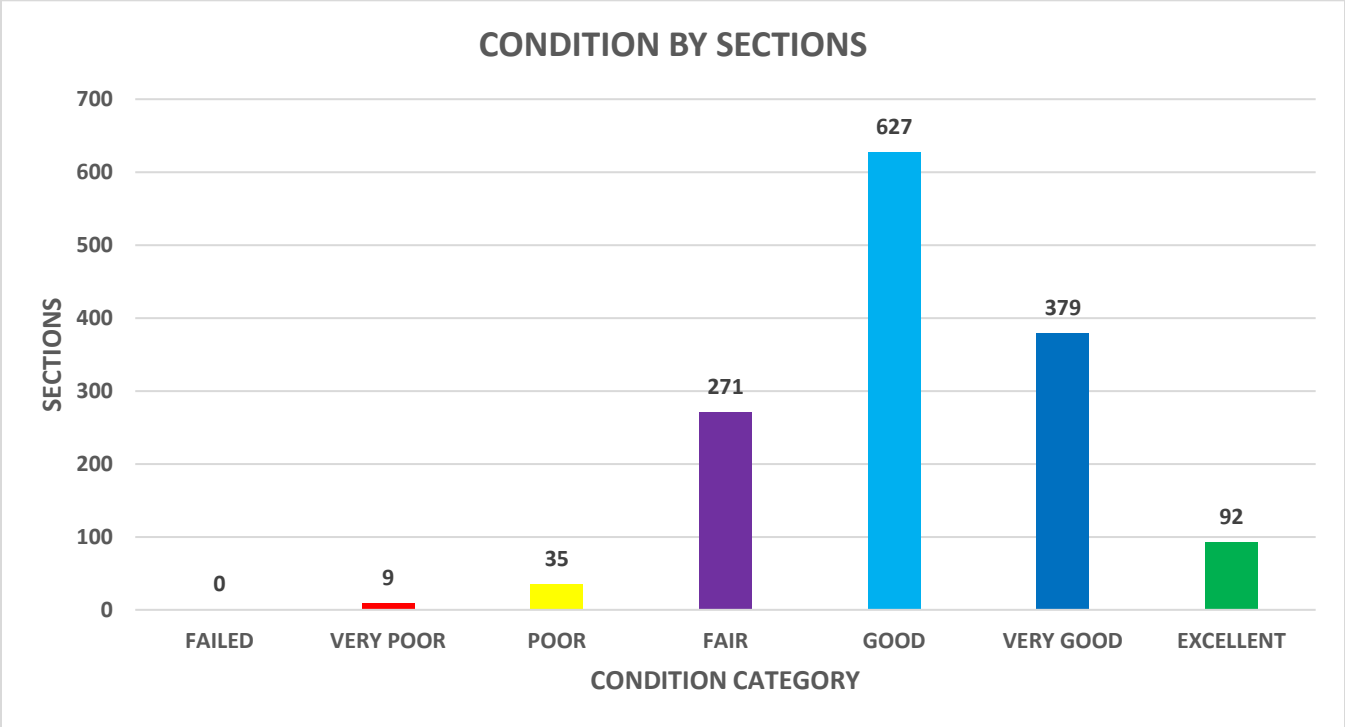

Figure 5. Sections by Condition Category

GIS CONDITION MAP

PMG assigned all pavement management data to GIS and will provide the shapefile to the agency. This allows for a wide variety of mapping options within both ESRI's ArcGIS and Google Earth. The following shows an example of a Latest Condition Map that has been created in both GIS and Google Earth for illustrative purposes. A 22 x 34 plot ready pdf version has been provided as a part of the project deliverable.

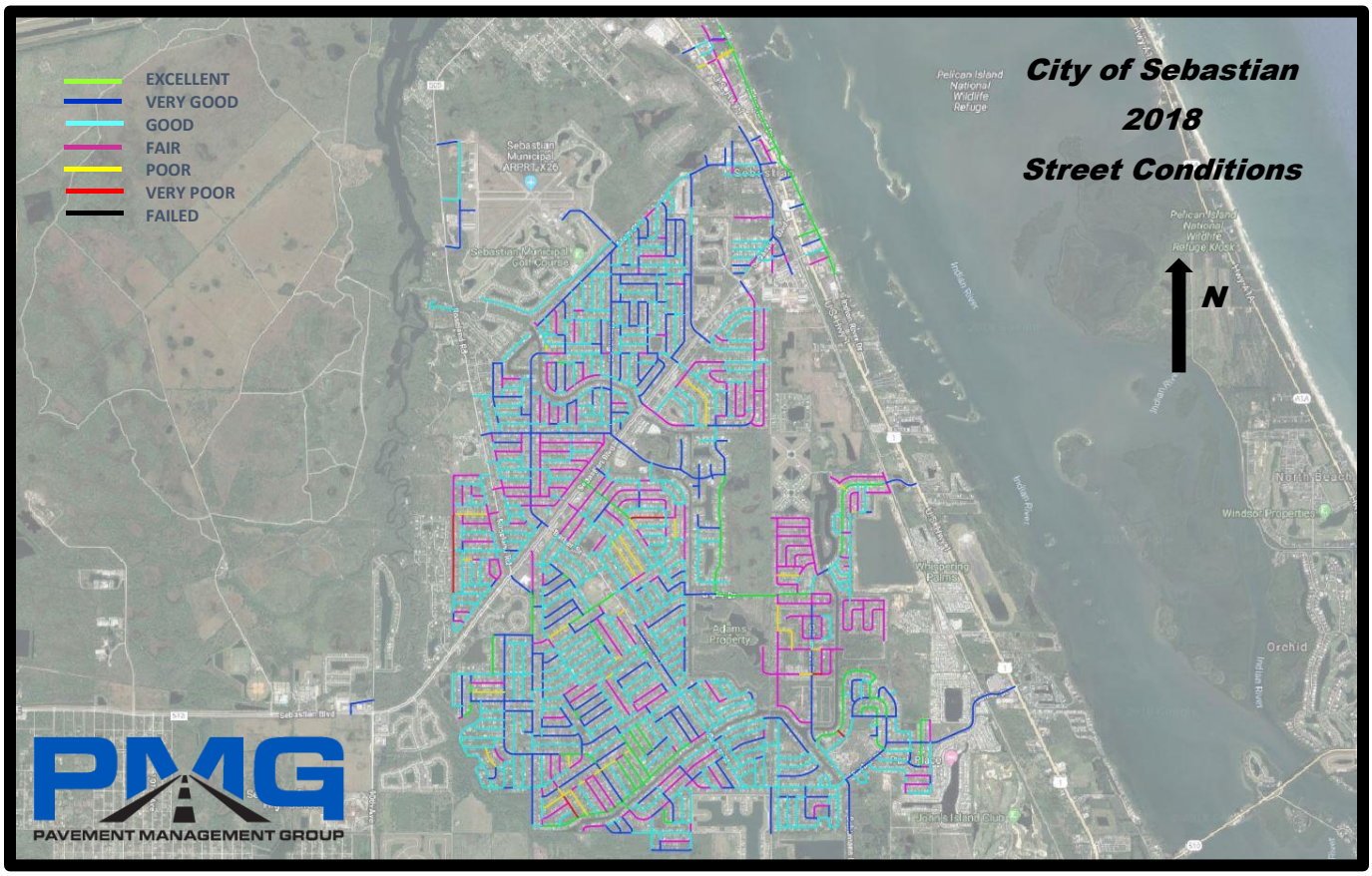

Figure 6. Street Section Latest Condition maps

GOOGLE EARTH WITH STREAMING VIDEO

PMG created and published a Google Earth project file to include the latest street conditions with accompanying streaming video. All video is hosted online and in the cloud by PMG to a private dedicated channel for Sebastian. Simply browse the City map, identify a section to view and click the icon to access the associated streaming video. Videos have also been provided on an external hard drive in their native 1080P full HD file format. To access the Google Earth and Streaming Videos, all that Is required is Google Earth to be installed, a high-speed internet connection and our provided Google Earth KMZ file. Figure 7 illustrates the Google Earth condition mapping with streaming video capability:

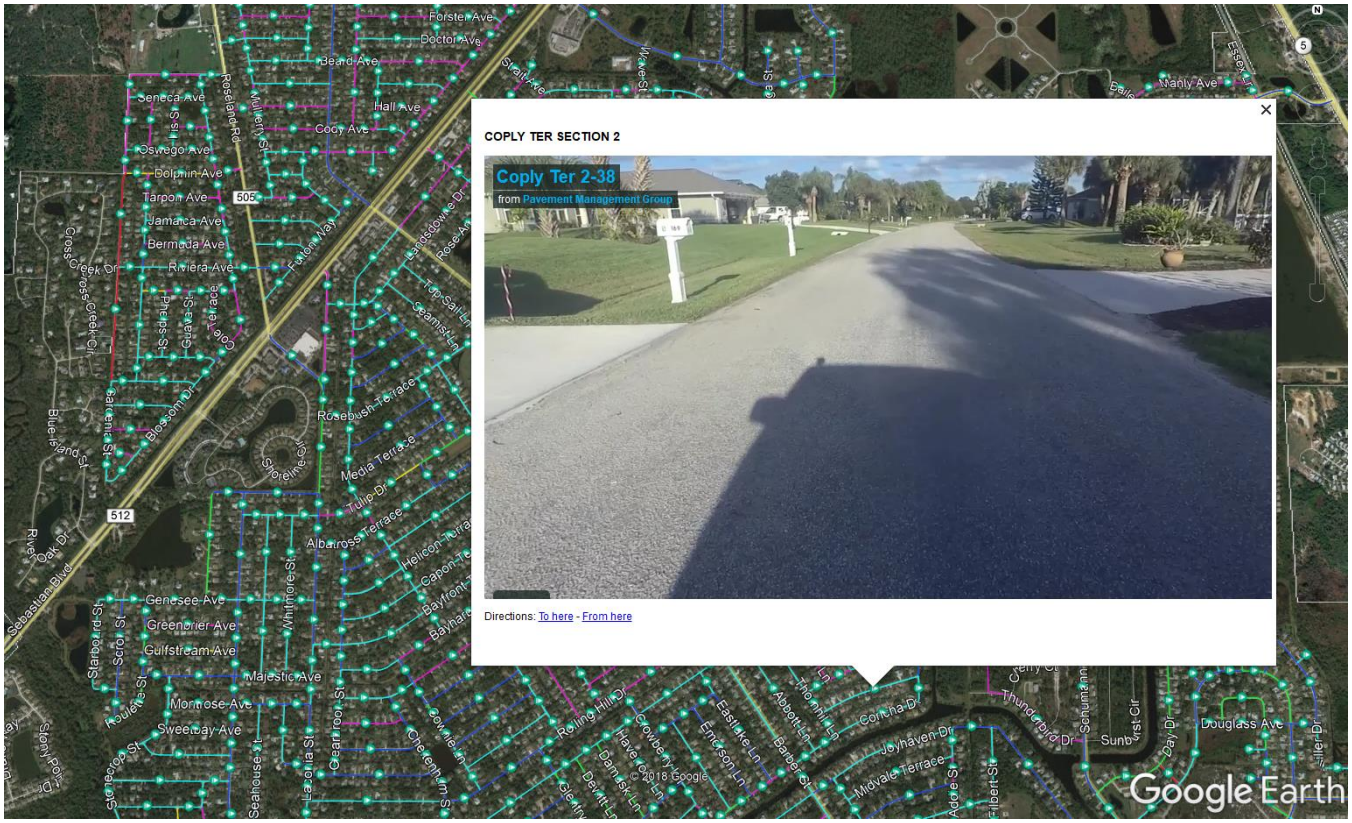

Figure 7. Google Earth Condition Layer with Streaming Video

LOCAL AGENCY CONDITION COMPARISON

PMG provides pavement management services to a wide variety of agencies within the Florida region, all on the ASTM D6433 standard and PCI 0 – 100 scale. The following chart shows a condition comparison of several agency street networks within the local region:

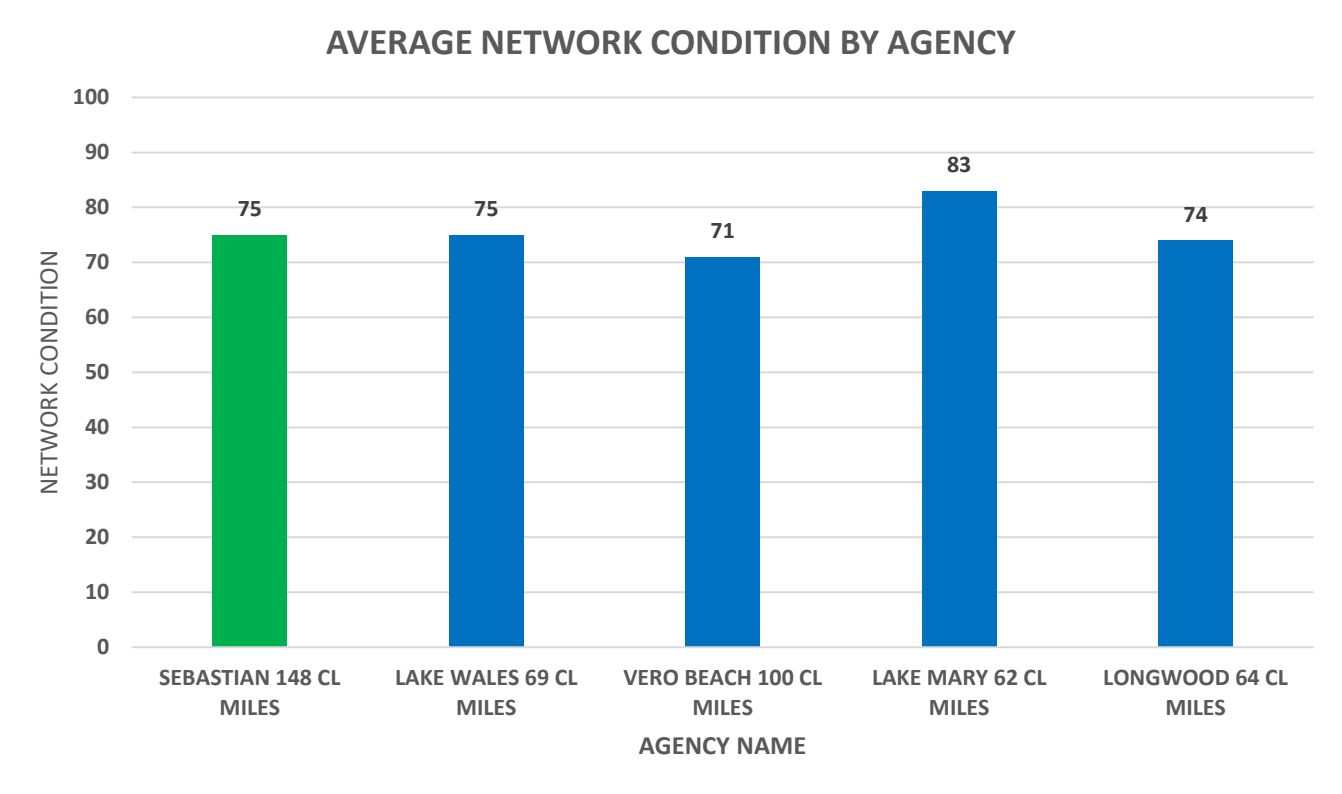

Figure 8. Local Agency Condition Comparison

CONCLUSION

The PCI study provides for a PCI rating on each pavement section within the maintained roadway network. Based upon the distresses identified within each representative sample location inspected, a PCI number is assigned to each pavement section. This number is on a scale of 0 – 100 with 0 being the worst and 100 being the best.

The City of Sebastian street network is approximately 290 lane miles (148 centerline miles) in size. Through the ASTM D6433-11 PCI study, PMG has determined the roadway network to have a network average PCI of 75. This classifies the overall network as being in "Good" condition.

PMG would again like to thank you for the opportunity to provide the City of Sebastian with this PCI study and our pavement management services. Our goal is to provide the highest level of services and support, providing our clients with the data, tools and expertise necessary to be successful in their goals of pavement management. Should you require any additional information or support regarding this PCI study or the PAVER™ PMS, please do not hesitate to ask.

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