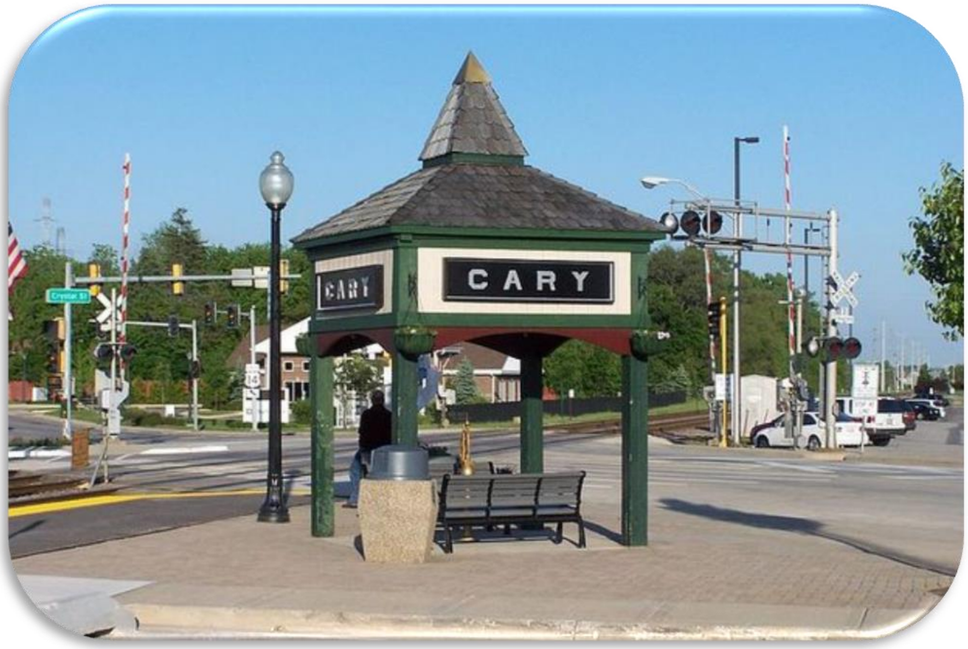

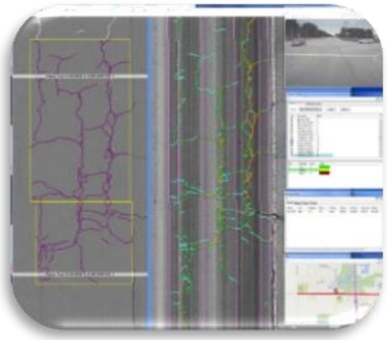


Pavement Data Collection and Pavement Management System Implementation for the Village of Oakwood Hills, Illinois

Final Report

Prepared For:
The Village of Oakwood Hills

In Association With
Chicago Metropolitan Agency for Planning

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LIST OF ACRONYMS

Acronym	**Explanation**
AC	Asphalt Concrete
APTech	Applied Pavement Technology, Inc.
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
CIP	Capital Improvement Plan
CMAP	Chicago Metropolitan Agency for Planning
EDGE	Enhanced Data Gathering Equipment
GIS	Geographic Information System
GPS	Global Positioning Sensor
HMA	Hot-Mix Asphalt
IRI	International Roughness Index
LCMS	Laser Crack Measurement System
M&R	Maintenance and Rehabilitation
NCPP	National Center for Pavement Preservation
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PMS	Pavement Management System
ROW	Right-of-Way

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EXECUTIVE SUMMARY

The Chicago Metropolitan Agency for Planning (CMAP) has partnered with agencies throughout the Northeastern Illinois region to promote and support asset management at the local level through its pavement management program. Pavement management is a form of asset management which seeks to optimize life-cycle costs of achieving and sustaining a desired target condition instead of prioritizing the repair of assets in worst condition first. Prioritized investment guides CMAP's approach to addressing the region's infrastructure investments as a core focus of ON TO 2050, the region's comprehensive plan. To assist local agencies implement asset management, CMAP engaged contractors to work with communities to develop a customized pavement management system tailored to the municipality. Applied Pavement Technology (APTech) assisted four local agencies, including the Village of Oakwood Hills (Village). APTech worked closely with the Village to define the road network in the Pavement Management System (PMS), collect pavement condition data, configure the PAVER PMS with treatment strategies and performance models, and perform budget scenario and work planning analyses. This report summarizes the work completed and results of the efforts.

Pavement management is the process of planning the maintenance and repair of a network of roads or other paved facilities to optimize pavement conditions over the entire network. The process of pavement management includes creating a network inventory, measuring the condition of each roadway, defining treatment strategies, establishing models to predict performance over time, and performing analyses to predict budget needs and create a work plan that will make the most efficient use of resources to achieve agency goals. Pavement management supports accountable, performance-based, goal-oriented decision making, and presentation of information to stakeholders clearly and effectively. Pavement management allows an agency to move from worst-first, reactive planning to proactive, performance-based planning to make the most effective use of available funds over time.

The Village road network includes about 12 centerline-miles (nearly 1.5 million ft^2) of roads, divided into 109 pavement management sections. The network is completely surfaced with Asphalt Concrete. The network is divided into three functional classes; Major Arterials, making up 11 percent of the area; Minor Arterials and Collectors, making up 2 percent of the area; and Local roads, making up 87 percent of the road surface area.

APTech collected pavement condition data in the Village in Spring 2021. Pavement distress was summarized to calculate Pavement Condition Index (PCI) values for each street in accordance with ASTM Specification D6433, *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys.* Overall, the area-weighted average PCI of the Village-maintained roadway network is 61. This puts the area-weighted average PCI for the Village in the Fair condition category. A map of the Village showing PCI for each road segment is shown in Figure ES-1. A summary of 2021 PCI results for each pavement section is provided in Appendix A.

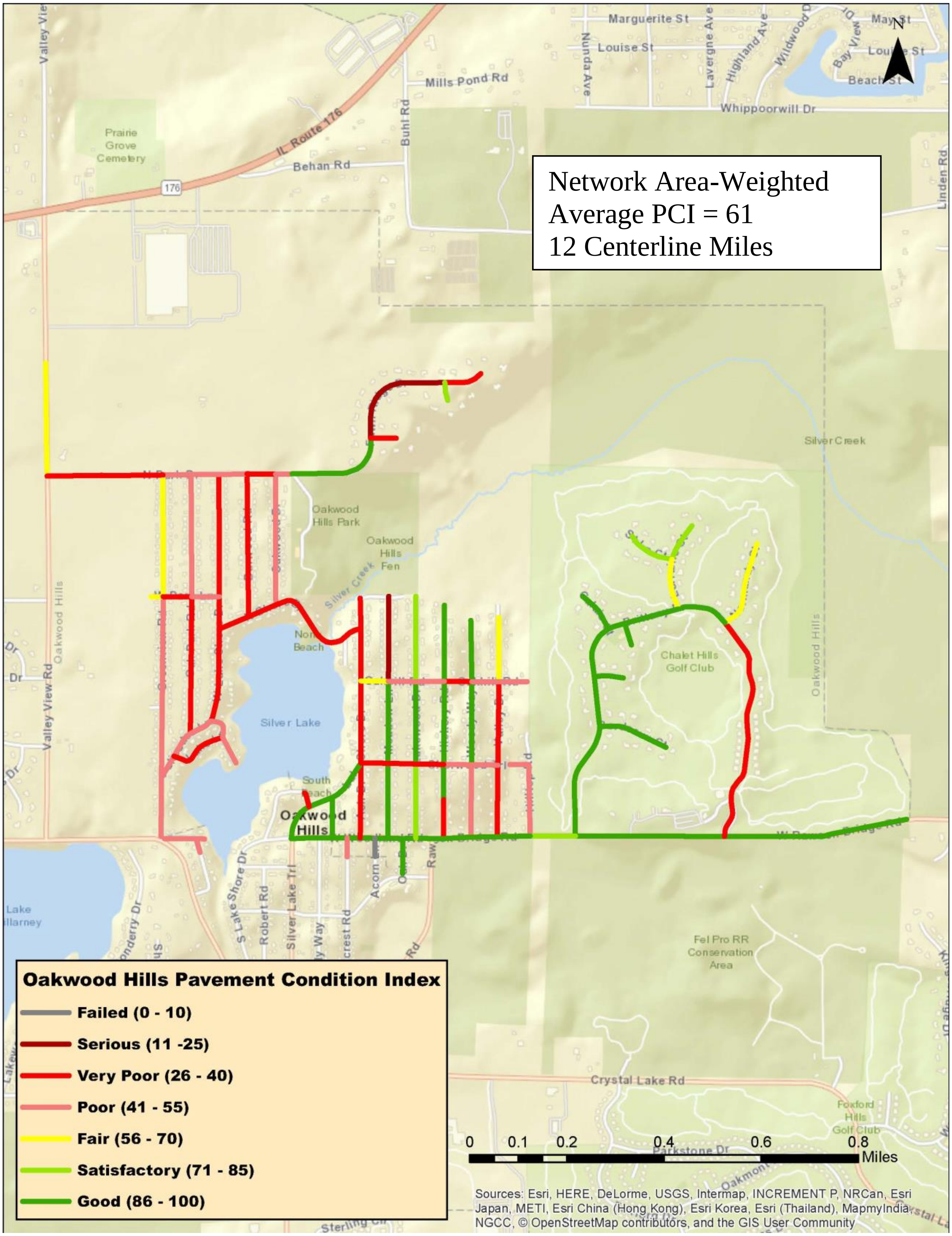


Figure ES-1. Village of Oakwood Hills map showing color-coded PCI.

APTech used PAVER to perform several analyses comparing the impact of different budget levels on network condition over a 5-year period. Table ES-1 presents a summary of the findings. The Village's current annual roadway maintenance and repair budget is about $100,000, which results in a decrease in condition over the next 5 years. An annual funding level of $165,000 is required to maintain the current area-weighted average network condition of 61 for the analysis period. An alternative budget level of $130,000 was evaluated and found to decrease the network PCI from 61 to 59 over the analysis period.

Table ES-1. Comparison of budget scenario analysis results.

Funding Scenario	Total 5-year Funded Costs	Remaining M&R Backlog in 2026	Total Funded + Backlog	Forecasted PCI in 2026
$487,000 per Year - Eliminate Backlog	$2,434,425	$0	$2,434,425	88
$165,000 per Year - Maintain Current Condition (PCI = 61)	$821,653	$1,839,720	$2,661,374	62
$130,000 per Year - Increased Funding	$637,684	$2,049,401	$2,687,085	59
$100,000 per Year - Current Funding	$480,697	$2,229,156	$2,709,853	56
$70,000 per Year - Decreased Funding	$340,270	$2,390,770	$2,731,040	54
$0 per Year - Do Nothing	$0	$2,783,814	$2,783,814	49

Summarizing, the Village's roadway network is currently in fair condition as per PCI condition categories. The Village has a current annual budget of $100,000 to address all work needs, and analyses confirmed that at this budget level the Village roadways will decline in condition to a PCI of 56 after 5 years.

As part of the budget scenario analyses the PMS also provides a summary of work needs by year for each budget level. For the Village's current annual funding level of $100,000 PAVER projects an ability to repair about 1.8 miles of roads over the 5-year analysis period. This is shown in figure ES-2.

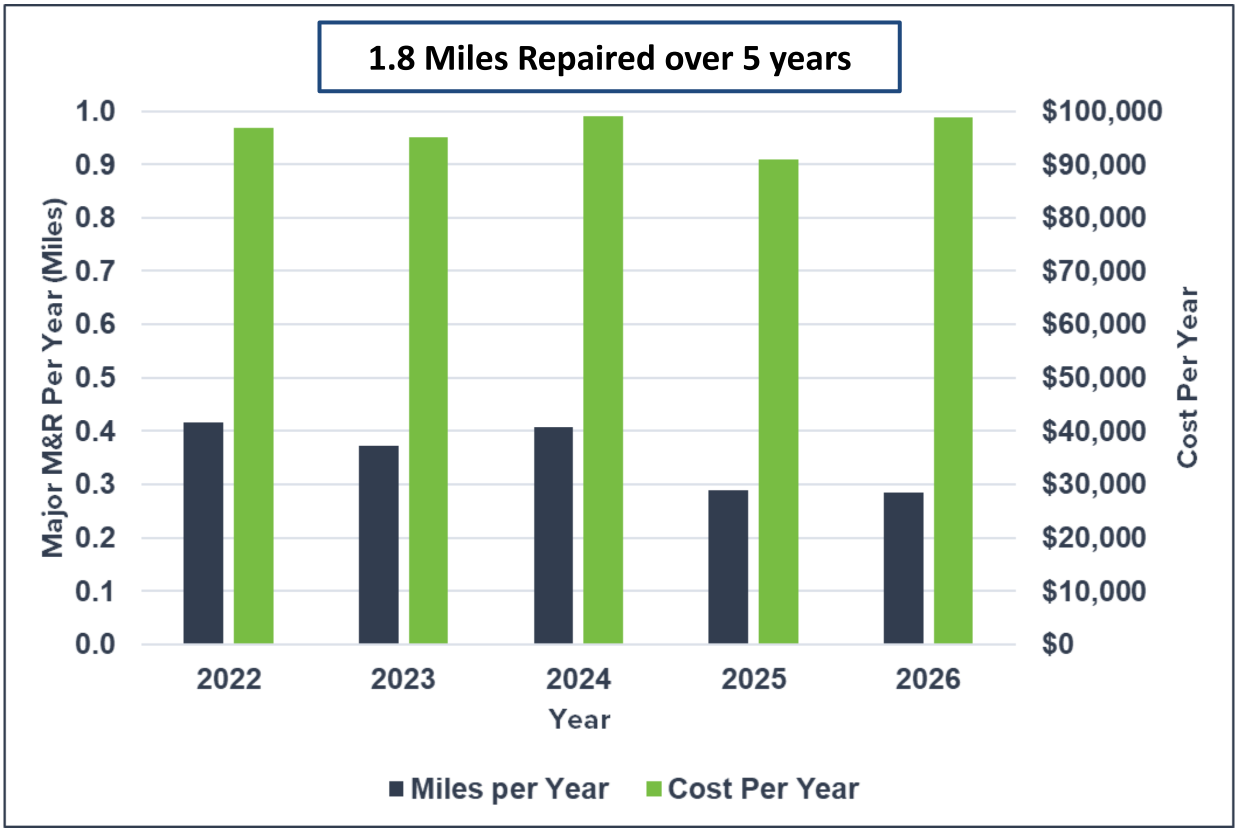


Figure ES-2. Summary of work completion by year for the current Village funding level.

The Village roadway network has a mix of conditions, with about 47 percent of the network in fair or better condition, and 53 percent in poor or worse condition. The Village would be well-advised to consider preservation approaches to maintain roads that are in good condition rather than letting them decline in condition and add to the burden of more expensive repair required of roads in poor or worse condition. Preservation approaches, including crack sealing and surface treatments, will cost-effectively slow the decline of roads in fair or better condition. This will allow the Village to target repairs needed over time making the best use of available funds.

PROJECT BACKGROUND

The Chicago Metropolitan Agency for Planning (CMAP) is the region's official comprehensive planning organization. The agency and its partners developed a comprehensive regional plan to help the seven counties and 284 communities of northeastern Illinois implement strategies that address transportation, housing, economic development, open space, the environment, and other quality of life issues. As part of this effort, the CMAP engaged contractors to assist with pavement condition data collection and pilot local pavement management system (PMS) implementations in communities in northeastern Illinois. The project consists of two primary tasks: (1) collect pavement condition data for municipal-maintained roads in the CMAP region, and (2) complete pavement management plans for selected local agencies.

CMAP hired Applied Pavement Technology (APTech) to collect pavement condition data and implement the PAVER PMS for four local agencies. One of those agencies is the Village of Oakwood Hills (Village). APTech worked closely with the Village to define the road network in the PMS, collect pavement condition data, configure the PMS with treatment strategies and performance models, and perform budget scenario and work planning analyses. This report summarizes the work completed and results of the efforts.

Scope of Work

The scope of work consisted of the following tasks:

Task 1 – Database Preparation
APTech scheduled a group kickoff meeting on Wednesday, March 17, 2021, wherein initial discussions provided introductory information including the primary objectives of the effort and expectations of the Village. APTech identified information needs so that the Village could start gathering and delivering it. Information included a roadway network shape file, available construction and work history records, repair policies, and budget numbers.

APTech established a PAVER database for the Village incorporating the information provided. Segmentation into management units was on a per block basis. APTech worked with the Village to confirm the road network definition prior to data collection.

Task 2 – Data Collection and Processing
In April 2021 APTech mobilized its Enhanced Data Gathering Equipment (EDGE - shown in figure 1) van for automated data collection. Collection included Laser Crack Measurement System (LCMS) downward images, road surface profile data, and four Right-of-Way (ROW) views (forward, forward-left, forward-right, rearward). All collected information was geo-referenced using an on-board GPS antenna.

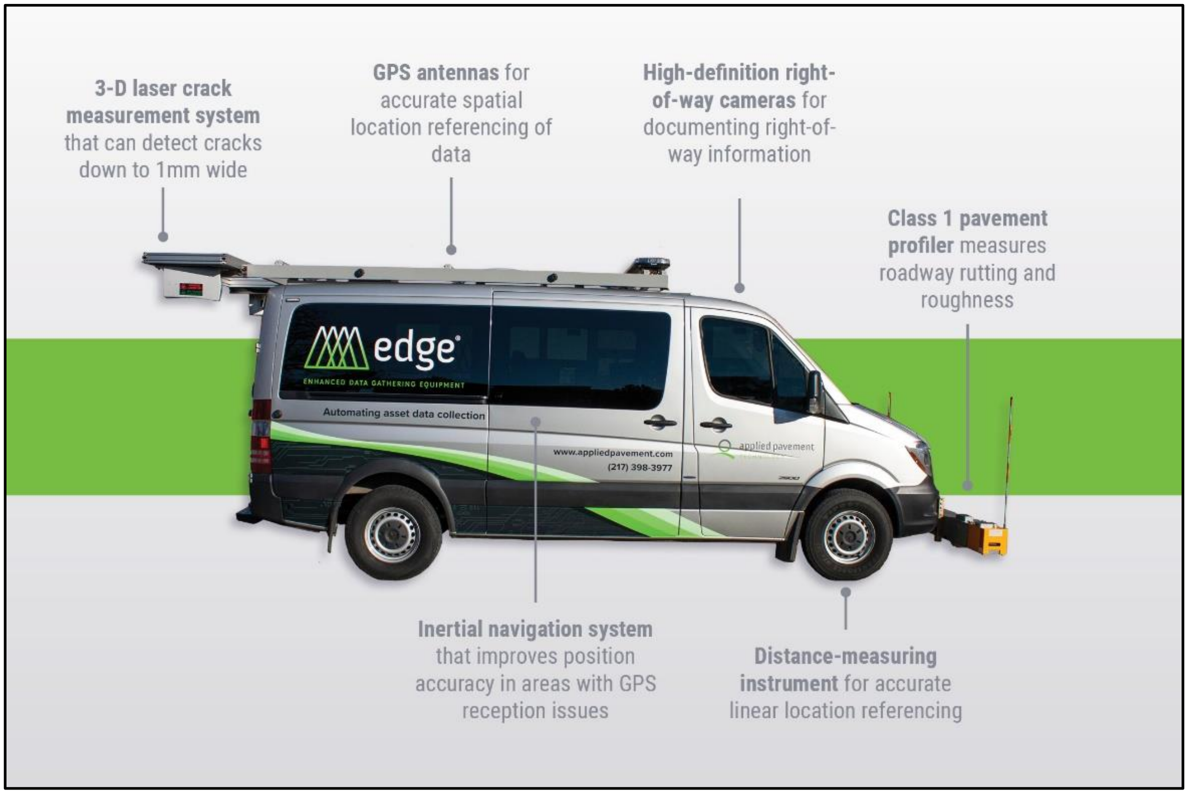


Figure 1. APTech's EDGE data collection vehicle.

Data collection was conducted in one pass for two-lane roads, and two passes for roads with three or more lanes. With each pass information described above was collected for one lane.

Information processing included conversion of LCMS data into images, automated identification of distresses, calculation of IRI, and calculation of rutting. Once the processing was complete, trained staff reviewed the results of automated distress identification to complete the summary of distress data. Summarized distress and rutting data were entered into PAVER for calculation of PCI by road segment. Summarized IRI measurements were tabulated for delivery to the Village.

Once PCI values were available for all roadway segments, APTech held a PCI review meeting with the Village. In this meeting the Village confirmed that results seemed reasonable allowing analyses to proceed.

Task 3 – Analysis and Reporting

APTech obtained work history, unit costs, repair policies, and budgets from the Village and updated its PAVER database prior to performing analyses. Analyses included five-year budget scenarios and statements of PAVER-produced work needs by year. Projected pavement conditions under six budget scenarios were completed, including:

- Unlimited (Eliminate Backlog) budget
- No funding
- Budget required to maintain current condition
- Projected network condition given current Village funding ($100,000/year)
- Projected network condition for one increased budget amount ($130,000/year)
- Projected network condition for one decreased budget amount ($70,000/year)

Results were presented graphically and in tabulated form. Work needs were provided by year by roadway segment.

Task 4 – Reporting
A draft report was submitted to CMAP and the City for review. Comments from CMAP and the City were incorporated to produce and deliver a final report.

Final deliverables also include electronic delivery of downward and ROW images and a viewer to both CMAP and the City.

Meetings
As part of the planned work APTech proposed five meetings with each municipality. These included:

- A virtual group kickoff meeting.
- A virtual PCI review meeting with each municipality.
- A virtual draft report/CIP review meeting.
- An on-site board meeting presentation for each municipality.
- A group 2-day PAVER software training session.

The project deliverables include the PAVER pavement management database, a network definition map, a pavement condition map, all images collected with a viewer, and this report. Optional deliverables available for the Village include the PAVER software and licenses, and PAVER training, should the Village desire to continue using this pavement management tool in the future.

To assist in the understanding of the information provided, the report begins with a brief introduction to pavement management. This section covers the history of pavement management, provides definitions of common pavement management-related terms, and discusses the different components of a modern-day PMS in more detail.

INTRODUCTION TO PAVEMENT MANAGEMENT

Agencies with a road network such as the Village of Oakwood Hills have long been responsible for maintaining their pavement infrastructure. Careful management of the pavements has become increasingly important as competition for scarce resources and expectations for agency accountability have increased. Faced with this daunting task agencies often find themselves asking many different questions like:

- What pavements should we address first?
- On what pavements is our money best spent?
- What annual budget do we need to keep our pavement network at its current condition over the next few years?
- How are our pavements really performing over time?
- Are we better off spending our money on pavements in very poor condition, or letting those bad pavements deteriorate while we concentrate on keeping good roads in good condition?

To answer these questions, and many more, pavement management practitioners developed the first pavement management systems (PMS) in the 1970s. In simple terms, a PMS is a systematic process that: 1) assesses the current pavement condition, 2) predicts future pavement condition, 3) determines maintenance and rehabilitation needs, and 4) prioritizes these needs to make the best use of anticipated funding levels (i.e., maximizing benefit while minimizing costs). The remainder of this section introduces some of the history of pavement management, provides definitions for common pavement management-related terms, and discusses the different components of a modern-day PMS in more detail.

Historical Perspective of Pavement Management

The concept of pavement management has evolved significantly since its inception in the 1970s. As standardized condition survey techniques came into place, more information regarding the cause of pavement deterioration became available. This information was then used to readily assess available repair alternatives and select the better repair strategy. This approach greatly improved the effectiveness of selected rehabilitation treatments since they were now being chosen both to correct existing deficiencies and to prevent their recurrence.

As computerized pavement management systems became available, an even more sophisticated level of analysis became possible. With today's systems, the results of the pavement condition surveys are used to assess current pavement conditions, and to identify pavement deterioration trends. This capability provides an agency with the ability to forecast future pavement conditions. As a result, agencies can assess the long-term impacts of decisions made today on future network conditions and identify the optimal time for repair so that funding can be scheduled in advance of the forecasted need.

The importance of identifying not only the best repair alternative but also the optimal time of repair was documented in U.S. Army Corps of Engineers, Construction Engineering Laboratory (USACERL) Technical Report M-90/05 and is summarized in figure 2 (Shahin and Walther 1990). This figure shows that over the first 75 percent of the pavement life, approximately 40 percent of the pavement condition deterioration takes place. After this point, the pavement deteriorates much faster, with the next 40 percent drop in pavement condition occurring over the next 12 percent of the pavement life. The financial impact of delaying repairs until the second drop in pavement condition can mean repair expenses four to five times higher than repairs triggered over the first 75 percent of the pavement life.

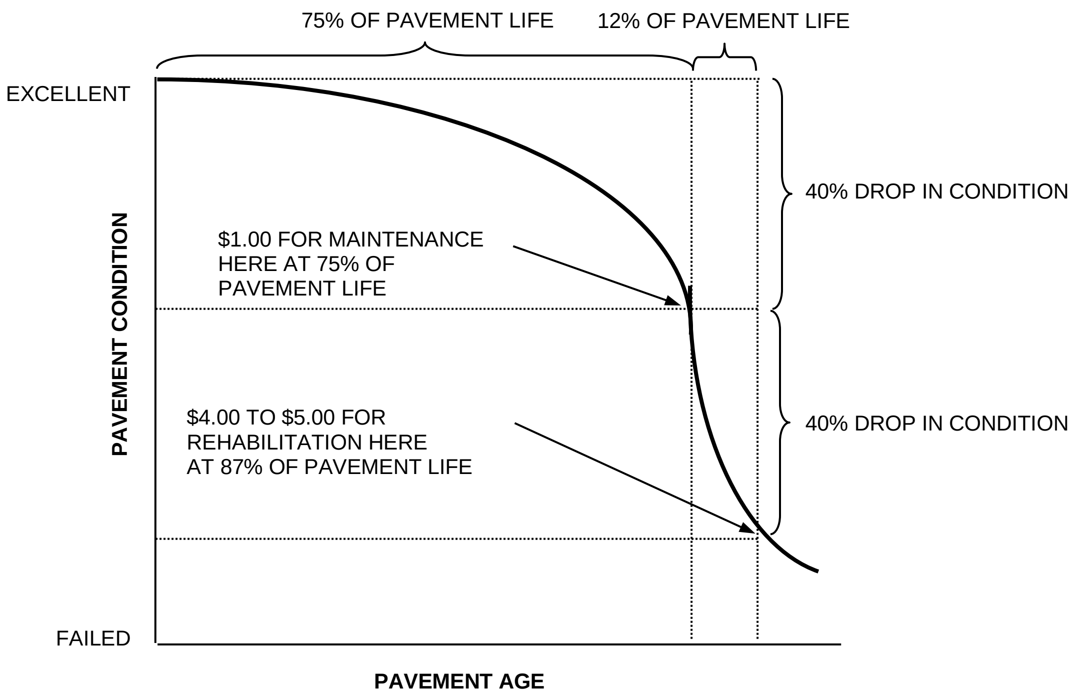


Figure 2. Typical pavement condition life cycle (Shahin and Walther 1990)[1].

General PMS Components

A PMS is comprised of six basic components, as shown in figure 3. To illustrate the general concepts of the PMS approach, each of these different components are discussed in more detail below.

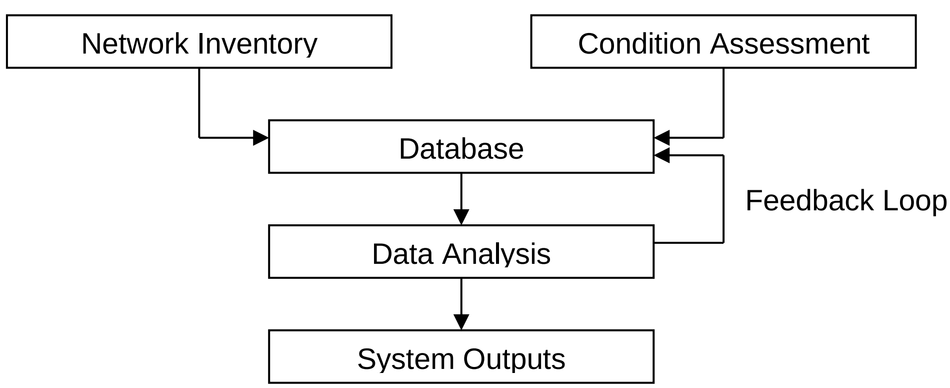


Figure 3. Basic components of a PMS.

[1] Shahin, M.Y. and J.A. Walther. 1990. Pavement Maintenance Management for Roads and Streets Using the MicroPAVER System. Technical Report M-90/05. Army Corps of Engineers Construction Engineering Laboratory (USACERL), Champaign, IL.

Network Inventory

Network inventory is used to define the physical characteristics of the pavements being managed. Typically, the collected inventory information includes location information, pavement characteristics (such as length, width, and type), construction and maintenance histories, and traffic data. The network inventory is the foundation for the PMS.

The first decision that an agency should make with respect to network inventory is which pavement areas to include in the PMS. While it is probable that major pavement areas—such as driving lanes, parking lanes and lots, and intersections—will be included in the database, the actual selection of the pavement facilities to be included in the PMS is up to the agency.

Once a decision has been made about which pavements to include in the database, information about these pavements must be collected. It is important to keep three guidelines in mind when determining the extent of historical information to include in the inventory. First, the data should be accessible so that large quantities of time are not invested in a records search. Second, the collected information should serve a purpose. Third, the information must be chosen to ensure that the PMS can meet the analysis needs of the agency.

Although there is flexibility in the amount of information that must be collected and the manner that is it stored in a PMS database, there are some types of information that are mandatory. The following list outlines the types of information that must be collected for the system to operate correctly:

- *Pavement location* – Physical locations of the pavements need to be identified.
- *Pavement dimensions* – Length, width, and/or area of the pavement sections.
- *Surface type* – Describes the pavement surface/structure; Examples include:
  - AC: Asphalt concrete pavement.
  - AAC: AC pavement that has received one or more asphalt overlays.
  - APC: PCC surface that has received one or more asphalt overlays.
  - PCC: Portland cement concrete pavement.
  - BR: Brick surface.
  - GR: Gravel road.
  - ST: Surface Treatment (e.g., chip seal surfaces)
- *Last construction date* – Date of original construction or last major rehabilitation, such as reconstruction or an overlay.

Examples of other information that are beneficial to record in a PMS database are included in the following list (note that this list is not comprehensive):

- *Pavement cross-section* – Information on the thicknesses and material types of each pavement layer.
- *Traffic* – Types and levels of traffic.

- *Maintenance history* – Date, type, and cost of maintenance activities performed on the pavements.
- *Testing data* – Coring, boring, deflection, roughness data, and so on.
- *Drainage facilities* – Type and location of drainage facilities.
- *Shoulders or curbs* – Type and location of shoulders or curbs.

In addition to there being mandatory types of information included in a PMS, there are also organizational requirements for building a database, as follows:

- Each network must have one or more branches.
- Each branch must have one or more sections.
- Each branch must have a defined use (i.e., roadway or parking lot).
- Each section must be contained within a single branch.
- Each section must have a last construction date, area, and surface type.

Since pavement maintenance and rehabilitation recommendations, pavement deterioration rates, and cost estimates are determined at the section level, a section's characteristics should be as consistent as possible in terms of pavement design and construction, traffic, and condition. There should also be a systematic method for assigning branch and section names and identifiers.

Condition Assessment

Pavement management decisions depend on some method of pavement evaluation. The method selected to evaluate pavement condition is extremely important because it is the basis of all M&R recommendations. For that reason, it is critical to select an objective and repeatable procedure so that PMS recommendations are reliable.

Pavement managers must evaluate their needs when determining not only the type of condition data to collect, but also how often to collect the data. For example, an agency experiencing rapid deterioration rates may elect to survey its pavements more frequently than the average organization, or to survey high-priority pavements on a more frequent basis than low-priority areas. Each agency must carefully evaluate its own circumstances to ensure that the data collection aspects of their PMS match both its needs and financial means. The PCI method is one of the most used methods to evaluate pavement conditions and this method has been used to assess the condition of the Village's roadways.

Database

Once the network inventory and pavement condition data have been collected, a database can be established to store and use the information. Although a manual filing system may be possible for a small network, the efficiency and cost-effectiveness of storing data on a computer makes an automated database the most practical alternative, especially when a comprehensive PMS is desired. PAVER, which is distributed by the American Public Works Association (APWA), was used as the Village's PMS software program.

Data Analysis

Data analysis can occur at the network or project level. At the network level, potential rehabilitation needs of the entire network are evaluated and prioritized for planning and scheduling budget needs over a multi-year period. The objective of network-level analysis is to evaluate rehabilitation needs for a future time period and prioritize project lists so that the agency makes the best use of the limited funds available for M&R. After the planning and programming decisions have been made during the network-level analysis, the information in the database can be used to supplement a project-level analysis. At the project-level, each individual project is investigated in detail to determine the appropriate rehabilitation treatment.

System Outputs

There are several different methods for presenting the results of the analyses, including tables, reports, graphs and maps. Because of the volume of information obtained from a PMS, graphical reports are generally more effective than comprehensive project reports for people who need to quickly evaluate large amounts of data.

Many agencies have found value in linking their PMS to maps to display information through color-coded maps. As with the graphical display, this capability has greatly enhanced the usefulness of the PMS to agencies that need to convey a lot of information in a short period of time. Map links are perhaps most useful in displaying the funded projects in each year of the analysis and for displaying pavement condition results.

Feedback Loop

An often-overlooked component of a PMS is the development of a feedback loop. The feedback loop establishes a process by which actual performance and cost data are input back into the models used in the pavement management analysis. For example, the PMS may use models that estimate the life of an asphalt overlay at 12 years. Actual performance data may show that the life of the agency’s overlays is closer to 8 to 10 years. This type of information should be used to update the pavement management models so that the system recommendations remain reliable and become improved with time.

PAVEMENT INVENTORY AND EVALUATION RESULTS

Systems Inventory and Network Definition

The Village of Oakwood Hills provided a GIS shape file from which the roadway network definition was established. The network consists of 12 centerline miles of streets classified as Major Arterial, Minor Arterial and Collector, and Local streets. Figure 4 provides a map showing the Village street network by functional class. The network is exclusively surfaced with asphalt concrete (AC).

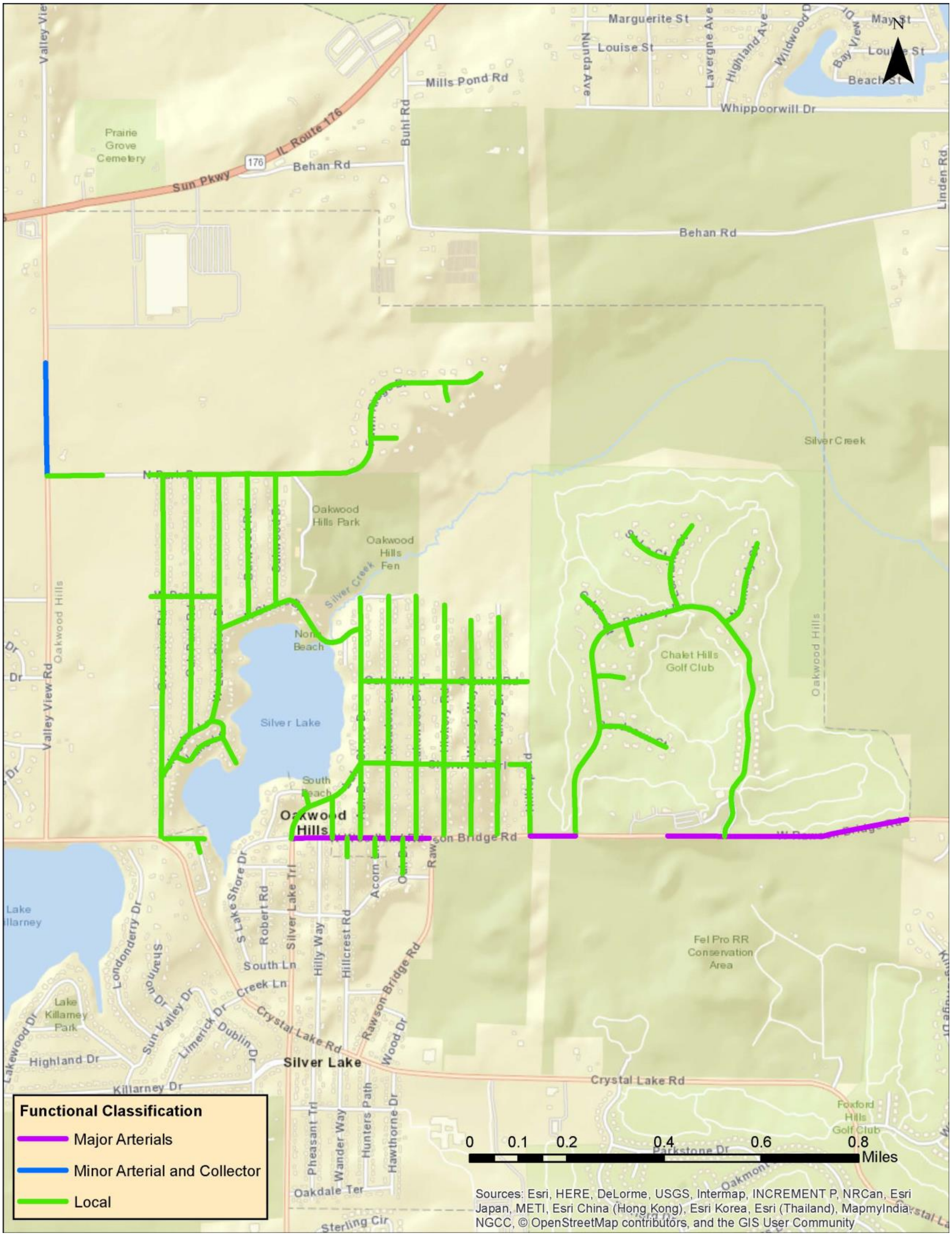


Figure 4. Village of Oakwood Hills street network by functional class.

Network definition is the process of dividing a collection of roadways into a logically organized system. A pavement management system requires that network definition activities be conducted to facilitate the storage and reporting of information and to provide a sound engineering basis for making maintenance and rehabilitation (M&R) recommendations. The procedures outlined in American Society for Testing and Materials (ASTM) D6433, *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys*, were followed during the network definition process.

Pavement divisions are established by creating an organizational hierarchy of the pavement network. The pavement network for the Village consists of branches, sections, and sample units. A branch consists of the entire length of a road. A section is a subdivision of a branch containing pavement with the same design, construction history, traffic, and condition. Finally, sections are divided into sample units. Sample units are relatively small areas. Within selected sample units, distress types and severities are identified and quantified to estimate repair needs and to calculate PCIs.

Approximately 12 centerline-miles (near 1.5 million ft^2) of roads, which consists of 109 pavement sections, are currently defined in the Village's PAVER database. All roads are surfaced with Asphalt Concrete. Figure 5 displays the breakdown of network area by functional classification. Local roads, minor arterials and collectors, and major arterials make up 87, 2, and 11 percent of the network surface area, respectively.

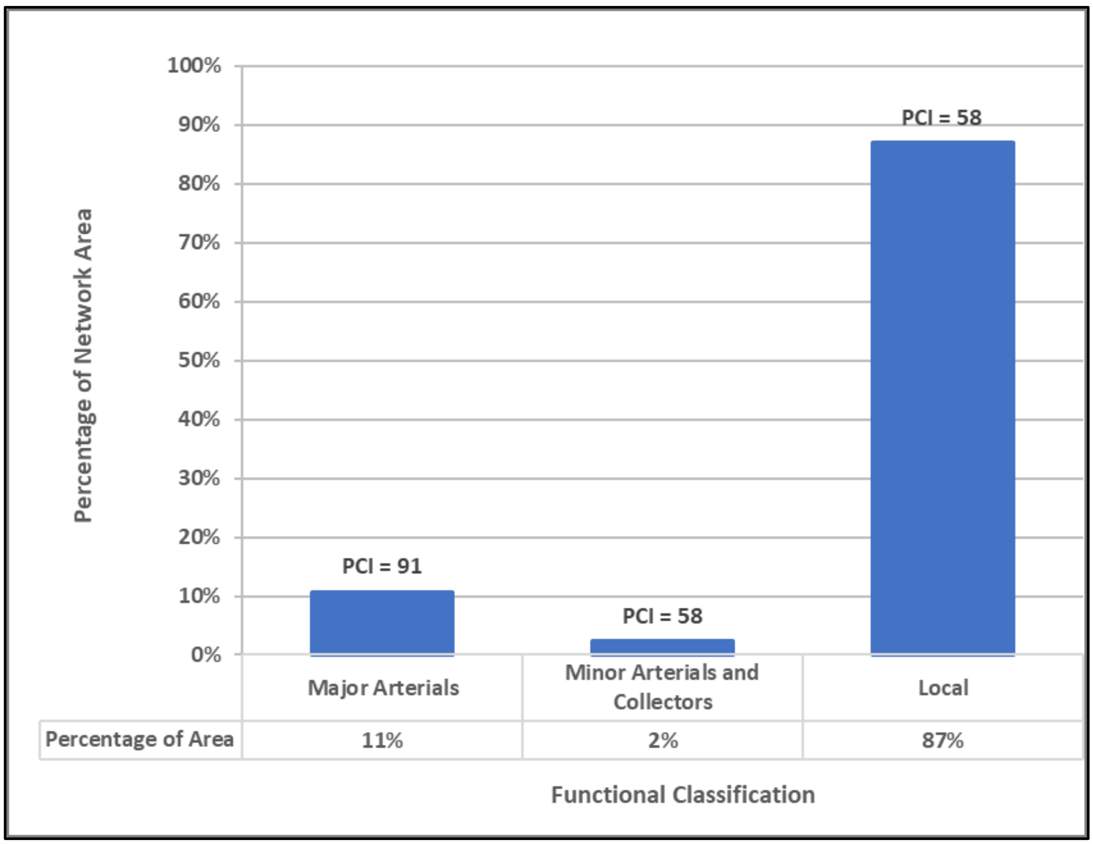


Figure 5. Network area by functional classification.

Pavement Condition Assessment Procedure

One of the most important components of a pavement management system is the methodology for the systematic assessment of pavement conditions. Pavement condition data are used to identify current M&R needs, predict future needs, and project the impact of alternative M&R strategies on overall network conditions. Because of its importance to the pavement management system, the approach used to evaluate pavement condition must provide the level of detail required for the data analysis needs and be repeatable among inspectors.

The PCI procedure described in ASTM D6433, *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys*, was used to assess pavement condition during the pavement evaluations conducted in April 2021. The PCI provides a numerical indication of the overall pavement condition. The PCI procedure is one of the standard approaches used by the pavement management industry to visually assess pavement condition. It was developed to provide a consistent, objective, and repeatable tool to represent the overall pavement condition. This methodology involves traveling the pavement length, identifying the type and severity of existing distress, and measuring the quantity (generally, length, area, or number of slabs affected) of distress.

Figure 6 illustrates PCI condition ranges. The PCI scale ranges from a value of 0 (representing a pavement in a completely failed condition) to a value of 100 (representing a pavement with no visible distress). In general terms, pavements with a PCI above 60 that are not exhibiting significant amounts of load-related distress (e.g., alligator cracking in the wheel-path) benefit from preventive maintenance actions, such as crack sealing and patching. Crack sealing and patching are cost-effective ways to extend pavement life when the pavement surface is still in good condition, generally when the PCI is between 70 and 85. Pavements with a PCI between 30 and 60 are more likely candidates for rehabilitation activities (such as an HMA overlay). Often, when the PCI is less than 30, reconstruction is the most viable alternative due to presence of the substantial damage to the pavement structure.

PCI Range		Condition Category	
100	86	Good	
85	71	Satisfactory	
70	56	Fair	
55	41	Poor	
40	26	Very Poor	
25	11	Serious	
10	0	Failed	

Figure 6. PCI condition ranges and categories.

During the condition inspections the APTech survey crew documented conditions with digital photographs, both to record typical conditions and to highlight areas of concern. These pictures may help visualize the differences between different PCI condition ranges. Pictures of pavement sections at PCI categories ranging from Good to Failed are provided in figure 7.

Figure 7. Example street segments at different PCIs.

Although PCI ratings can be used as a general guideline for identifying the repair type, examining the individual distresses measured during the inspection is often more useful in assessing the cause(s) of deterioration. The PCI procedure divides distresses into three categories based on the expected cause of the distress. By knowing the cause(s) of the pavement deterioration, appropriate repair and rehabilitation alternatives can be identified.

The three categories of distress types are load-related distresses (such as alligator cracking, rutting, or corner breaks), climate-related distresses (such as block cracking or joint seal damage), and other distresses (which include distresses that are not directly related to load or climate, such as lane/shoulder drop-off). Load-related distresses are defined as being caused by vehicular traffic and may provide an indication of structural deficiency. Climate-related distresses often signify the presence of aged and/or environment-susceptible materials. Asphalt and PCC pavement distresses are summarized by category in table 1.

Table 1. Pavement distresses by category (as categorized in PAVER).

Load-Related	**Climate-Related**	**Other**
Asphalt Pavement		
• Fatigue (Alligator) Cracking • Edge Cracking • Potholes • Rutting	• Block Cracking • Joint Reflection Cracking • Longitudinal and Transverse (L&T) Cracking • Raveling • Weathering	• Bleeding • Bumps and Sags • Corrugation • Depression • Lane/Shoulder Drop-off • Patching • Polished Aggregate • Railroad Crossing • Shoving • Slippage Cracking • Swelling
PCC Pavement		
• Corner Break • Divided Slab • Linear Cracking • Punchout	• Blow Up • Durability Cracking • Joint Seal Damage • Shrinkage Cracking • Corner Spalling • Joint Spalling	• Faulting • Lane/Shoulder Drop Off • Large Patch • Small Patch • Polished Aggregate • Popout • Pumping • Railroad Crossing • Scaling

Pavement Condition Inspection Results

Overall, the area-weighted average PCI of the Village-maintained roadways is 61. This puts the area-weighted average PCI for the Village in the Fair condition category. A map of the Village showing PCI for each road segment is shown in Figure 8.

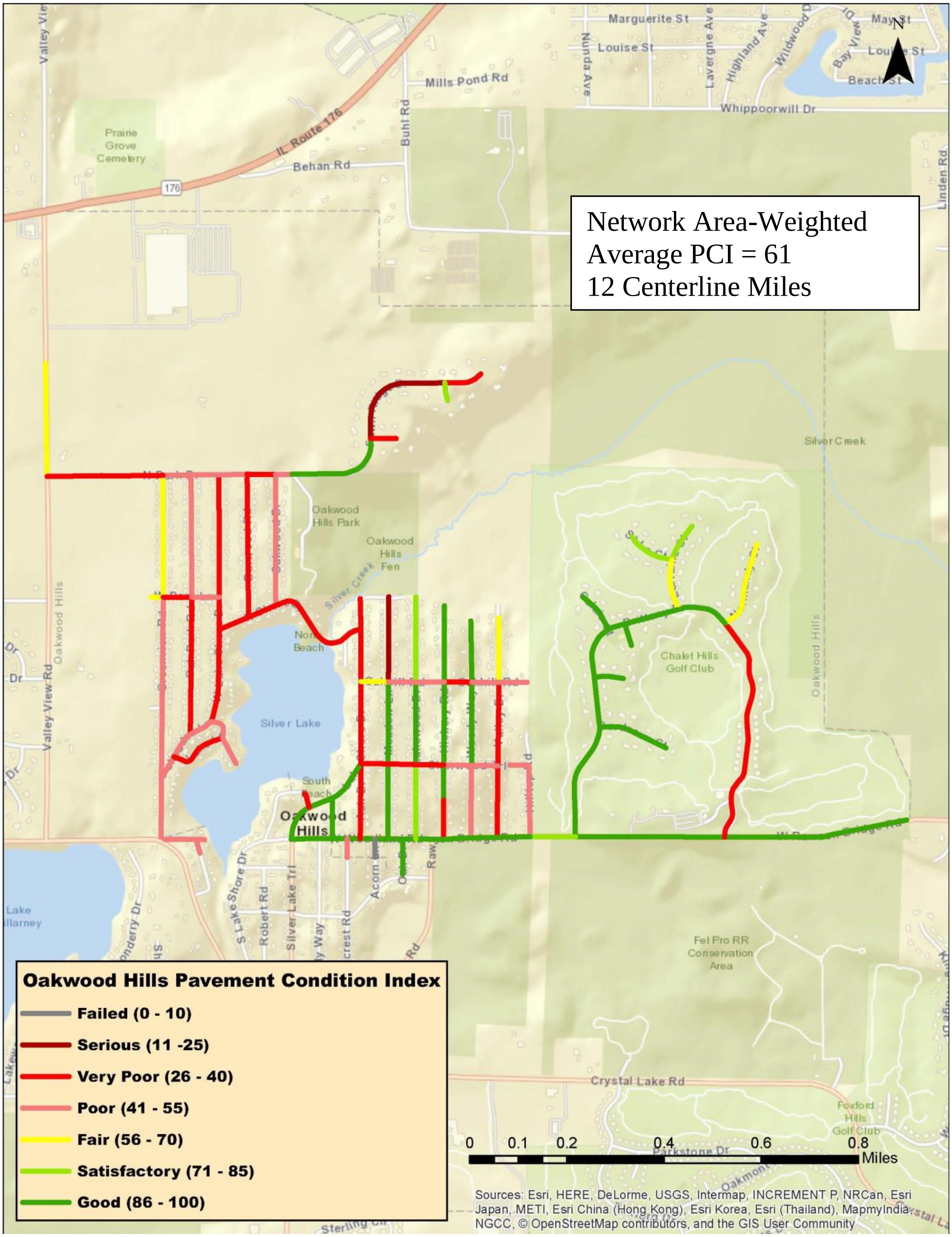


Figure 8. Village of Oakwood Hills map showing color-coded PCI.

Figure 9 shows the percentage of pavement area associated with each condition category. About 47 percent of the network area is in Fair or better condition, while 53 percent of the network is in Poor or worse condition. Approximately a third of the network is in Very Poor condition. A tabulated summary of 2021 PCI results for each pavement section is provided in Appendix A.

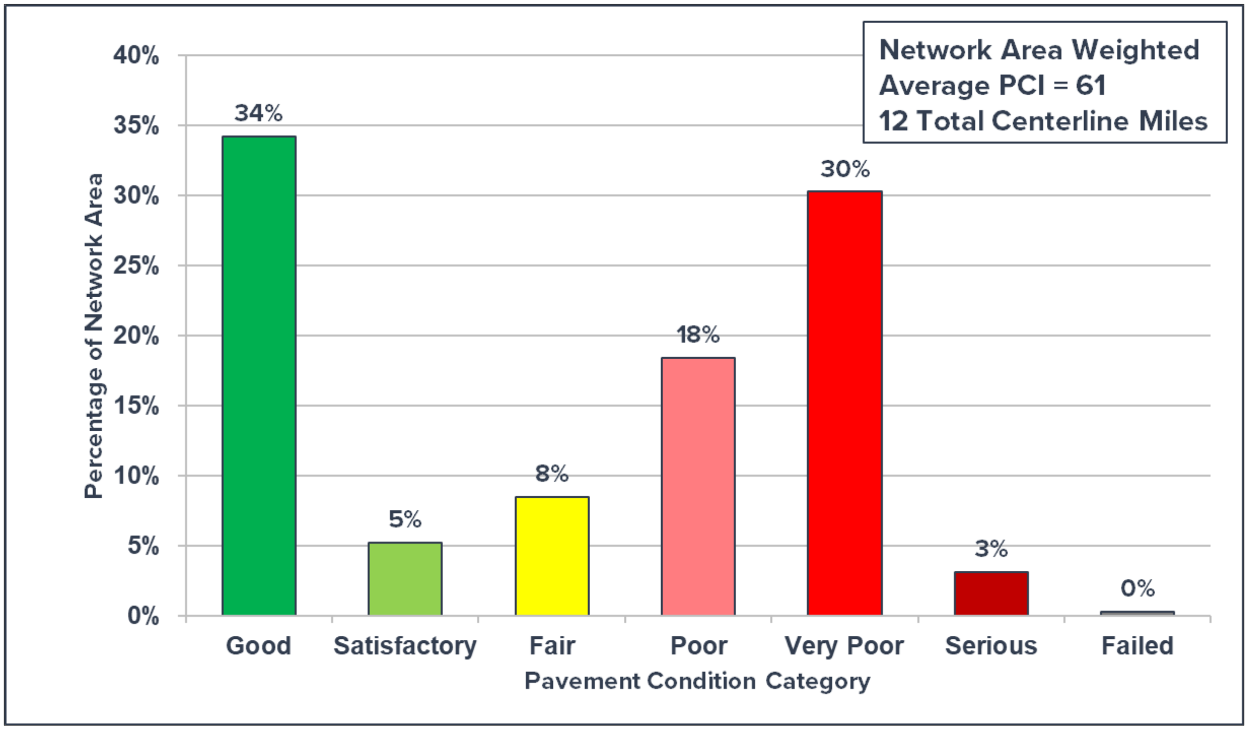


Figure 9. Percentage of network area by PCI category.

Figure 10 provides pie charts showing the distribution in terms of percent area for the major arterial roads, minor arterial and collector roads, and the local roads. Recall that the Village network is about 87 percent local roads. The major arterial roadways, representing about 11 percent of the network area, have the best average condition with an area-weighted average PCI of 91. For the minor arterial and collector roads that make up 2 percent of the network area, the area-weighted average is 58. For the local roads representing a majority of Village mileage, the area-weighted average PCI is 58.

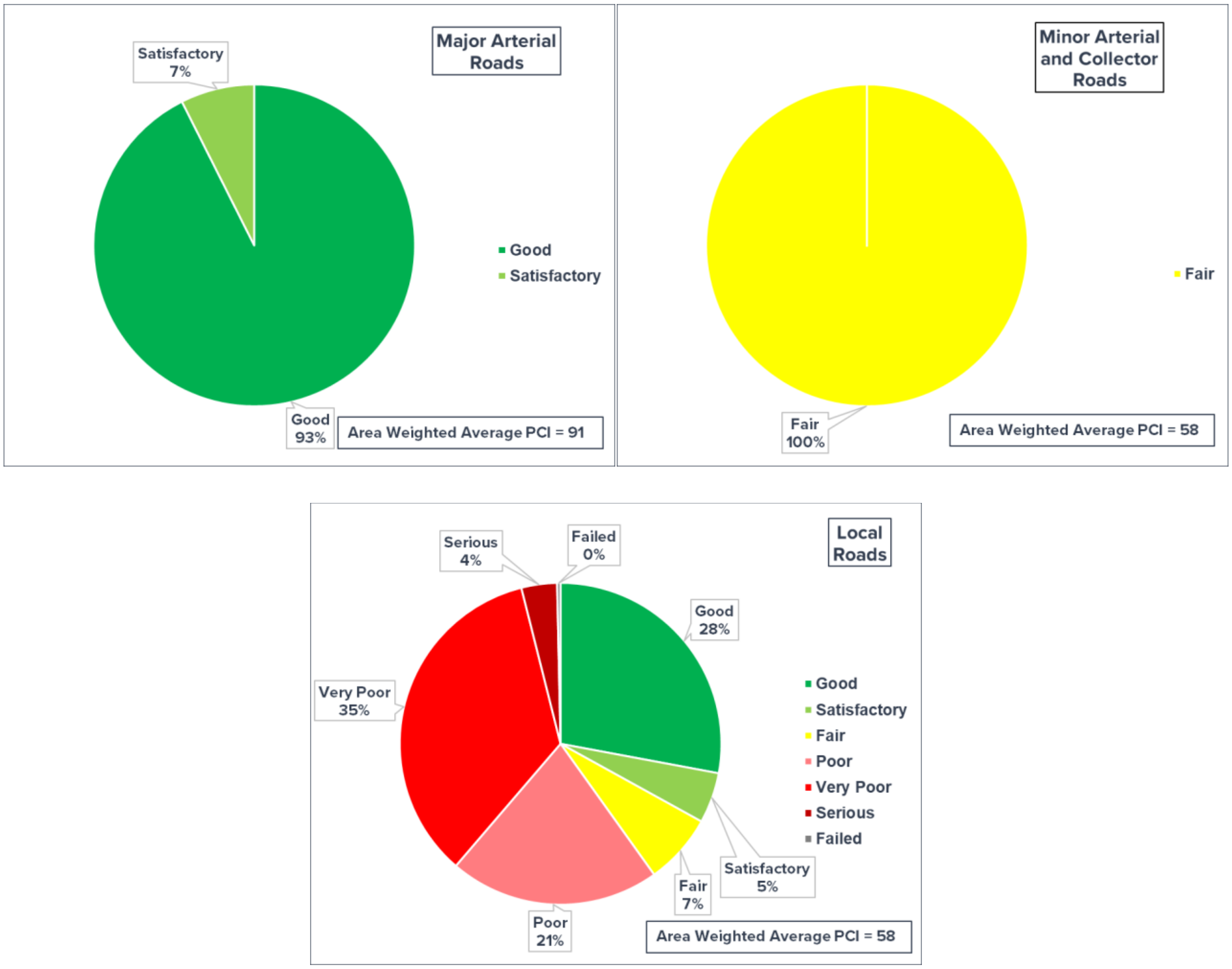


Figure 10. Distribution of condition for by functional class.

In addition to cracking distress, APTech measured roughness, summarized as International Roughness Index (IRI) for each road segment. It is noteworthy to mention that specifications for reliable IRI data collection require higher speeds than the Village network layout generally allowed for, resulting in higher overall roughness values. Figure 11 shows the percentage of pavement sections associated with each IRI category. IRI categories were developed for high volume roadways in general, and don't apply well to local streets. Since local streets are usually slower speeds, the importance of smoothness is not nearly as significant. The Village network is 87 percent local streets, so the impact of IRI on decision making is likely low. A summary of 2021 IRI results for each pavement section along with a map of the Village showing IRI values are provided in Appendix C.

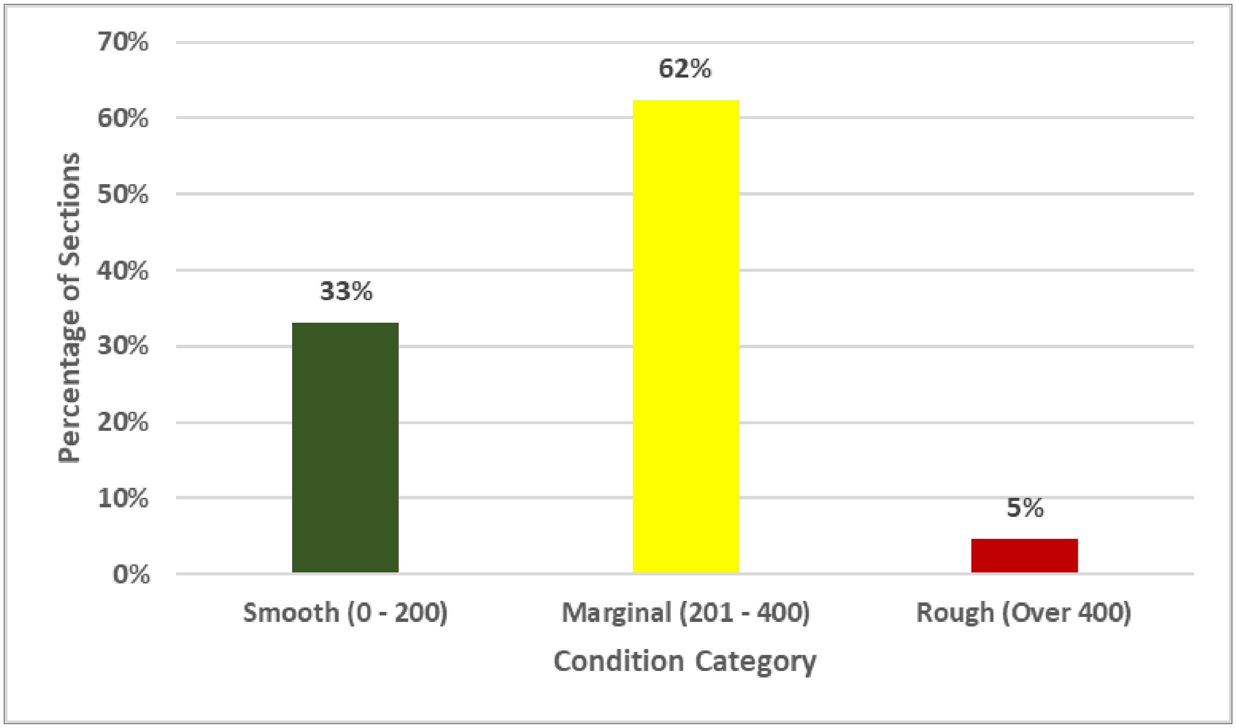


Figure 11. Percentage of network area by IRI condition category.

PAVER DATABASE CUSTOMIZATION

Background

PAVER is a pavement management software tool developed by the US Army Corps of Engineers and distributed by the American Public Works Association (APWA). It stores pavement inventory information, calculates pavement conditions using visual assessment data, develops models to predict future pavement performance, stores past performance data, and develops basic M&R plans. The software was customized to reflect the specific conditions and needs for maintaining the pavements for the Village. Customizing PAVER is essential to ensure the analysis results are meaningful and applicable to the specific agency needs. APTech defined the PAVER inputs using past pavement management experience and assistance from Village staff.

PAVER permits the user to define many database fields to meet specific requirements. This customization occurs at three levels: the network level (e.g., all Village-maintained roads), the branch level (e.g., entire street length), and the section level (e.g., portions of each street with the same surface and condition). The Village pavement system is represented by a single network, where each road is a unique branch. Sections are used to further divide each branch into smaller areas with common attributes (such as pavement type and general condition). Sample units are also identified within each section, as required by the inspection process. Note that as per CMAP specifications surveys were conducted for 100 percent of each section, so there was one sample unit per section.

The customization of the Village pavement management system can be broken down into the following areas:

- Database-related customization.
- Performance modeling.
- M&R alternatives.

Each of these areas is addressed under separate headings in this chapter.

Database-Related Customization

At the network level, the network identifier and name can be customized, and user-definable fields can be developed. The Village database was customized at the network level to include one network in the database consisting of all Village roads. The network identifier and name are Oakwood.

Branches are subdivisions within a network. A branch is a single entity that serves a distinct function. In PAVER, the user can customize the facility identifier, the facility name, and the branch use; user-definable fields can also be developed. The Village's PAVER system includes branch IDs that correspond to road names. The use of the pavement is defined as Roadway. There were no user-defined fields at the branch level.

A section is a subdivision of a branch used to define pavements with common attributes, such as cross section, construction date, traffic level, and general condition. In PAVER the user can customize the section identifier, from/to descriptors, use, pavement type, rank, category, street type, and zone. In addition, there are unlimited user-definable fields available for use. The Village system has been customized at the section level with section identifiers created for the Village, from/to locations referencing intersections, ranks of B, C, and E for major arterial, minor arterial and collector, and local roads, respectively, and user-defined fields for full classification and IRI information.

Performance Modeling

Performance models play an essential role in developing pavement M&R programs. The performance models are used within a pavement management system to predict pavement performance over time, helping to determine the appropriate time to apply maintenance or rehabilitation to maximize the benefits from the expenditure. In addition, by projecting the rate at which the pavement condition will change over time, a meaningful life cycle cost analysis can be performed to compare the costs of different rehabilitation alternatives.

A PCI assessment provides the condition of the pavement at the time of the inspection. However, for developing future M&R plans, it is also valuable to be able to predict the future PCI of the pavement sections. This can be done in PAVER through the development and application of performance models. By using the actual pavement condition data from all inspections and the known age at the time of inspection, it is possible to develop database-specific performance models for groups of pavements. First, the pavement network is divided into groups of pavements called "families," which are comprised of sections that are expected to perform in a similar manner over time. For example, AC surfaced roadway pavements that receive heavy traffic might be grouped into one family, whereas AC surfaced pavements that are primarily used for residential traffic might comprise another family.

Figure 12 graphically illustrates the application of performance model prediction. In this example, a pavement family model was developed using past pavement condition data (shown as black points) and statistically fitted through the data to develop the performance model (shown as the blue curve). For a given pavement section, if the pavement is performing better (or worse) than the rest of the pavement family (for example, see PCI value at 10 years), the model is "shifted" horizontally within PAVER to represent the improved pavement condition (shown as the orange modified family model). In this example, the model shift results in an extension of predicted future pavement condition from the original pavement family model.

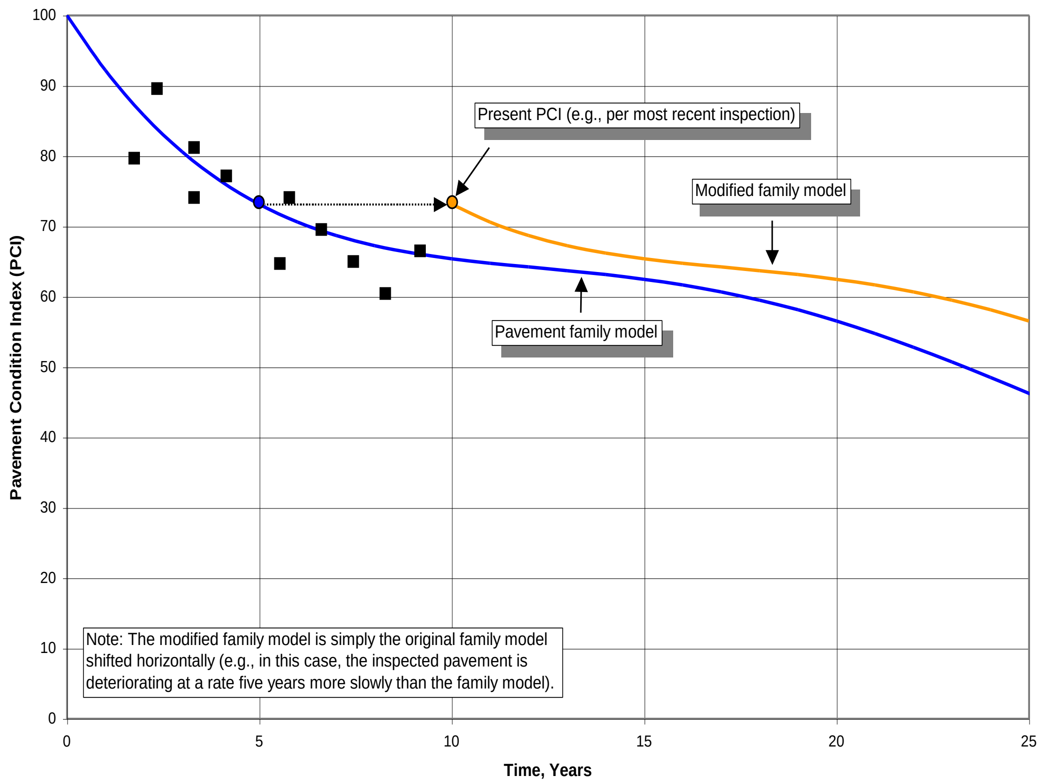


Figure 12. Example of pavement performance model application.

Performance characteristics such as pavement use, pavement type, surface type, and traffic level can be investigated to determine their impact on pavement performance. For the Village of Oakwood Hills, pavements were combined into a single family: AC-surfaced roads. The performance curve developed for these pavements is shown in figure 13.

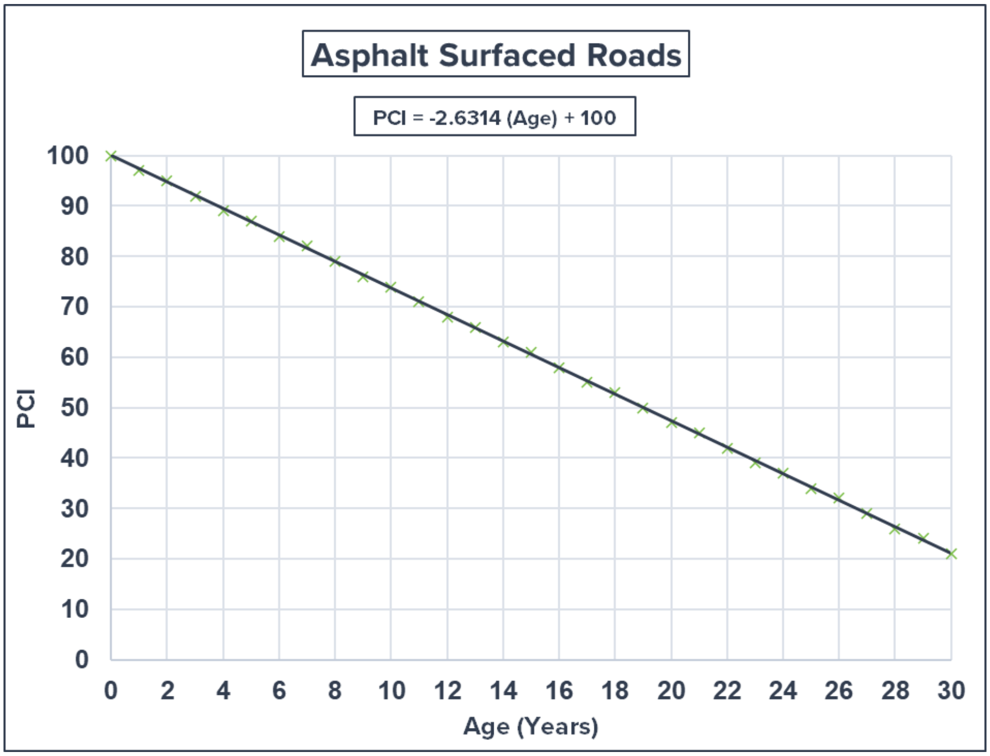


Figure 13. AC-surfaced roads performance model.

Maintenance and Rehabilitation Alternatives

Maintenance Policies

Preventive maintenance, such as crack sealing, is the application of treatments to pavement surfaces that are generally in good condition. The goal of preventive maintenance is to preserve the pavement system by slowing the rate of deterioration through proactive treatments. Since preventive maintenance treatments are usually very low in cost, their use is a cost-effective strategy for preserving network conditions.

The critical PCI is the pavement condition level below which preventive maintenance actions are no longer cost-effective, and it represents the time when rehabilitation work is triggered. Preventive maintenance treatments are recommended above the critical PCI level. Currently, all roads are set to a critical PCI of 50.

Stopgap maintenance, such as localized patching, is recommended when rehabilitation activities are warranted but funding is insufficient to perform the needed level of work. The goal of these policies is to keep the pavement operational through the repair of distress type and severity level combinations that could create hazardous situations through the potential for tire damage, hydroplaning, or other safety concerns.

Table 2 presents localized preventive and stopgap maintenance policies that were used in PAVER for AC pavements. The localized preventive and stopgap maintenance policies primarily consist of crack and joint sealing, and patching to address isolated areas of distress and to slow down the rate of deterioration of the pavement section. The maintenance activities recommended for the Village will be discussed in later sections of this report.

Table 2. Localized preventive and stopgap maintenance policies for asphalt pavements.

Distress Type	Severity Level	Maintenance Action	Stopgap Maintenance Action
Alligator Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Bleeding	Low	Monitor	Monitor
	Medium	Monitor	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Block Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing – AC	Monitor
	High	Crack Sealing and Patching	Monitor
Bumps and Sags	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Corrugation	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Depression	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Edge Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing – AC	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Joint Reflection Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing – AC	Monitor
	High	Crack Sealing and Patching	Monitor
Lane/Shoulder Drop-off	Low	Monitor	Patching and Repairs
	Medium	Monitor	Monitor
	High	Monitor	Monitor
Longitudinal and Transverse Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing – AC	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Patching	Low	Monitor	Monitor
	Medium	Monitor	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Polished Aggregate	N/A	Monitor	Monitor
Potholes	Low	Crack Sealing and Patching	Patching and Repairs
	Medium	Crack Sealing and Patching	Patching and Repairs
	High	Crack Sealing and Patching	Patching and Repairs
Rutting	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Shoving	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Slippage Cracking	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Patching and Repairs
	High	Crack Sealing and Patching	Patching and Repairs
Swelling	Low	Monitor	Monitor
	Medium	Crack Sealing and Patching	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Raveling	Medium	Monitor	Monitor
	High	Crack Sealing and Patching	Patching and Repairs
Weathering	All	Monitor	Monitor

Treatment Strategies

In PAVER treatment strategies determine what action will be taken when a pavement is in a certain condition range. They can be altered to explore the impact of different treatment types on network condition over time. For this analysis, a treatment strategy was created in accordance with the Village's current practices and APTech's recommendations. Figure 14 shows the treatment strategy created in the PAVER database for all Village roads. This treatment strategy was reviewed by the Village prior to its use in the analyses.

<table>
<tr><th colspan="2">PCI</th><th>Stopgap</th><th>Localized Preventive</th><th>Major M&R</th></tr>
<tr><td>0</td><td>10</td><td rowspan="5">Patching and Repairs</td><td rowspan="5">Do Nothing</td><td>Surface Replacement</td></tr>
<tr><td>10</td><td>20</td><td rowspan="4">Mill and Overlay (Variable Depth)</td></tr>
<tr><td>20</td><td>30</td></tr>
<tr><td>30</td><td>40</td></tr>
<tr><td>40</td><td>50</td></tr>
<tr><td>50</td><td>60</td><td rowspan="5">Do Nothing</td><td rowspan="3">Crack Seal and Patching</td><td rowspan="5">Do Nothing</td></tr>
<tr><td>60</td><td>70</td></tr>
<tr><td>70</td><td>80</td></tr>
<tr><td>80</td><td>90</td><td>Crack Seal</td></tr>
<tr><td>90</td><td>100</td><td>Do Nothing</td></tr>
<tr><td colspan="5">Critical PCI = 50</td></tr>
</table>

Figure 14. Village of Oakwood Hills AC pavement treatment approach.

Unit Costs

Unit cost data for maintenance activities is presented in table 3. This information is used by PAVER to estimate the cost of M&R needs. The cost data is based on information provided by the Village.

Table 3. Unit costs for AC maintenance activities.

Treatment	Unit Cost
Crack Seal	\$0.60/ft
Crack Seal and Repairs	\$2.00/ft^2
Patching and Repairs	\$3.33/ft^2
Mill and Overlay (PCI 35 – 50)	\$2.00 – 2.50/ft^2
Mill and Overlay (PCI 20 – 35)	\$2.50 – 3.00/ft^2
Mill and Overlay (PCI 10 – 20)	\$3.00 – 3.50ft^2
Surface Replacement	\$5.00/ft^2

MAJOR WORK BUDGET ANALYSIS RESULTS

PAVER analyses were completed for six budget scenarios over a 5-year analysis period. These were:

- Eliminate backlog – Project the funds required to fix the entire network
- Maintain current condition – Project the funds required to maintain the current area-weighted average network condition (PCI = 61).
- Current funding – Project the PCI at the end of the analysis period given the current agency funding ($100,000/year).
- Increased funding – Project the PCI at the end of the analysis period given an increase in annual funding ($130,000/year).
- Decreased funding – Project the PCI at the end of the analysis period given reduced funds ($70,000/year).
- Do nothing – Project the PCI at the end of the analysis period if no M&R funds are spent, and only stopgap spending for safety work is considered.

The analysis starting date (year 1) was January 1, 2022 and an inflation rate of 3 percent was added to costs after year 1. All scenarios **only** include major work activities such as AC surface replacement and AC mill and overlays.

Figure 15 compares projected network conditions over time for the six budget scenarios. An annual funding level of $165,000 is required to maintain the current area-weighted average network condition (PCI = 61) for the analysis period. At the current Village annual budget level of $100,000 PAVER is projecting a Fair network area condition (PCI=56) at the end of the analysis period. To eliminate the backlog over 5 years, an annual budget of $487,000 is necessary.

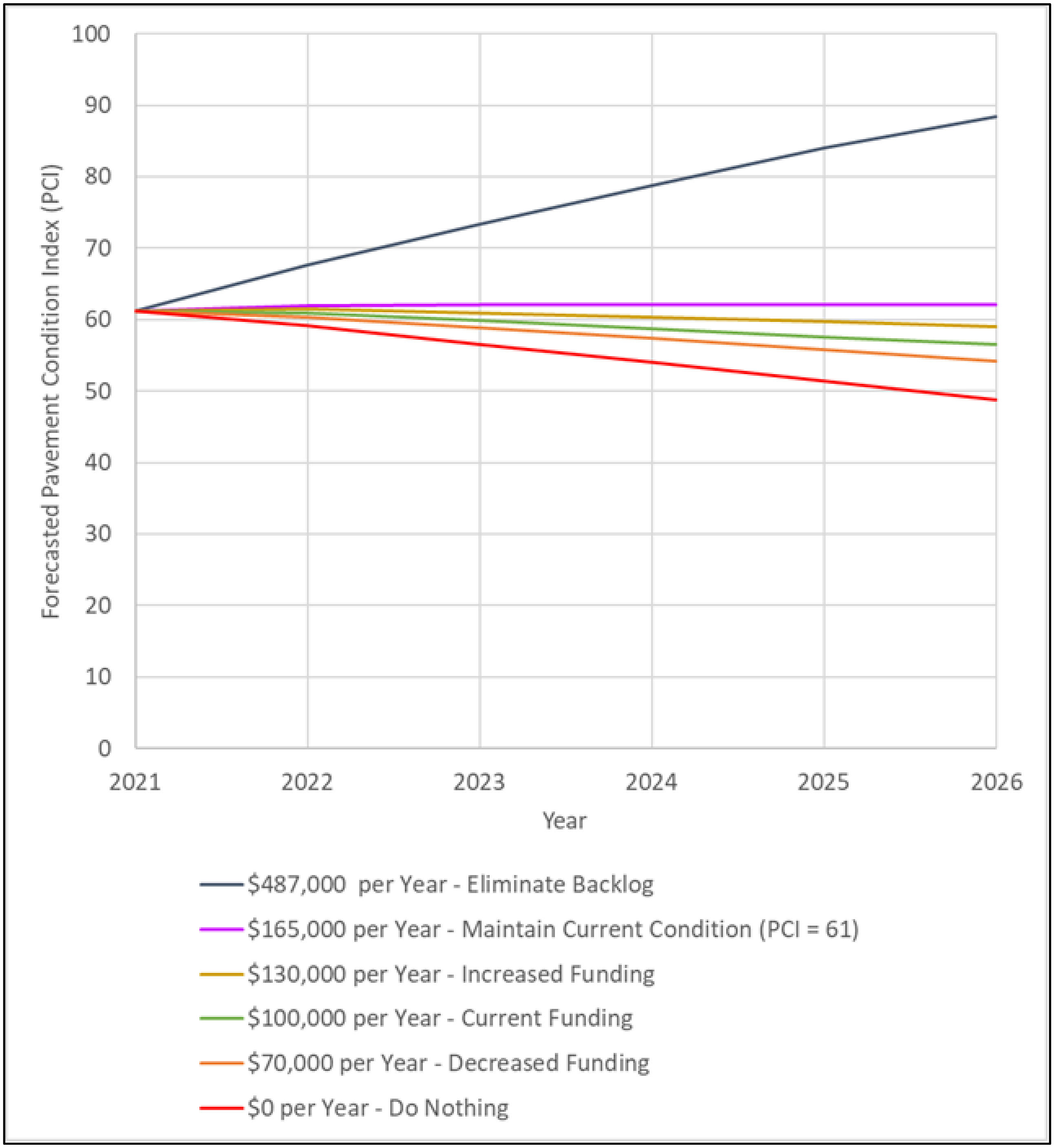


Figure 15. Impact of different budget levels on PCI.

Figure 16 provides a comparison of the backlog over the analysis period. Backlog represents the unresolved work needs in the network. As may be seen, for all funding scenarios except the backlog elimination scenrio there is a growth in backlog over time. At an annual budget of $487,000 the backlog is resolved in 5 years.

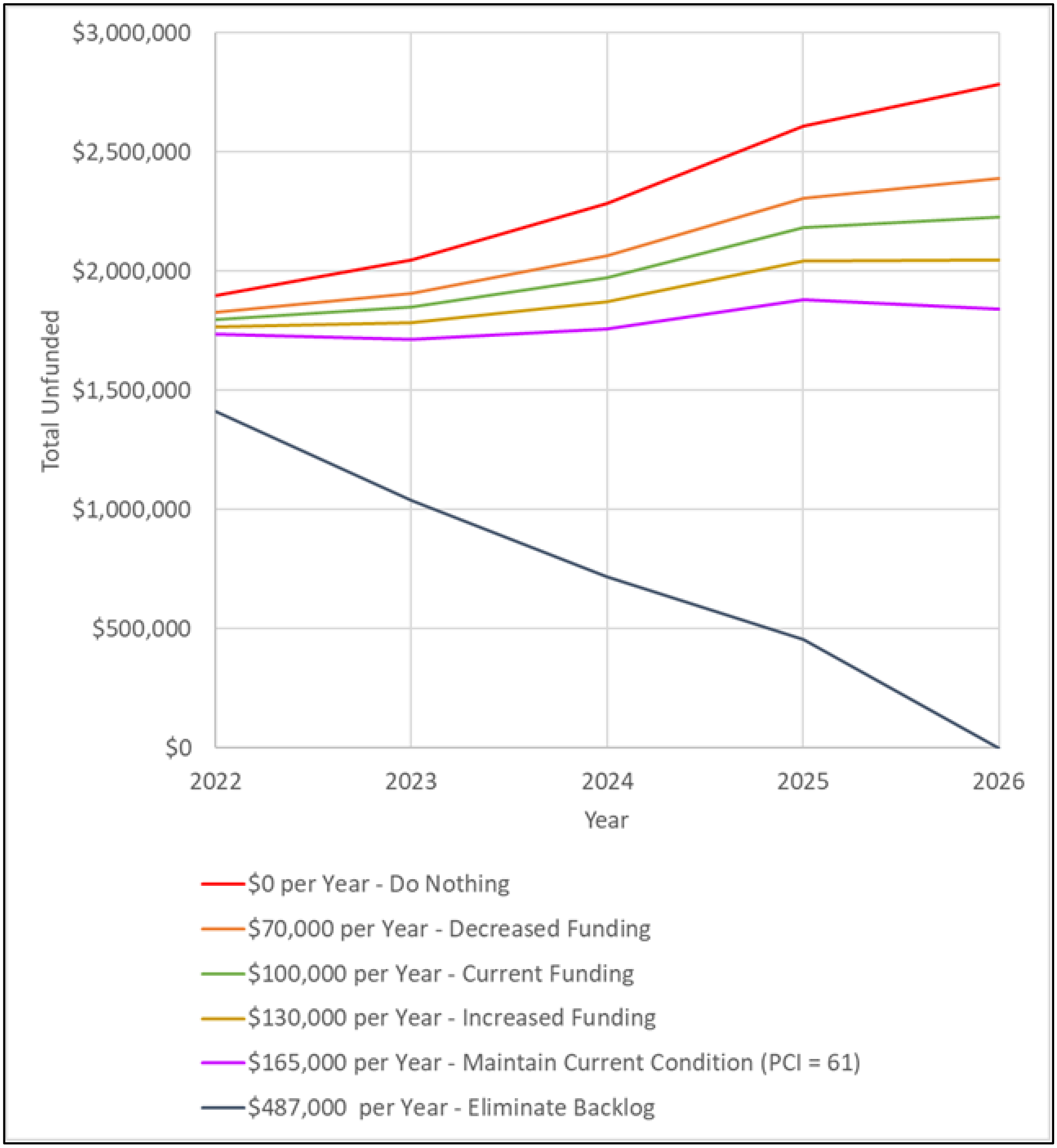


Figure 16. Impact of different budget levels on backlog.

Figure 17 shows the percentage of the network in each PCI condition category over the 5-year analysis period at the current annual Village funding level of $100,000. This graphic indicates that at the current Village funding level there is a reduction in roads in good condition and corresponding increase in roads in satisfactory condition, and a similar trend is shown with roads moving from very poor condition to serious condition. The decline in condition will result in a growth of backlog work at much higher unit cost.

Figure 17. Percent of network in condition ranges (proposed Village funding).

Table 4 provides a comparison of the total funded plus backlog value for each of the funding scenarios for the 5-year analysis period, and the forecasted PCI for each. This table is valuable in that it displays the total accumulated cost of deferring repairs over time. The "Total Funded + Backlog" column shows that the less that is spent annually, the greater the network cost, and the poorer the network condition.

Table 4. Comparison of total accumulated cost over time at different funding levels.

Funding Scenario	Total 5-year Funded Costs	Remaining M&R Backlog in 2026	Total Funded + Backlog	Forecasted PCI in 2026
$487,000 per Year – Eliminate Backlog	$2,434,425	$0	$2,434,425	88
$165,000 per Year – Maintain Current Condition (PCI = 61)	$821,653	$1,839,720	$2,661,374	62
$130,000 per Year – Increased Funding	$637,684	$2,049,401	$2,687,085	59
$100,000 per Year – Current Funding	$480,697	$2,229,156	$2,709,853	56
$70,000 per Year – Decreased Funding	$340,270	$2,390,770	$2,731,040	54
$0 per Year – Do Nothing	$0	$2,783,814	$2,783,814	49

APTech prepared a summary of work needs by year as projected by PAVER for the Village's current annual funding level ($100,000) for the 5-year analysis period. A summary of the results of that analysis is provided in figure 18, showing that at the proposed funding level PAVER projects that about 1.8 miles of Village roads will be repaired over the analysis period. A tabulated work needs list is provided Appendix B, and a map showing major M&R work locations by year is provided in Appendix E.

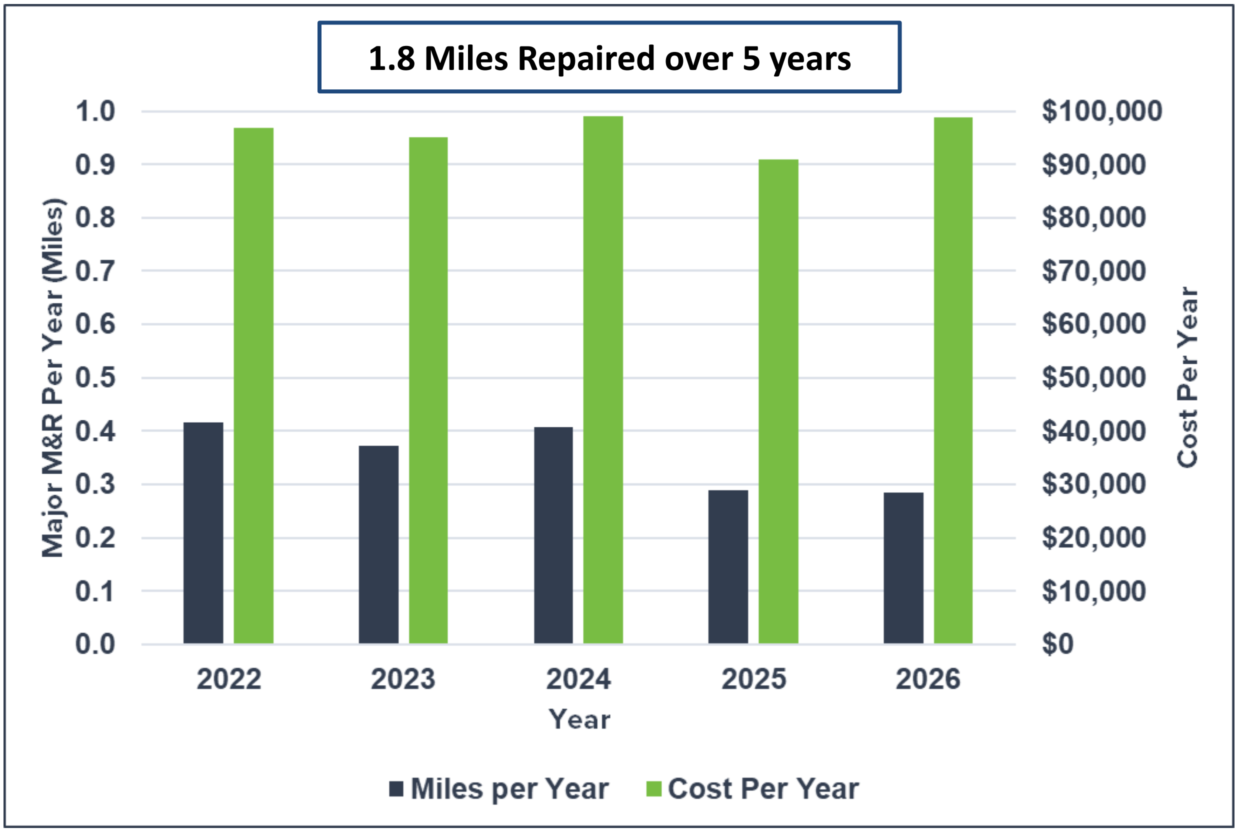


Figure 18. Summary of work completed by year at current Village funding.

LOCALIZED MAINTENANCE ANALYSIS RESULTS

In addition to the budget scenario analyses, APTech used PAVER to project work needs for the Village. The first work needs projection is called the Consequence of Localized Distress Maintenance. This summary, presented in table 5, shows the localized stopgap and preventive maintenance needs for the entire network. This work needs report is typically run immediately after a condition survey to help the agency understand current stopgap and preventive maintenance needs across the network.

For the Village PAVER identified 37 sections (of the total 109 sections) that are currently in need of localized stopgap work, at a projected cost of $13,259. Recall that stopgap work, such as localized patching, is done to maintain safe roadway conditions when funds do not exist to address major M&R needs. An additional 31 sections are recommended for localized preventive maintenance work at a current cost of $6,383. The projected localized stopgap and preventive work needs across the Village are shown in figure 19.

Table 5. Consequence of localized distress maintenance.

Policy	Number of Sections	Cost	Weighted Average PCI Before Maintenance	Weighted Average PCI After Maintenance
Localized Stopgap	37	$13,259	35.60	38.70
Localized Preventive	31	$6,383	78.20	81.70

Policy	Work Description	Work Quantity	Work Cost
Localized Stopgap	Patching and Repairs	3,982 ft^2	$13,259
Localized Preventive	Crack Sealing and Patching	1,909 ft^2	$3,817
Localized Preventive	Crack Sealing - AC	4,276 ft	$2,565
Total			**$19,642**

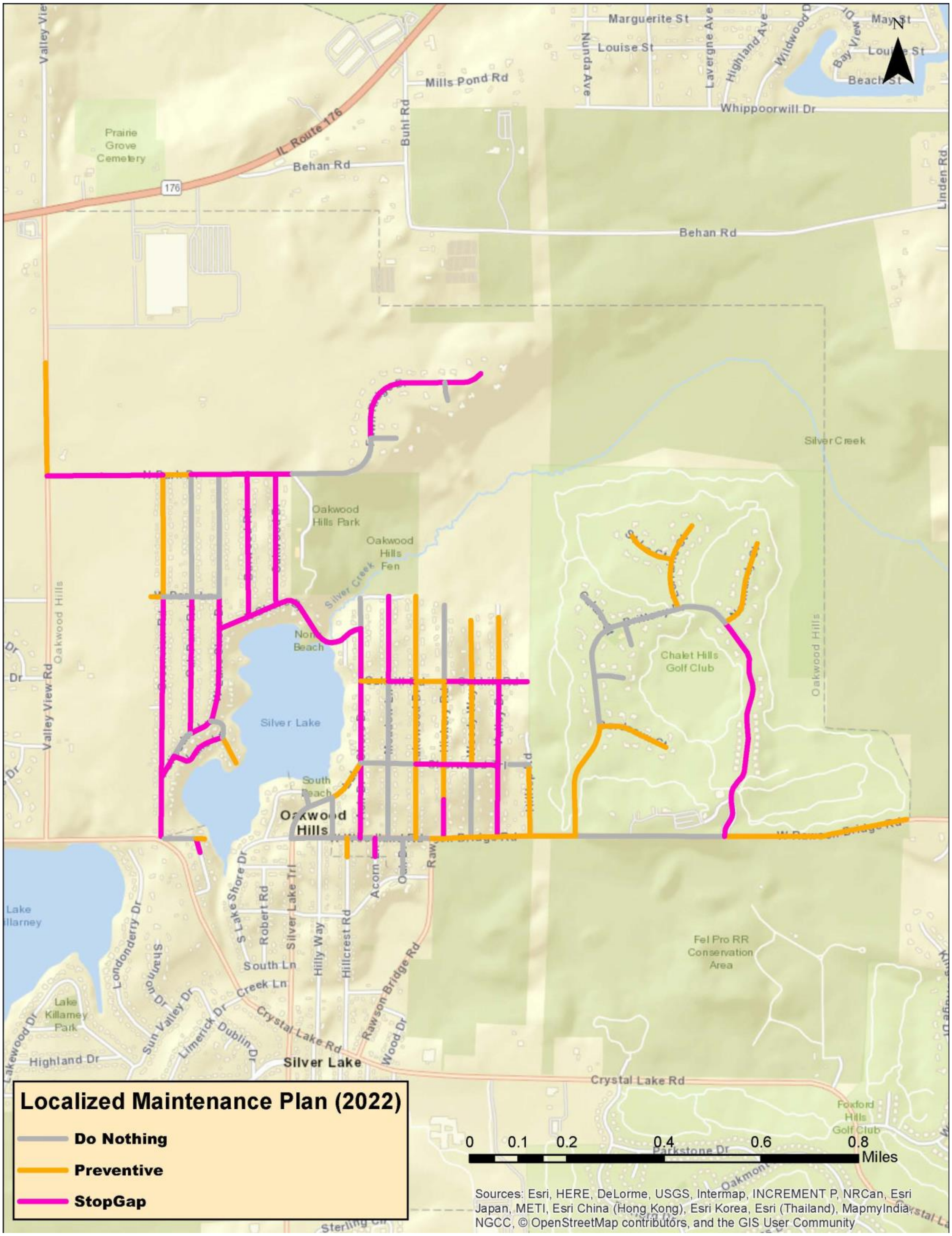


Figure 19. Localized stopgap and preventive maintenance needs in 2022.

THE IMPACT OF PAVEMENT PRESERVATION

According to the National Center for Pavement Preservation (NCPP), it costs six to fourteen times less to use pavement preservation activities and extend the life of pavement segments rather than waiting until the pavement reaches poor condition and repairing or replacing it. Figure 20 shows the benefit of using a pavement preservation approach.

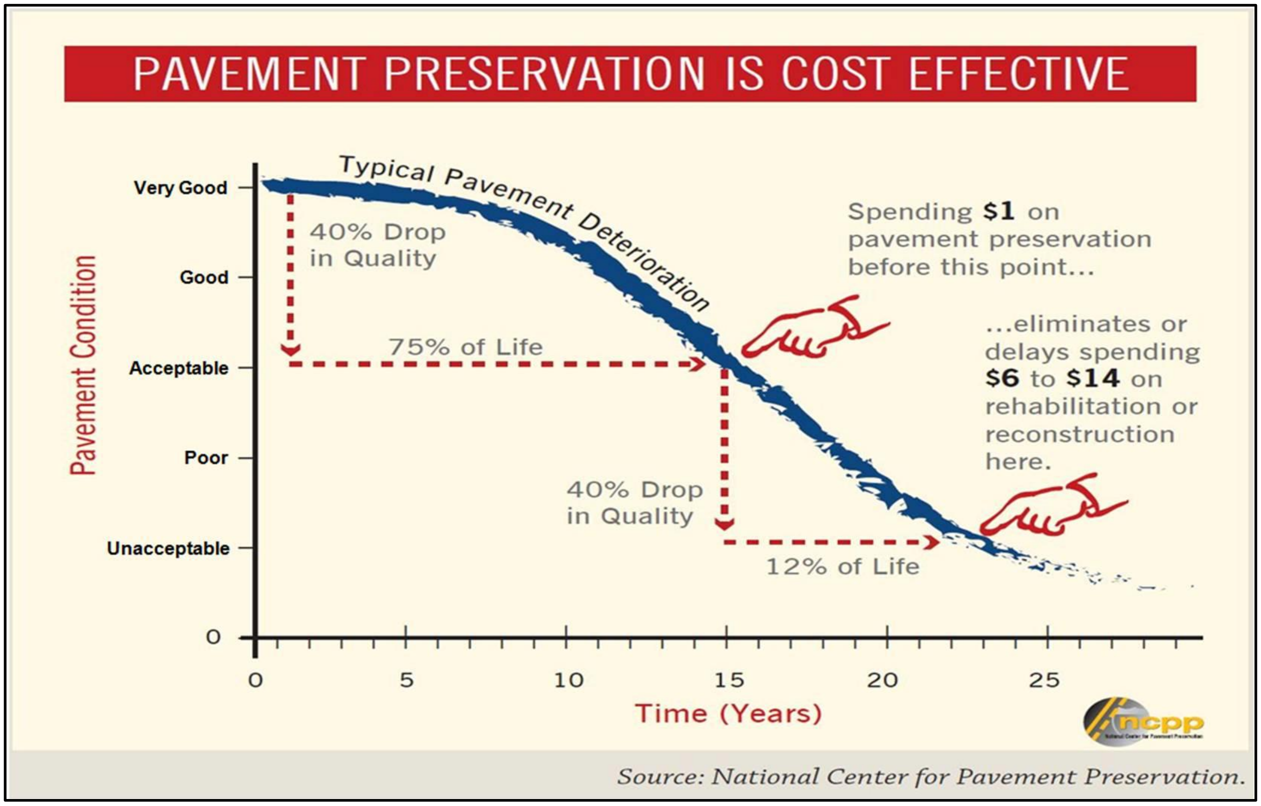


Figure 20. Pavement preservation cost vs. pavement rehabilitation cost.

Preservation treatments have shorter expected lifespans, which causes concern among the public about more frequent applications and associated interruptions. However, research clearly shows that life-cycle costs for roadway maintenance are reduced by using pavement preservation approaches, keeping good roads in good condition while repairing those that have fallen below acceptable levels of condition for preservation.

One might question why such an approach should be considered. The answer is by preserving the roads currently in the Village, those pavements currently in fair or good condition will not decline and add to the already significant rehabilitation and reconstruction burden the Village has. It is extremely important to keep the good roads in good condition at low cost, especially when considering the situation the Village is in.

Preservation approaches need not be complicated. Sealing cracks and making spot repairs to maintain a pavement surface that does not allow water intrusion is an extremely cost-effective preservation approach. More extensive methods can effectively preserve pavements in fair condition as well, slowing their decline in condition over time and reducing the growing rehabilitation burden. Such treatments might include:

- Crack Sealing
- Patching
- Rejuvenation
- Microsurfacing (or other similar surface treatments)

Pavement preservation has been proven to be an effective way to make the most out of scarce resources. There are vendors in the area that can provide these treatments at competitive rates. Pavement preservation will help the Village maintain pavements at a better condition for a longer period at a lower life-cycle cost.

SUMMARY AND RECOMMENDATIONS

CMAP hired APTech to implement the PAVER pavement management system, document the condition of the Village's road network, create a PAVER database, configure PAVER for analyses, and develop a maintenance and rehabilitation plan. The goal was to provide a tool for the Village of Oakwood Hills to use for annual pavement maintenance planning and helping prioritize pavement M&R needs for future years.

In April 2021, APTech inspected approximately 12 centerline-miles of roadway pavement maintained by the Village of Oakwood Hills. The 2021 area-weighted average network PCI is 61, placing the network average in the Fair condition category. The following summarizes the findings from analyzing the PCI data and M&R planning scenarios:

- If no funding is provided for pavement maintenance and rehabilitation, the pavement system is expected to deteriorate from the current PCI of 61 to a PCI of 49 by 2026. This will result in an increase in the financial burden to maintain the roadway network.
- At the Village's current annual funding level ($100,000) the network will decline in condition from the current PCI of 61 to a PCI of 56 in five years.
- The required annual funding to maintain the current PCI of 61 for the next 5 years is $165,000. Any funding below this annual level will result in a decline in condition over time.
- At the Village's request two additional annual budget levels were evaluated: $130,000 and $70,000. At these budget levels the PCI for the network would decrease to 59 and 54, respectively.
- A budget of $487,000 per year is necessary to eliminate the existing backlog by 2026. In this scenario the resulting average network PCI would increase to 88, at which point it would be well maintained with maintenance and preservation treatments.

The Village roadway network has a mix of conditions, with about 47 percent of the network in fair or better condition, and 53 percent in poor or worse condition. The Village would be well-advised to consider preservation approaches to maintain roads that are in good condition rather than letting them decline in condition and add to the burden of more expensive repair required of roads in poor or worse condition. Preservation approaches, including crack sealing and surface treatments, will cost-effectively slow the decline of roads in fair or better condition. This will allow the Village to target repairs needed over time making the best use of available funds.

The PAVER PMS that has been established for the Village can be used in future years to perform additional analyses and evaluate different strategies. To do this the Village will need to maintain the PMS by periodically updating work history information and collecting updated condition data.

APPENDIX A – 2021 PCI STREET LIST

Table A-1. 2021 PCI by road segment.

NetworkID	BranchID	Branch Name	SectionID	From	To	Length	Width	Area	Surf. Type	PCI	PCI Category
OAKWOODHLS	ACORN00001	ACORN LN	SEC0000001	WOODLAND_R	SEC_BREAK	200	22	4,400	AC	100	Good
OAKWOODHLS	ASHDR00002	ASH DR	SEC0000002	SHERWOOD_T	WOODLAND_R	813	20	16,260	AC	27	Very Poor
OAKWOODHLS	BERNA00003	BERNAY CT	SEC0000003	BRITTANY_D	END	317	26	8,242	AC	97	Good
OAKWOODHLS	BIRCH00004	BIRCH LANE	SEC0000004	LAKE_LN	END	313	18	5,634	AC	52	Poor
OAKWOODHLS	BORDE00005	BORDEAUX CT	SEC0000005	BRITTANY_D	END	771	26	20,046	AC	89	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000006	NORMANDY_C	RAWSON_BRI	2,484	28	69,552	AC	29	Very Poor
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000007	LORRAINE_C	NORMANDY_C	568	26	14,768	AC	100	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000008	DAUPHINE_C	LORRAINE_C	608	24	14,592	AC	100	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000009	CALAIS_CT	DAUPHINE_C	186	26	4,836	AC	100	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000010	BERNAY_CT	CALAIS_CT	586	26	15,236	AC	100	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000011	BORDEAUX_C	BERNAY_CT	545	26	14,170	AC	100	Good
OAKWOODHLS	BRITT00006	BRITTANY DR	SEC0000012	RAWSON_BRI	BORDEAUX_C	1,264	26	32,864	AC	99	Good
OAKWOODHLS	BURWO00007	BURWOOD RD	SEC0000013	N_PARK_DR	N_SHORE_DR	1,551	22	34,122	AC	37	Very Poor
OAKWOODHLS	CALAI00008	CALAIS CT	SEC0000014	BRITTANY_D	END	462	26	12,012	AC	92	Good
OAKWOODHLS	CAUPH00009	CAUPHINE CT	SEC0000015	BRITTANY_D	END	245	26	6,370	AC	91	Good
OAKWOODHLS	DEERT00010	DEER TR	SEC0000016	FAWN RIDGE	END	194	24	4,656	AC	75	Satisfactory
OAKWOODHLS	ECHOH00011	ECHO HILL	SEC0000017	ECHO_HILL	WOODLAND_R	438	24	10,512	AC	100	Good
OAKWOODHLS	FAWNR00012	FAWN RIDGE	SEC0000018	SEC_BREAK	FENVIEW_CT	1,097	22	24,134	AC	100	Good
OAKWOODHLS	FAWNR00012	FAWN RIDGE	SEC0000019	FENVIEW_CT	DEER_TRAIL	1,256	22	27,632	AC	24	Serious
OAKWOODHLS	FAWNR00012	FAWN RIDGE	SEC0000020	DEER_TRAIL	END	419	22	9,218	AC	27	Very Poor
OAKWOODHLS	FENVI00013	FENVIEW	SEC0000021	FAWN RIDGE	END	276	24	6,624	AC	30	Very Poor
OAKWOODHLS	GREEN00014	GREENVIEW RD	SEC0000022	N_PARK_DR	W_PARK_LN	1,322	22	29,084	AC	56	Fair
OAKWOODHLS	GREEN00014	GREENVIEW RD	SEC0000023	W_PARK_LN	PALISADES_	1,972	22	43,384	AC	45	Poor
OAKWOODHLS	GREEN00014	GREENVIEW RD	SEC0000024	PALISADES_	W_WOODLAND	635	26	16,510	AC	44	Poor
OAKWOODHLS	HICKO00015	HICKORY RD	SEC0000025	END	OAKHILL_DR	826	22	18,172	AC	91	Good
OAKWOODHLS	HICKO00015	HICKORY RD	SEC0000026	OAKHILL_DR	SHERWOOD_T	903	22	19,866	AC	90	Good
OAKWOODHLS	HICKO00015	HICKORY RD	SEC0000027	SHERWOOD_T	WOODLAND_R	385	22	16,914	AC	89	Good
OAKWOODHLS	HICKO00015	HICKORY RD	SEC0000105	SHERWOOD_T	WOODLAND_R	422	22	9,284	AC	36	Very Poor
OAKWOODHLS	HILLC00016	HILLCREST RD	SEC0000028	WOODLAND_R	SEC_BREAK	206	24	4,944	AC	52	Poor

Table A-1. 2021 PCI by road segment (continued).

NetworkID	BranchID	Branch Name	SectionID	From	To	Length	Width	Area	Surf. Type	PCI	PCI Category
OAKWOODHLS	HILLT00017	HILLTOP RD	SEC0000029	RAWSON_BRI	SHERWOOD_T	778	22	17,116	AC	52	Poor
OAKWOODHLS	LAKEL00018	LAKE LANE	SEC0000030	PALISADES_	BIRCH_LN	633	20	12,660	AC	40	Very Poor
OAKWOODHLS	LAKEL00018	LAKE LANE	SEC0000031	W_LAKE_SHO	BIRCH_LN	272	24	6,528	AC	44	Poor
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000032	N_SHORE_DR	E_PARK_LN	328	22	7,216	AC	38	Very Poor
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000033	SHERWOOD_T	EHO_HILL	493	22	10,846	AC	97	Good
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000034	OAKHILL_DR	SHERWOOD_T	892	24	21,408	AC	36	Very Poor
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000035	LAKEVIEW_D	WOODLAND_R	417	22	9,174	AC	100	Good
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000036	ECHO_HILL	LAKEVIEW_D	275	24	6,600	AC	100	Good
OAKWOODHLS	LAKES00020	LAKE SHORE DR	SEC0000037	N_SHORE_DR	OAKHILL_DR	569	24	13,656	AC	33	Very Poor
OAKWOODHLS	LAKEV00021	LAKEVIEW	SEC0000038	LAKE_SHORE	SEC_BREAK	158	22	3,476	AC	32	Very Poor
OAKWOODHLS	LAKEW00022	LAKEWOOD DR	SEC0000039	E_PARK_LN	OAKHILL_DR	926	20	18,520	AC	84	Satisfactory
OAKWOODHLS	LAKEW00022	LAKEWOOD DR	SEC0000040	SHERWOOD_T	WOODLAND_R	807	22	17,754	AC	84	Satisfactory
OAKWOODHLS	LAKEW00022	LAKEWOOD DR	SEC0000041	OAKHILL_DR	SHERWOOD_T	894	24	21,456	AC	92	Good
OAKWOODHLS	LORRA00023	LORRAINE CT	SEC0000042	ST_LO_CT	END	424	26	11,024	AC	85	Satisfactory
OAKWOODHLS	LORRA00023	LORRAINE CT	SEC0000043	BRITTANY_D	ST_LO_CT	557	26	14,482	AC	70	Fair
OAKWOODHLS	MEADO00024	MEADON LN	SEC0000044	E_PARK_LN	OAKHILL_DR	925	20	18,500	AC	20	Serious
OAKWOODHLS	MEADO00024	MEADON LN	SEC0000045	OAKHILL_DR	SHERWOOD_T	893	20	17,860	AC	100	Good
OAKWOODHLS	MEADO00024	MEADON LN	SEC0000046	SHERWOOD_T	WOODLAND_R	812	22	17,864	AC	100	Good
OAKWOODHLS	NORMA00025	NORMANDY CT	SEC0000047	BRITTANY_D	END	966	26	25,116	AC	58	Fair
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000048	GREENVIEW_	OAK_PARK_R	305	22	6,710	AC	53	Poor
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000049	W_LAKE_SHO	BURWOOD_RD	307	22	6,754	AC	43	Poor
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000050	BURWOOD_RD	OAKWOOD_DR	309	22	6,798	AC	40	Very Poor
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000051	OAK_PARK_R	W_LAKE_SHO	303	22	6,666	AC	43	Poor
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000052	OAKWOOD_DR	SEC_BREAK	184	22	4,048	AC	45	Poor
OAKWOODHLS	NORTH00026	NORTH PARK DR	SEC0000053	VALLEY_VIE	GREENVIEW_	1,259	22	27,698	AC	39	Very Poor
OAKWOODHLS	NORTH00027	NORTH SHORE DR	SEC0000054	W_LAKE_SHO	BURWOOD_RD	346	22	7,612	AC	36	Very Poor
OAKWOODHLS	NORTH00027	NORTH SHORE DR	SEC0000055	BURWOOD_RD	OAKWOOD_DR	334	22	7,348	AC	38	Very Poor
OAKWOODHLS	NORTH00027	NORTH SHORE DR	SEC0000056	OAKWOOD_DR	LAKE_SHORE	1,182	24	28,368	AC	31	Very Poor
OAKWOODHLS	OAKDR00028	OAK DR	SEC0000057	WOODLAND_R	SEC_BREAK	383	22	8,426	AC	100	Good

Table A-1. 2021 PCI by road segment (continued).

NetworkID	BranchID	Branch Name	SectionID	From	To	Length	Width	Area	Surf. Type	PCI	PCI Category
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000060	LAKE_SHORE	MEADOW_LN	297	20	5,940	AC	59	Fair
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000061	HICKORY_RD	WOODY_WAY	301	20	6,020	AC	40	Very Poor
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000062	WOODY_WAY	VALLEY_DR	293	20	5,860	AC	42	Poor
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000063	MEADOW_LN	LAKEWOOD_D	299	20	5,980	AC	44	Poor
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000064	VALLEY_DR	END	309	20	6,180	AC	45	Poor
OAKWOODHLS	OAKHI00030	OAKHILL RD	SEC0000065	LAKEWOOD_D	HICKORY_RD	308	20	6,160	AC	53	Poor
OAKWOODHLS	OAKPK00029	OAK PK RD	SEC0000058	N_PARK_DR	W_PARK_LN	1,325	22	29,150	AC	42	Poor
OAKWOODHLS	OAKPK00029	OAK PK RD	SEC0000059	W_PARK_LN	PALISADES_	1,488	22	32,736	AC	36	Very Poor
OAKWOODHLS	OAKWO00031	OAKWOOD DR	SEC0000066	N_PARK_DR	N_SHORE_DR	1,416	20	28,320	AC	43	Poor
OAKWOODHLS	PALIS00032	PALISADES LN	SEC0000067	OAK_PARK_R	W_LAKE_SHO	266	24	6,384	AC	44	Poor
OAKWOODHLS	PALIS00032	PALISADES LN	SEC0000068	LAKE_LN	OAK_PARK_R	308	22	6,776	AC	50	Poor
OAKWOODHLS	PALIS00032	PALISADES LN	SEC0000069	GREENVIEW_	LAKE_LN	273	22	6,006	AC	48	Poor
OAKWOODHLS	PLEAS00042	PLEASANT VIEW LN	SEC0000104	W_WOODLAND	SEC_BREAK	156	22	3,432	AC	46	Poor
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000070	BRITTANY_D	SEC_BREAK	1,998	24	47,952	AC	91	Good
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000071	SEC_BREAK	BRITTANY_D	1,634	24	39,216	AC	87	Good
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000072	HILLTOP_RD	BRITTANY_D	489	24	11,736	AC	85	Satisfactory
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000106	VALLEY_DR	HILLTOP_RD	359	24	8,616	AC	87	Good
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000107	WOODY_WY	VALLEY_DR	288	24	6,912	AC	86	Good
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000108	HICKORY_RD	WOODY_WY	294	24	7,056	AC	87	Good
OAKWOODHLS	RAWSO00033	RAWSON BRIDGE RD	SEC0000109	RAWSON_RD	HICKORY_RD	128	24	3,072	AC	94	Good
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000073	LAKE_SHORE	MEADOW_LN	296	22	6,512	AC	40	Very Poor
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000074	HICKORY_RD	WOODY_WAY	299	22	6,578	AC	48	Poor
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000075	WOODY_WAY	VALLEY_DR	288	22	6,336	AC	48	Poor
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000076	MEADOW_LN	LAKEWOOD_D	301	22	6,622	AC	37	Very Poor
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000077	LAKEWOOD_D	HICKORY_RD	305	22	6,710	AC	37	Very Poor
OAKWOODHLS	SHERW00034	SHERWOOD TR	SEC0000078	HILLTOP_RD	END	202	20	4,040	AC	41	Poor
OAKWOODHLS	STLOC00035	ST LO CT	SEC0000079	LORRAINE_C	END	521	26	13,546	AC	79	Satisfactory
OAKWOODHLS	VALLE00036	VALLEY DR	SEC0000080	END	OAKHILL_DR	699	20	13,980	AC	56	Fair
OAKWOODHLS	VALLE00036	VALLEY DR	SEC0000081	OAKHILL_DR	SHERWOOD_T	907	22	19,954	AC	36	Very Poor

Table A-1. 2021 PCI by road segment (continued).

NetworkID	BranchID	Branch Name	SectionID	From	To	Length	Width	Area	Surf. Type	PCI	PCI Category
OAKWOODHLS	VALLE00036	VALLEY DR	SEC0000082	SHERWOOD_T	RAWSON_BRI	779	22	17,138	AC	36	Very Poor
OAKWOODHLS	VALLE00037	VALLEY VIEW RD	SEC0000083	N_PARK_DR	SEC_BREAK	1,230	28	34,440	AC	58	Fair
OAKWOODHLS	WESTP00039	WEST PARK LN	SEC0000087	GREENVIEW_	END	133	20	2,660	AC	56	Fair
OAKWOODHLS	WESTP00039	WEST PARK LN	SEC0000088	GREENVIEW_	OAK_PARK_R	310	20	6,200	AC	36	Very Poor
OAKWOODHLS	WESTP00039	WEST PARK LN	SEC0000089	OAK_PARK_R	W_LAKE_SHO	301	20	6,020	AC	42	Poor
OAKWOODHLS	WLAKE00038	W LAKESHORE DR	SEC0000084	N_PARK_DR	W_PARK_LN	1,324	24	31,776	AC	36	Very Poor
OAKWOODHLS	WLAKE00038	W LAKESHORE DR	SEC0000085	W_PARK_LN	N_SHORE_DR	353	24	8,472	AC	36	Very Poor
OAKWOODHLS	WLAKE00038	W LAKESHORE DR	SEC0000086	N_SHORE_DR	PALISADES_	1,009	24	24,216	AC	32	Very Poor
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000090	LAKEWOOD_D	RAWSON_RD	175	22	3,850	AC	97	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000091	ASH_DR	ACORN_LN	162	22	3,564	AC	100	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000092	ACORN_LN	MEADOW_LN	138	22	3,036	AC	99	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000093	MEADOW_LN	OAK_DR	162	22	3,564	AC	100	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000094	LAKE_SHORE	WOODLAND_R	306	22	6,732	AC	100	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000095	WOODLAND_R	ECHO_HILL	143	22	3,146	AC	96	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000096	HILLCREST_	ASH_DR	141	22	3,102	AC	99	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000097	ECHO_HILL	HILLCREST_	161	22	3,542	AC	98	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000098	OAK_DR	LAKEWOOD_D	141	22	3,102	AC	100	Good
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000099	GREENVIEW_	PLEASANT_V	346	22	7,612	AC	49	Poor
OAKWOODHLS	WOODL00040	WOODLAND RD	SEC0000103	PLEASANT_V	END	88	22	1,936	AC	52	Poor
OAKWOODHLS	WOODY00041	WOODY WAY	SEC0000100	END	OAKHILL_DR	667	22	14,674	AC	92	Good
OAKWOODHLS	WOODY00041	WOODY WAY	SEC0000101	OAKHILL_DR	SHERWOOD_T	901	22	19,822	AC	93	Good
OAKWOODHLS	WOODY00041	WOODY WAY	SEC0000102	SHERWOOD_T	WOODLAND_R	789	22	17,358	AC	47	Poor

APPENDIX B – CURRENT FUNDING WORK NEEDS PROJECTION

Table B-1. Current Funding Major M&R by Year.

Year	Network ID	Branch ID	Section ID	True Area (Sq Ft)	PCI Before	Cost	Work Type
2022	OAKWOODHLS	BIRCH00004	SEC0000004	5,634.	49.97	$11,272.91	Mill and Overlay
2022	OAKWOODHLS	HILLC00016	SEC0000028	4,944.	49.97	$9,892.31	Mill and Overlay
2022	OAKWOODHLS	HILLT00017	SEC0000029	17,116.	49.97	$34,246.91	Mill and Overlay
2022	OAKWOODHLS	PALIS00032	SEC0000068	6,776.	47.97	$14,009.77	Mill and Overlay
2022	OAKWOODHLS	PLEAS00042	SEC0000104	3,432.	43.97	$7,553.59	Mill and Overlay
2022	OAKWOODHLS	WOODL00040	SEC0000099	7,612.	46.97	$15,992.05	Mill and Overlay
2022	OAKWOODHLS	WOODL00040	SEC0000103	1,936.	49.97	$3,873.69	Mill and Overlay
2023	OAKWOODHLS	NORTH00026	SEC0000048	6,710.	48.34	$14,204.24	Mill and Overlay
2023	OAKWOODHLS	NORTH00026	SEC0000052	4,048.	40.34	$9,681.32	Mill and Overlay
2023	OAKWOODHLS	OAKHI00030	SEC0000064	6,180.	40.34	$14,780.28	Mill and Overlay
2023	OAKWOODHLS	OAKHI00030	SEC0000065	6,160.	48.34	$13,039.96	Mill and Overlay
2023	OAKWOODHLS	PALIS00032	SEC0000069	6,006.	43.34	$13,745.28	Mill and Overlay
2023	OAKWOODHLS	SHERW00034	SEC0000074	6,578.	43.34	$15,054.36	Mill and Overlay
2023	OAKWOODHLS	SHERW00034	SEC0000075	6,336.	43.34	$14,500.52	Mill and Overlay
2024	OAKWOODHLS	GREEN00014	SEC0000022	29,084.	48.71	$63,033.57	Mill and Overlay
2024	OAKWOODHLS	VALLE00036	SEC0000080	13,980.	48.71	$30,298.76	Mill and Overlay
2024	OAKWOODHLS	WESTP00039	SEC0000087	2,660.	48.71	$5,765.00	Mill and Overlay
2025	OAKWOODHLS	OAKHI00030	SEC0000060	5,940.	49.07	$13,182.03	Mill and Overlay
2025	OAKWOODHLS	VALLE00037	SEC0000083	34,440.	48.07	$77,683.93	Mill and Overlay
2026	OAKWOODHLS	LAKEL00018	SEC0000031	6,528.	31.44	$19,240.05	Mill and Overlay
2026	OAKWOODHLS	NORMA00025	SEC0000047	25,116.	45.44	$60,830.88	Mill and Overlay
2026	OAKWOODHLS	PALIS00032	SEC0000067	6,384.	31.44	$18,815.64	Mill and Overlay

Table B-2. Recommended Localized and Stopgap Maintenance.

Network ID	Branch ID	Section ID	True Area (SqFt)	PCI Before	PCI After	Cost	Policy
OAKWOODHLS	BIRCH00004	SEC0000004	*5,634.00*	52.00	64.00	$353.99	Localized Preventive
OAKWOODHLS	BORDE00005	SEC0000005	*20,046.00*	89.00	89.00	$4.06	Localized Preventive
OAKWOODHLS	BRITT00006	SEC0000012	*32,864.00*	99.00	99.00	$2.10	Localized Preventive
OAKWOODHLS	GREEN00014	SEC0000022	*29,084.00*	56.00	68.00	$878.96	Localized Preventive
OAKWOODHLS	HICKO00015	SEC0000026	*19,866.00*	90.00	90.00	$5.83	Localized Preventive
OAKWOODHLS	HICKO00015	SEC0000027	*16,913.68*	89.00	90.00	$28.63	Localized Preventive
OAKWOODHLS	HILLC00016	SEC0000028	*4,944.00*	52.00	70.00	$512.06	Localized Preventive
OAKWOODHLS	HILLT00017	SEC0000029	*17,116.00*	52.00	68.00	$1,122.60	Localized Preventive
OAKWOODHLS	LAKES00020	SEC0000033	*10,846.00*	97.00	97.00	$4.07	Localized Preventive
OAKWOODHLS	LAKEW00022	SEC0000039	*18,520.00*	84.00	86.00	$33.89	Localized Preventive
OAKWOODHLS	LAKEW00022	SEC0000040	*17,754.00*	84.00	84.00	$9.24	Localized Preventive
OAKWOODHLS	LAKEW00022	SEC0000041	*21,456.00*	92.00	92.00	$0.79	Localized Preventive
OAKWOODHLS	LORRA00023	SEC0000042	*11,024.00*	85.00	85.00	$0.22	Localized Preventive
OAKWOODHLS	LORRA00023	SEC0000043	*14,482.00*	70.00	72.00	$86.97	Localized Preventive
OAKWOODHLS	NORMA00025	SEC0000047	*25,116.00*	58.00	58.00	$19.30	Localized Preventive
OAKWOODHLS	NORTH00026	SEC0000048	*6,710.00*	53.00	68.00	$284.25	Localized Preventive
OAKWOODHLS	OAKHI00030	SEC0000060	*5,940.00*	59.00	70.00	$207.60	Localized Preventive
OAKWOODHLS	OAKHI00030	SEC0000065	*6,160.00*	53.00	68.00	$329.20	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000070	*47,952.00*	91.00	90.00	$37.26	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000072	*11,736.00*	85.00	85.00	$3.77	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000106	*8,616.00*	87.00	86.00	$2.53	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000107	*6,912.00*	86.00	89.00	$40.86	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000108	*7,056.00*	87.00	87.00	$2.53	Localized Preventive
OAKWOODHLS	RAWSO00033	SEC0000109	*3,072.00*	94.00	93.00	$1.26	Localized Preventive
OAKWOODHLS	STLOC00035	SEC0000079	*13,546.00*	79.00	79.00	$2.28	Localized Preventive
OAKWOODHLS	VALLE00036	SEC0000080	*13,980.00*	56.00	73.00	$919.09	Localized Preventive
OAKWOODHLS	VALLE00037	SEC0000083	*34,440.00*	58.00	66.00	$1,058.16	Localized Preventive
OAKWOODHLS	WESTP00039	SEC0000087	*2,660.00*	56.00	71.00	$212.79	Localized Preventive
OAKWOODHLS	WOODL00040	SEC0000103	*1,936.00*	52.00	67.00	$208.91	Localized Preventive
OAKWOODHLS	WOODY00041	SEC0000100	*14,674.00*	92.00	92.00	$8.34	Localized Preventive
OAKWOODHLS	WOODY00041	SEC0000101	*19,822.00*	93.00	93.00	$1.01	Localized Preventive
OAKWOODHLS	ACORN00001	SEC0000001	*4,400.00*	5.00	17.00	$930.82	Stopgap
OAKWOODHLS	ASHDR00002	SEC0000002	*16,260.00*	27.00	36.00	$1,398.71	Stopgap
OAKWOODHLS	BRITT00006	SEC0000006	*69,552.00*	29.00	30.00	$2,105.91	Stopgap
OAKWOODHLS	BURWO00007	SEC0000013	*34,122.00*	37.00	38.00	$175.84	Stopgap
OAKWOODHLS	FAWNR00012	SEC0000019	*27,632.00*	24.00	29.00	$949.60	Stopgap
OAKWOODHLS	FAWNR00012	SEC0000020	*9,218.00*	27.00	29.00	$53.25	Stopgap
OAKWOODHLS	GREEN00014	SEC0000023	*43,384.00*	45.00	49.00	$388.54	Stopgap
OAKWOODHLS	GREEN00014	SEC0000024	*16,510.00*	44.00	46.00	$205.36	Stopgap
OAKWOODHLS	HICKO00015	SEC0000105	*9,284.00*	36.00	36.00	$92.37	Stopgap

Table B-2. Recommended Localized and Stopgap Maintenance (continued).

Network ID	Branch ID	Section ID	True Area (SqFt)	PCI Before	PCI After	Cost	Policy
OAKWOODHLS	LAKEL00018	SEC0000030	*12,660.00*	40.00	41.00	$104.64	Stopgap
OAKWOODHLS	LAKES00020	SEC0000034	*21,408.00*	36.00	36.00	$170.64	Stopgap
OAKWOODHLS	LAKES00020	SEC0000037	*13,656.00*	33.00	35.00	$70.56	Stopgap
OAKWOODHLS	MEADO00024	SEC0000044	*18,500.00*	20.00	28.00	$1,169.49	Stopgap
OAKWOODHLS	NORTH00026	SEC0000049	*6,754.00*	43.00	50.00	$220.33	Stopgap
OAKWOODHLS	NORTH00026	SEC0000050	*6,798.00*	40.00	49.00	$281.06	Stopgap
OAKWOODHLS	NORTH00026	SEC0000051	*6,666.00*	43.00	47.00	$82.87	Stopgap
OAKWOODHLS	NORTH00026	SEC0000052	*4,048.00*	45.00	49.00	$95.11	Stopgap
OAKWOODHLS	NORTH00026	SEC0000053	*27,698.00*	39.00	44.00	$340.47	Stopgap
OAKWOODHLS	NORTH00027	SEC0000054	*7,612.00*	36.00	37.00	$151.47	Stopgap
OAKWOODHLS	NORTH00027	SEC0000055	*7,348.00*	38.00	40.00	$116.77	Stopgap
OAKWOODHLS	NORTH00027	SEC0000056	*28,368.00*	31.00	38.00	$992.07	Stopgap
OAKWOODHLS	OAKHI00030	SEC0000061	*6,020.00*	40.00	42.00	$117.36	Stopgap
OAKWOODHLS	OAKHI00030	SEC0000062	*5,860.00*	42.00	47.00	$138.13	Stopgap
OAKWOODHLS	OAKHI00030	SEC0000063	*5,980.00*	44.00	46.00	$73.91	Stopgap
OAKWOODHLS	OAKHI00030	SEC0000064	*6,180.00*	45.00	47.00	$75.27	Stopgap
OAKWOODHLS	OAKPK00029	SEC0000059	*32,736.00*	36.00	36.00	$150.80	Stopgap
OAKWOODHLS	OAKWO00031	SEC0000066	*28,320.00*	43.00	44.00	$510.75	Stopgap
OAKWOODHLS	PALIS00032	SEC0000067	*6,384.00*	44.00	47.00	$152.76	Stopgap
OAKWOODHLS	PALIS00032	SEC0000069	*6,006.00*	48.00	50.00	$61.14	Stopgap
OAKWOODHLS	PLEAS00042	SEC0000104	*3,432.00*	46.00	50.00	$85.80	Stopgap
OAKWOODHLS	SHERW00034	SEC0000074	*6,578.00*	48.00	50.00	$59.08	Stopgap
OAKWOODHLS	SHERW00034	SEC0000075	*6,336.00*	48.00	51.00	$62.12	Stopgap
OAKWOODHLS	SHERW00034	SEC0000077	*6,710.00*	37.00	39.00	$66.08	Stopgap
OAKWOODHLS	VALLE00036	SEC0000081	*19,954.00*	36.00	39.00	$445.33	Stopgap
OAKWOODHLS	VALLE00036	SEC0000082	*17,138.00*	36.00	41.00	$179.16	Stopgap
OAKWOODHLS	WLAKE00038	SEC0000085	*8,472.00*	36.00	37.00	$181.12	Stopgap
OAKWOODHLS	WLAKE00038	SEC0000086	*24,216.00*	32.00	37.00	$804.35	Stopgap

APPENDIX C – 2021 IRI SUMMARY

Table C-1. IRI values by road segment.

Network ID	Branch ID	Section ID	From	To	IRI	Category
OAKWOODHLS	ACORN00001	SEC0000001	WOODLAND_R	SEC_BREAK	359	Marginal (201 - 400)
OAKWOODHLS	ASHDR00002	SEC0000002	SHERWOOD_T	WOODLAND_R	294	Marginal (201 - 400)
OAKWOODHLS	BERNA00003	SEC0000003	BRITTANY_D	END	306	Marginal (201 - 400)
OAKWOODHLS	BIRCH00004	SEC0000004	LAKE_LN	END	258	Marginal (201 - 400)
OAKWOODHLS	BORDE00005	SEC0000005	BRITTANY_D	END	250	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000006	NORMANDY_C	RAWSON_BRI	320	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000007	LORRAINE_C	NORMANDY_C	278	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000008	DAUPHINE_C	LORRAINE_C	289	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000009	CALAIS_CT	DAUPHINE_C	272	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000010	BERNAY_CT	CALAIS_CT	291	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000011	BORDEAUX_C	BERNAY_CT	278	Marginal (201 - 400)
OAKWOODHLS	BRITT00006	SEC0000012	RAWSON_BRI	BORDEAUX_C	170	Smooth (0 - 200)
OAKWOODHLS	BURWO00007	SEC0000013	N_PARK_DR	N_SHORE_DR	163	Smooth (0 - 200)
OAKWOODHLS	CALAI00008	SEC0000014	BRITTANY_D	END	271	Marginal (201 - 400)
OAKWOODHLS	CAUPH00009	SEC0000015	BRITTANY_D	END	250	Marginal (201 - 400)
OAKWOODHLS	DEERT00010	SEC0000016	FAWN RIDGE	END	476	Rough (Over 400)
OAKWOODHLS	ECHOH00011	SEC0000017	ECHO_HILL	WOODLAND_R	334	Marginal (201 - 400)
OAKWOODHLS	FAWNR00012	SEC0000018	SEC_BREAK	FENVIEW_CT	174	Smooth (0 - 200)
OAKWOODHLS	FAWNR00012	SEC0000019	FENVIEW_CT	DEER_TRAIL	244	Marginal (201 - 400)
OAKWOODHLS	FAWNR00012	SEC0000020	DEER_TRAIL	END	326	Marginal (201 - 400)
OAKWOODHLS	FENVI00013	SEC0000021	FAWN RIDGE	END	390	Marginal (201 - 400)
OAKWOODHLS	GREEN00014	SEC0000022	N_PARK_DR	W_PARK_LN	176	Smooth (0 - 200)
OAKWOODHLS	GREEN00014	SEC0000023	W_PARK_LN	PALISADES_	200	Smooth (0 - 200)
OAKWOODHLS	GREEN00014	SEC0000024	PALISADES_	W_WOODLAND	166	Smooth (0 - 200)
OAKWOODHLS	HICKO00015	SEC0000025	END	OAKHILL_DR	294	Marginal (201 - 400)
OAKWOODHLS	HICKO00015	SEC0000026	OAKHILL_DR	SHERWOOD_T	238	Marginal (201 - 400)
OAKWOODHLS	HICKO00015	SEC0000027	SHERWOOD_T	WOODLAND_R	306	Marginal (201 - 400)
OAKWOODHLS	HICKO00015	SEC0000105	SHERWOOD_T	WOODLAND_R	301	Marginal (201 - 400)
OAKWOODHLS	HILLC00016	SEC0000028	WOODLAND_R	SEC_BREAK	303	Marginal (201 - 400)
OAKWOODHLS	HILLT00017	SEC0000029	RAWSON_BRI	SHERWOOD_T	301	Marginal (201 - 400)
OAKWOODHLS	LAKEL00018	SEC0000030	PALISADES_	BIRCH_LN	330	Marginal (201 - 400)
OAKWOODHLS	LAKEL00018	SEC0000031	W_LAKE_SHO	BIRCH_LN	360	Marginal (201 - 400)
OAKWOODHLS	LAKES00020	SEC0000032	N_SHORE_DR	E_PARK_LN	213	Marginal (201 - 400)
OAKWOODHLS	LAKES00020	SEC0000033	SHERWOOD_T	EHO_HILL	258	Marginal (201 - 400)
OAKWOODHLS	LAKES00020	SEC0000034	OAKHILL_DR	SHERWOOD_T	115	Smooth (0 - 200)
OAKWOODHLS	LAKES00020	SEC0000035	LAKEVIEW_D	WOODLAND_R	233	Marginal (201 - 400)
OAKWOODHLS	LAKES00020	SEC0000036	ECHO_HILL	LAKEVIEW_D	380	Marginal (201 - 400)
OAKWOODHLS	LAKES00020	SEC0000037	N_SHORE_DR	OAKHILL_DR	155	Smooth (0 - 200)
OAKWOODHLS	LAKEV00021	SEC0000038	LAKE_SHORE	SEC_BREAK	529	Rough (Over 400)
OAKWOODHLS	LAKEW00022	SEC0000039	E_PARK_LN	OAKHILL_DR	217	Marginal (201 - 400)
OAKWOODHLS	LAKEW00022	SEC0000040	SHERWOOD_T	WOODLAND_R	233	Marginal (201 - 400)

Table C-1. IRI values by road segment (continued).

Network ID	Branch ID	Section ID	From	To	IRI	Category
OAKWOODHLS	LAKEW00022	SEC0000041	OAKHILL_DR	SHERWOOD_T	186	Smooth (0 - 200)
OAKWOODHLS	LORRA00023	SEC0000042	ST_LO_CT	END	255	Marginal (201 - 400)
OAKWOODHLS	LORRA00023	SEC0000043	BRITTANY_D	ST_LO_CT	190	Smooth (0 - 200)
OAKWOODHLS	MEADO00024	SEC0000044	E_PARK_LN	OAKHILL_DR	384	Marginal (201 - 400)
OAKWOODHLS	MEADO00024	SEC0000045	OAKHILL_DR	SHERWOOD_T	346	Marginal (201 - 400)
OAKWOODHLS	MEADO00024	SEC0000046	SHERWOOD_T	WOODLAND_R	316	Marginal (201 - 400)
OAKWOODHLS	NORMA00025	SEC0000047	BRITTANY_D	END	211	Marginal (201 - 400)
OAKWOODHLS	NORTH00026	SEC0000048	GREENVIEW_	OAK_PARK_R	173	Smooth (0 - 200)
OAKWOODHLS	NORTH00026	SEC0000049	W_LAKE_SHO	BURWOOD_RD	218	Marginal (201 - 400)
OAKWOODHLS	NORTH00026	SEC0000050	BURWOOD_RD	OAKWOOD_DR	196	Smooth (0 - 200)
OAKWOODHLS	NORTH00026	SEC0000051	OAK_PARK_R	W_LAKE_SHO	174	Smooth (0 - 200)
OAKWOODHLS	NORTH00026	SEC0000052	OAKWOOD_DR	SEC_BREAK	309	Marginal (201 - 400)
OAKWOODHLS	NORTH00026	SEC0000053	VALLEY_VIE	GREENVIEW_	184	Smooth (0 - 200)
OAKWOODHLS	NORTH00027	SEC0000054	W_LAKE_SHO	BURWOOD_RD	165	Smooth (0 - 200)
OAKWOODHLS	NORTH00027	SEC0000055	BURWOOD_RD	OAKWOOD_DR	122	Smooth (0 - 200)
OAKWOODHLS	NORTH00027	SEC0000056	OAKWOOD_DR	LAKE_SHORE	209	Marginal (201 - 400)
OAKWOODHLS	OAKDR00028	SEC0000057	WOODLAND_R	SEC_BREAK	685	Rough (Over 400)
OAKWOODHLS	OAKHI00030	SEC0000060	LAKE_SHORE	MEADOW_LN	263	Marginal (201 - 400)
OAKWOODHLS	OAKHI00030	SEC0000061	HICKORY_RD	WOODY_WAY	393	Marginal (201 - 400)
OAKWOODHLS	OAKHI00030	SEC0000062	WOODY_WAY	VALLEY_DR	350	Marginal (201 - 400)
OAKWOODHLS	OAKHI00030	SEC0000063	MEADOW_LN	LAKEWOOD_D	371	Marginal (201 - 400)
OAKWOODHLS	OAKHI00030	SEC0000064	VALLEY_DR	END	376	Marginal (201 - 400)
OAKWOODHLS	OAKHI00030	SEC0000065	LAKEWOOD_D	HICKORY_RD	313	Marginal (201 - 400)
OAKWOODHLS	OAKPK00029	SEC0000058	N_PARK_DR	W_PARK_LN	182	Smooth (0 - 200)
OAKWOODHLS	OAKPK00029	SEC0000059	W_PARK_LN	PALISADES_	184	Smooth (0 - 200)
OAKWOODHLS	OAKWO00031	SEC0000066	N_PARK_DR	N_SHORE_DR	323	Marginal (201 - 400)
OAKWOODHLS	PALIS00032	SEC0000067	OAK_PARK_R	W_LAKE_SHO	183	Smooth (0 - 200)
OAKWOODHLS	PALIS00032	SEC0000068	LAKE_LN	OAK_PARK_R	141	Smooth (0 - 200)
OAKWOODHLS	PALIS00032	SEC0000069	GREENVIEW_	LAKE_LN	163	Smooth (0 - 200)
OAKWOODHLS	PLEAS00042	SEC0000104	W_WOODLAND	SEC_BREAK	704	Rough (Over 400)
OAKWOODHLS	RAWSO00033	SEC0000070	BRITTANY_D	SEC_BREAK	76	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000071	SEC_BREAK	BRITTANY_D	89	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000072	HILLTOP_RD	BRITTANY_D	113	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000106	VALLEY_DR	HILLTOP_RD	113	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000107	WOODY_WY	VALLEY_DR	113	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000108	HICKORY_RD	WOODY_WY	113	Smooth (0 - 200)
OAKWOODHLS	RAWSO00033	SEC0000109	RAWSON_RD	HICKORY_RD	326	Marginal (201 - 400)
OAKWOODHLS	SHERW00034	SEC0000073	LAKE_SHORE	MEADOW_LN	174	Smooth (0 - 200)
OAKWOODHLS	SHERW00034	SEC0000074	HICKORY_RD	WOODY_WAY	318	Marginal (201 - 400)
OAKWOODHLS	SHERW00034	SEC0000075	WOODY_WAY	VALLEY_DR	674	Rough (Over 400)
OAKWOODHLS	SHERW00034	SEC0000076	MEADOW_LN	LAKEWOOD_D	190	Smooth (0 - 200)

Table C-1. IRI values by road segment (continued).

Network ID	Branch ID	Section ID	From	To	IRI	Category
OAKWOODHLS	SHERW00034	SEC0000077	LAKEWOOD_D	HICKORY_RD	233	Marginal (201 - 400)
OAKWOODHLS	SHERW00034	SEC0000078	HILLTOP_RD	END	259	Marginal (201 - 400)
OAKWOODHLS	STLOC00035	SEC0000079	LORRAINE_C	END	241	Marginal (201 - 400)
OAKWOODHLS	VALLE00036	SEC0000080	END	OAKHILL_DR	311	Marginal (201 - 400)
OAKWOODHLS	VALLE00036	SEC0000081	OAKHILL_DR	SHERWOOD_T	246	Marginal (201 - 400)
OAKWOODHLS	VALLE00036	SEC0000082	SHERWOOD_T	RAWSON_BRI	222	Marginal (201 - 400)
OAKWOODHLS	VALLE00037	SEC0000083	N_PARK_DR	SEC_BREAK	85	Smooth (0 - 200)
OAKWOODHLS	WESTP00039	SEC0000087	GREENVIEW_	END	378	Marginal (201 - 400)
OAKWOODHLS	WESTP00039	SEC0000088	GREENVIEW_	OAK_PARK_R	238	Marginal (201 - 400)
OAKWOODHLS	WESTP00039	SEC0000089	OAK_PARK_R	W_LAKE_SHO	234	Marginal (201 - 400)
OAKWOODHLS	WLAKE00038	SEC0000084	N_PARK_DR	W_PARK_LN	166	Smooth (0 - 200)
OAKWOODHLS	WLAKE00038	SEC0000085	W_PARK_LN	N_SHORE_DR	230	Marginal (201 - 400)
OAKWOODHLS	WLAKE00038	SEC0000086	N_SHORE_DR	PALISADES_	199	Smooth (0 - 200)
OAKWOODHLS	WOODL00040	SEC0000090	LAKEWOOD_D	RAWSON_RD	326	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000091	ASH_DR	ACORN_LN	281	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000092	ACORN_LN	MEADOW_LN	248	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000093	MEADOW_LN	OAK_DR	218	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000094	LAKE_SHORE	WOODLAND_R	286	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000095	WOODLAND_R	ECHO_HILL	122	Smooth (0 - 200)
OAKWOODHLS	WOODL00040	SEC0000096	HILLCREST_	ASH_DR	195	Smooth (0 - 200)
OAKWOODHLS	WOODL00040	SEC0000097	ECHO_HILL	HILLCREST_	164	Smooth (0 - 200)
OAKWOODHLS	WOODL00040	SEC0000098	OAK_DR	LAKEWOOD_D	181	Smooth (0 - 200)
OAKWOODHLS	WOODL00040	SEC0000099	GREENVIEW_	PLEASANT_V	382	Marginal (201 - 400)
OAKWOODHLS	WOODL00040	SEC0000103	PLEASANT_V	END	335	Marginal (201 - 400)
OAKWOODHLS	WOODY00041	SEC0000100	END	OAKHILL_DR	331	Marginal (201 - 400)
OAKWOODHLS	WOODY00041	SEC0000101	OAKHILL_DR	SHERWOOD_T	303	Marginal (201 - 400)
OAKWOODHLS	WOODY00041	SEC0000102	SHERWOOD_T	WOODLAND_R	256	Marginal (201 - 400)

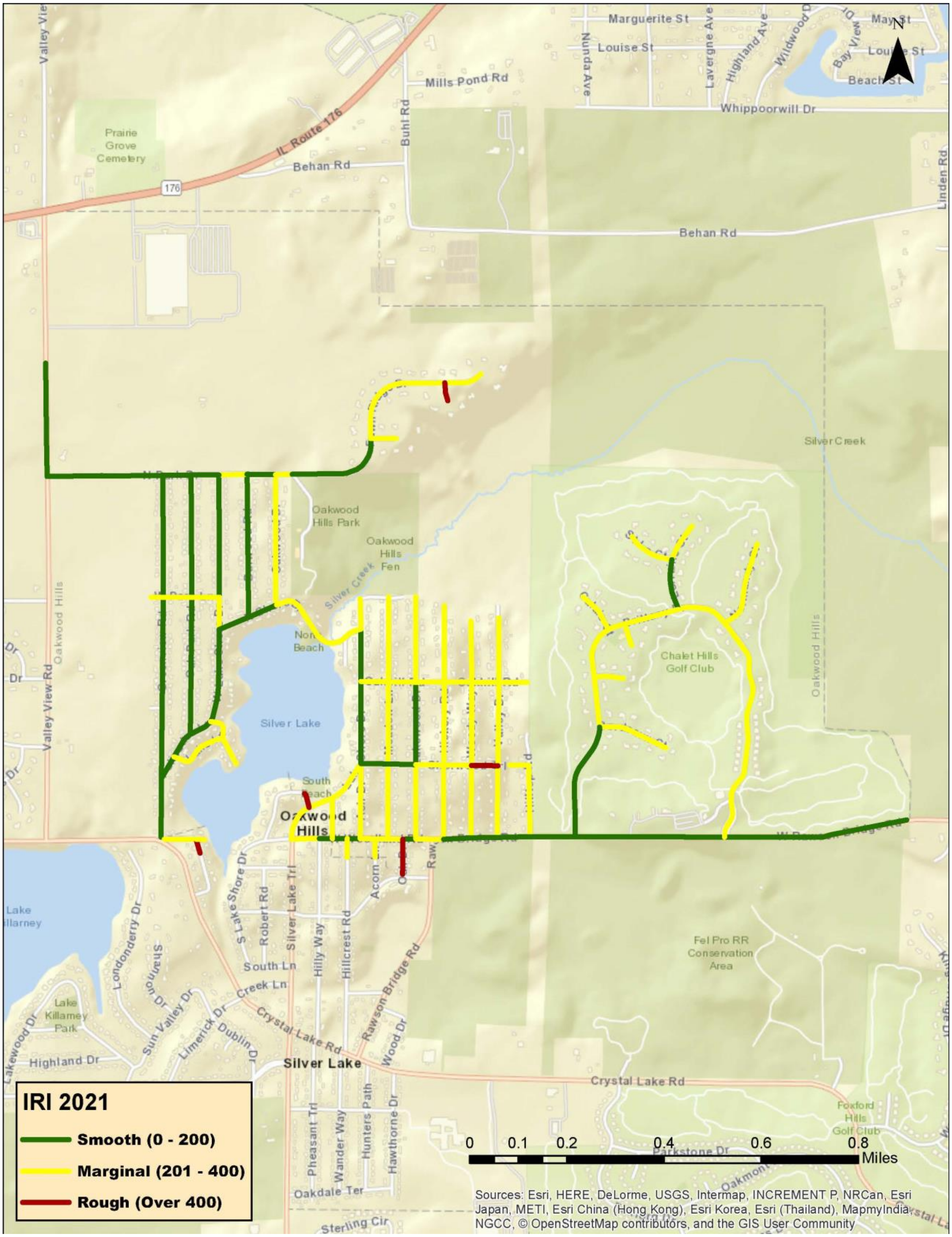


Figure C-1. Map of 2021 IRI ranges.

APPENDIX D – DEFINITION OF TERMS

Definition of Terms

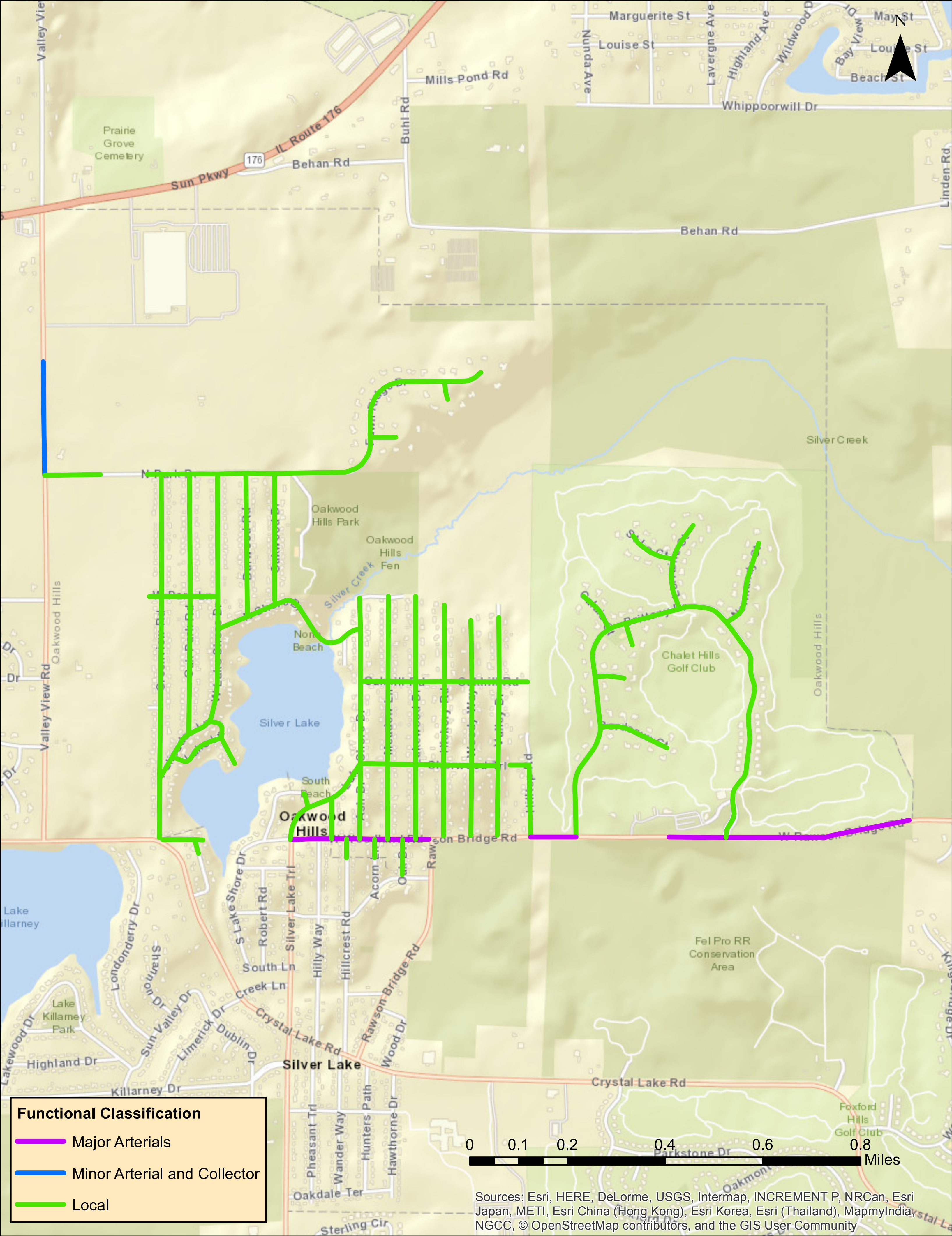
This section provides definitions of some of the more general terms used in discussions about pavement management.

- **Backlog** – Amount of unfunded maintenance and rehabilitation (M&R).
- **Branch** – A part of the network that is a distinct entity and has a unique function. Each road and parking lot in the pavement network is considered a separate branch. Note that a branch does not have to have consistent characteristics throughout its area, such as surface type or age.
- **Condition analysis** – Determination of current pavement condition in terms of amount of deterioration present, cause of deterioration, and deterioration rate.
- **Deterioration rate** – Drop in pavement condition in terms of PCI points per year.
- **Effect on pavement life** – The effect that a treatment has on the remaining life of a section. For example, complete reconstruction yields an essentially new pavement with all of its life (as defined by the performance model assigned to the section) remaining.
- **Family** – Group of pavement sections that deteriorate in a similar manner.
- **Hot Mix Asphalt (HMA)** – asphalt mix prepared at an asphalt plant that requires compaction after placement.
- **Impact analysis** – A comparison of different M&R plans to determine the impact that different decisions will have on the pavement network.
- **M&R** – This is an abbreviation for "maintenance and rehabilitation," but generally refers to any pavement work activities, such as localized maintenance, rehabilitation, and reconstruction.
- **PAVER** – A pavement management system developed by the U.S. Army Corps of Engineers. It consists of a Microsoft® Access database for storing inventory and condition information and some analysis tools.
- **Needs analysis** – The determination of M&R requirements, associated costs, and scheduling subject to constraints (e.g., funding levels or desired network condition) for a specified period of time (often 1 to 5 years).
- **Network** – A broad grouping of pavements within a specified physical area, sometimes managed separately (such as districts or subdivisions).
- **Pavement condition index (PCI)** – A numerical indicator between 0 and 100 that reflects the surface condition of a pavement. PCI inspections are performed in accordance with ASTM D-6433, *Standard Test Method for Roads and Parking Lots Pavement Condition Index Surveys*[2], and correspond with PAVER pavement management software.
- **Pavement maintenance** – Routine maintenance actions, both preventive and reactive, applied to preserve the pavement structure.

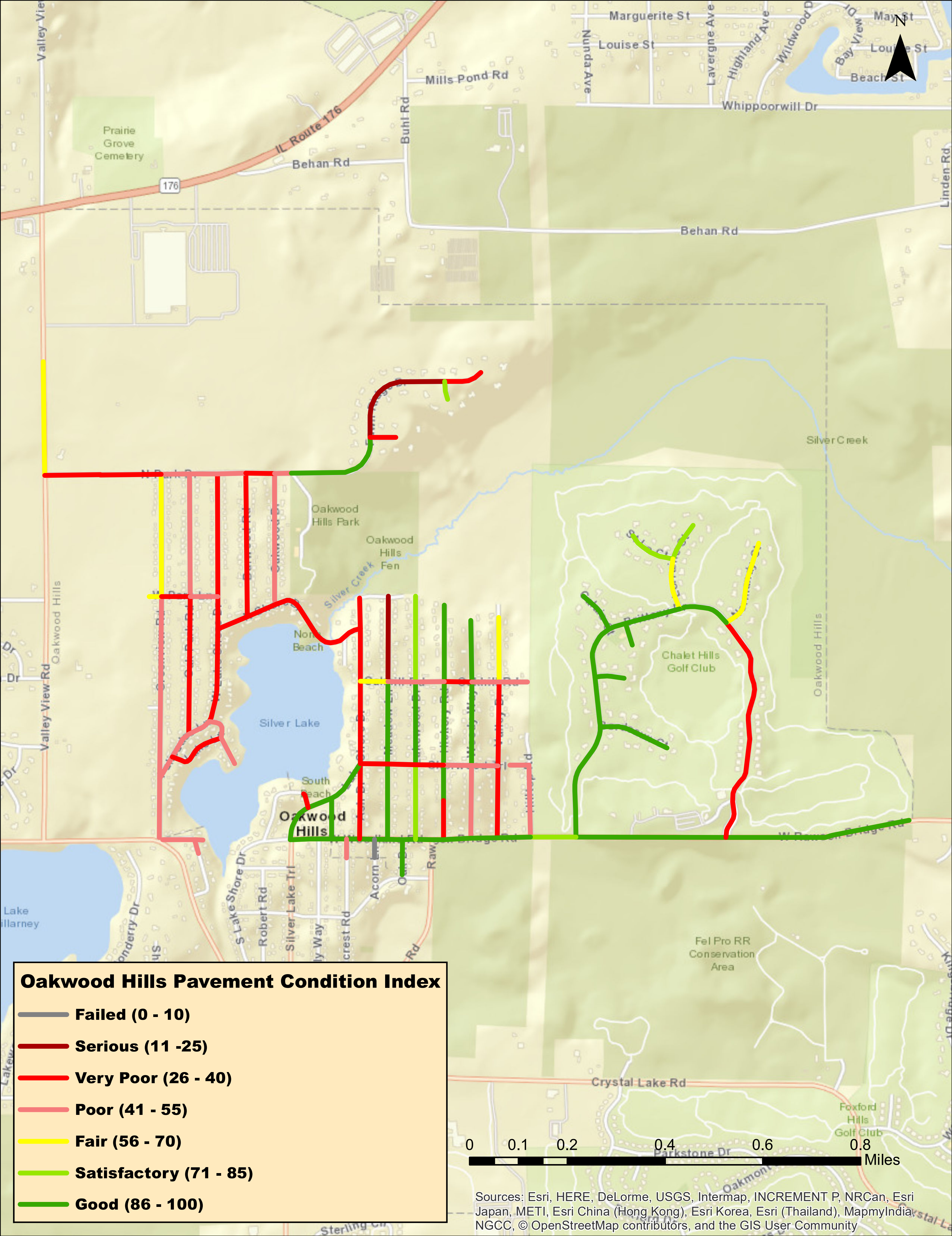
[2] American Society for Testing and Materials (ASTM). 2007. *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys.* ASTM D6433-07. American Society for Testing and Materials, West Conshohocken, PA.

- **Pavement rehabilitation** – Work undertaken to restore the serviceability and extend the life of an existing pavement. This includes overlays and other work necessary to return an existing pavement to a condition of structural or functional adequacy.
- **Performance** – Change in pavement condition over time.
- **Performance model** – Mathematical description of the expected values that pavement attributes will take during a specified analysis period.
- **Preventive maintenance** – Maintenance activities performed with the primary objective of slowing the rate of pavement deterioration.
- **Prioritization** – Technique used to determine which M&R activities should be performed when there is insufficient funding to perform all required M&R.
- **Regression analysis** – Statistical tool that is used to relate two or more variables in a mathematical equation.
- **Sample unit** – A subdivision of a pavement section for PCI inspection purposes.
- **Section** – A part of a branch that has consistent characteristics throughout its area. The PMS analyzes pavement information at the section level; therefore, a section is considered the management unit. This means that pavement condition is analyzed at the section level and that pavement M&R recommendations are made at the section level.
- **Stopgap Maintenance** – Maintenance activities performed to keep the pavement operational in a safe condition.
- **Treatment trigger** – A set of conditions that must exist in order for a treatment to be considered. For example, in order for a thin asphalt concrete (AC) overlay to be considered a viable treatment for a pavement section, the following criteria need to be met: 1) the section PCI must be between 40 and 70, and 2) the section must have an asphalt surface.

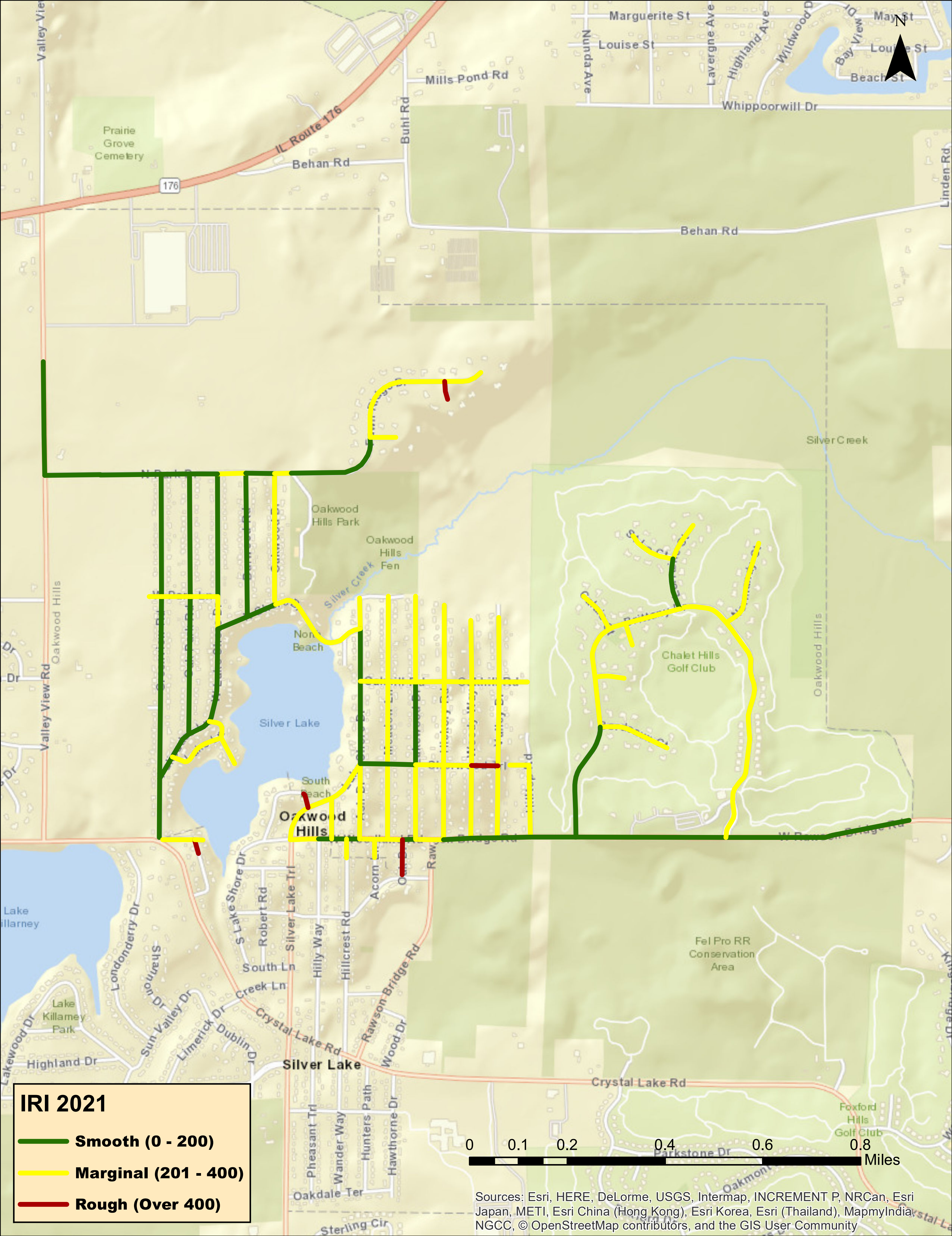
APPENDIX E – MAPS

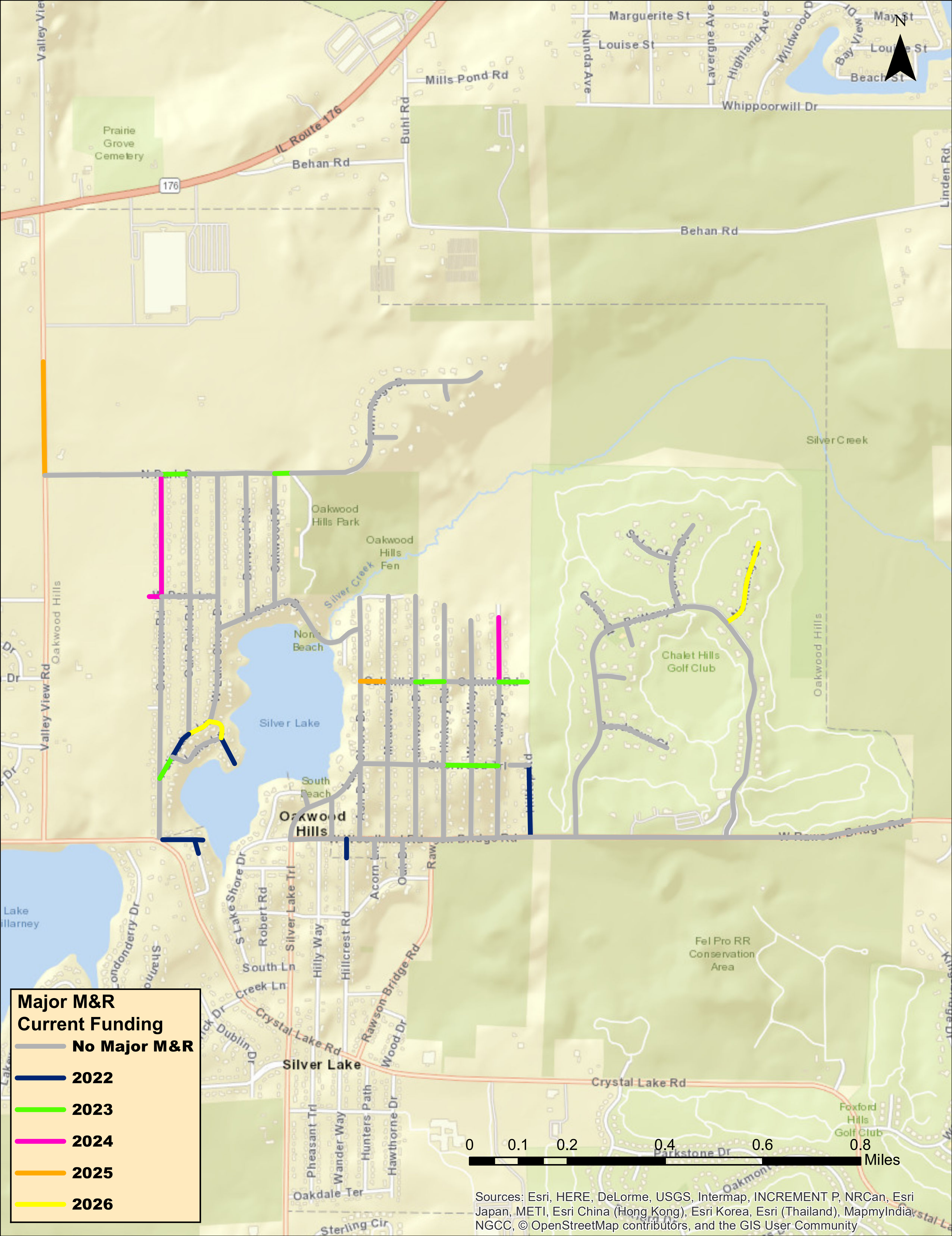


Functional Classification
Major Arterials
Minor Arterial and Collector
Local
0 0.1 0.2 0.4 0.6 0.8 Miles
N
Silver Lake
Oakwood Hills
Chalet Hills Golf Club
Oakwood Hills Park
Oakwood Hills Fen
Silver Creek
Prairie Grove Cemetery
Fel Pro RR Conservation Area
Lake Killarney Park
Foxford Hills Golf Club
Sun Pkwy
IL Route 176
Behan Rd
Mills Pond Rd
Whippoorwill Dr
Valley View Rd
Crystal Lake Rd
Rawson Bridge Rd
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

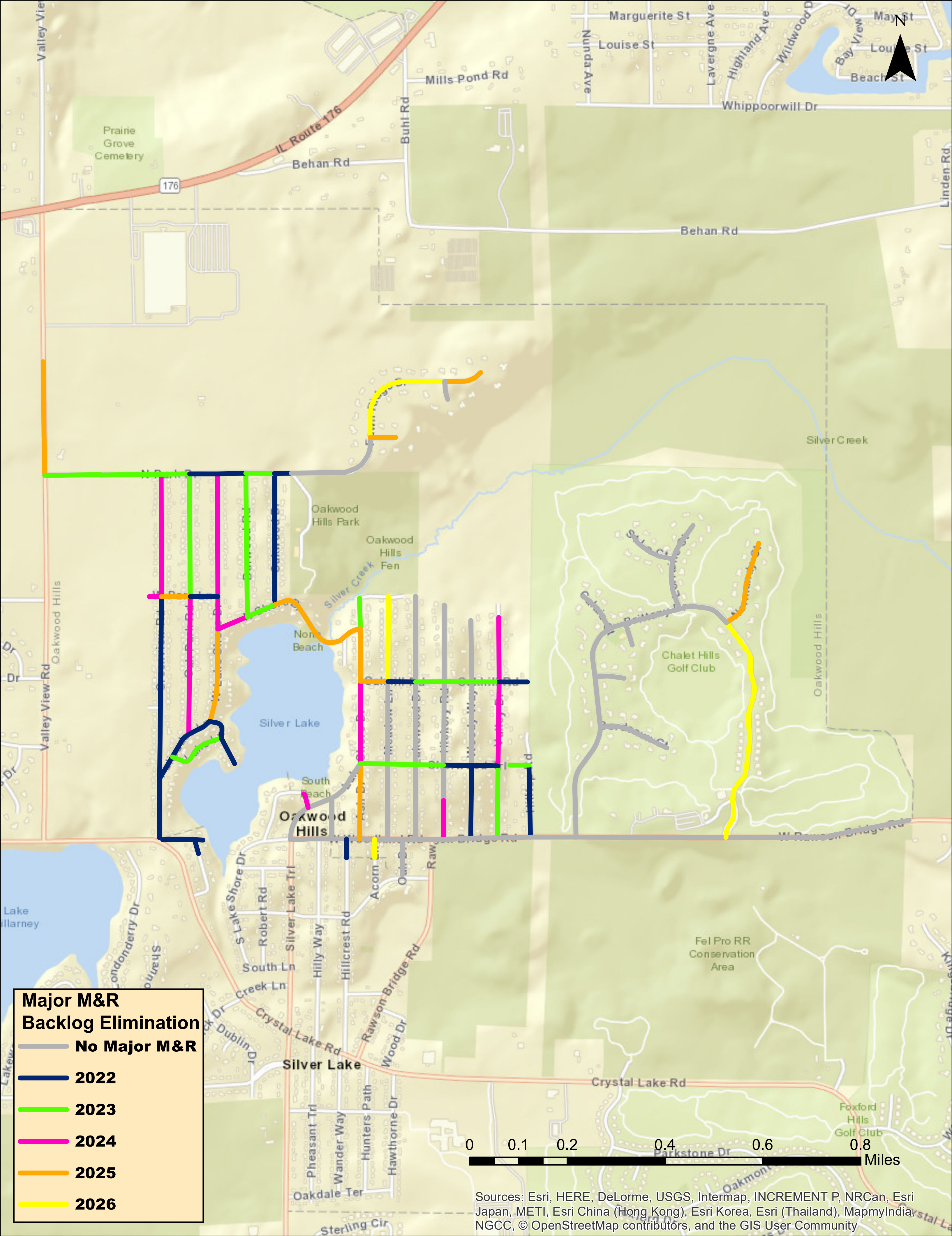


Oakwood Hills Pavement Condition Index
Failed (0 - 10)
Serious (11 -25)
Very Poor (26 - 40)
Poor (41 - 55)
Fair (56 - 70)
Satisfactory (71 - 85)
Good (86 - 100)
0
0.1
0.2
0.4
0.6
0.8
Miles
N
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Marguerite St
Louise St
Mills Pond Rd
Nunda Ave
Lavergne Ave
Highland Ave
Wildwood Dr
Whippoorwill Dr
Beach St
Prairie Grove Cemetery
IL Route 176
176
Behan Rd
Buhl Rd
Linden Rd
Valley View Rd
Oakwood Hills
Oakwood Hills Park
Oakwood Hills Fen
Silver Creek
Chalet Hills Golf Club
Silver Lake
North Beach
South Beach
Oakwood Hills
S Lake Shore Dr
Robert Rd
Silver Lake Trl
Acorn
Lake Killarney
Fel Pro RR Conservation Area
Crystal Lake Rd
Parkstone Dr
Foxford Hills Golf Club

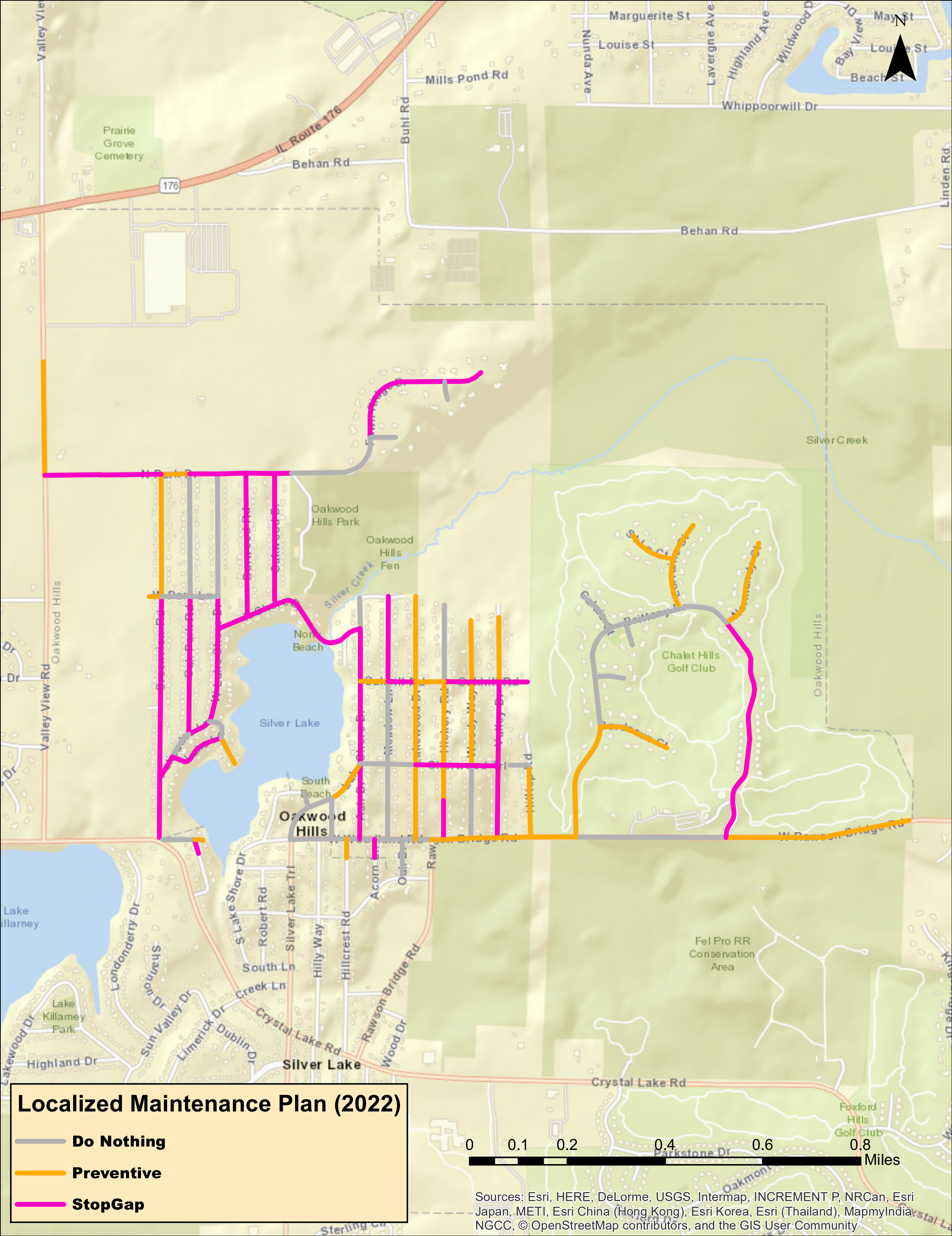

IRI 2021
Smooth (0 - 200)
Marginal (201 - 400)
Rough (Over 400)
N
0
0.1
0.2
0.4
0.6
0.8
Miles
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
Marguerite St
Louise St
Mills Pond Rd
Whippoorwill Dr
Nunda Ave
Lavergne Ave
Highland Ave
Wildwood Dr
Bay View Dr
Beach St
Prairie Grove Cemetery
IL Route 176
176
Behan Rd
Buhl Rd
Linden Rd
Valley View Rd
Oakwood Hills
Oakwood Hills Park
Oakwood Hills Fen
Silver Creek
Silver Lake
North Beach
South Beach
Chalet Hills Golf Club
W Rawson Bridge Rd
Rawson Bridge Rd
S Lake Shore Dr
Robert Rd
Silver Lake Trl
Hilly Way
Hillcrest Rd
Acorn
South Ln
Creek Ln
Crystal Lake Rd
Lake Killarney
Lake Killarney Park
Londonderry Dr
Shannon Dr
Sun Valley Dr
Limerick Dr
Dublin Dr
Lakewood Dr
Highland Dr
Wood Dr
Silver Lake
Fel Pro RR Conservation Area
Foxford Hills Golf Club
Parkstone Dr
Oakmont
Pheasant Trl
Wander Way
Hunters Path
Hawthorne Dr
Oakdale Ter
Sterling Cir



Major M&R
Current Funding
No Major M&R
2022
2023
2024
2025
2026
0 0.1 0.2 0.4 0.6 0.8 Miles
N
Prairie Grove Cemetery
IL Route 176
176
Behan Rd
Mills Pond Rd
Buhl Rd
Marguerite St
Louise St
Nunda Ave
Lavergne Ave
Highland Ave
Wildwood Dr
Whippoorwill Dr
Bay View Dr
Beach St
May St
Linden Rd
Valley View Rd
Oakwood Hills
Oakwood Hills Park
Oakwood Hills Fen
Silver Creek
Silver Lake
North Beach
South Beach
Oakwood Hills
Chalet Hills Golf Club
W Rawson Bridge Rd
Rawson Bridge Rd
Lake Killarney
Londonderry Dr
S Lake Shore Dr
Robert Rd
Silver Lake Trl
Hilly Way
Hillcrest Rd
Acorn
South Ln
Creek Ln
Crystal Lake Rd
Dublin
Wood Dr
Silver Lake
Fel Pro RR Conservation Area
Foxford Hills Golf Club
Parkstone Dr
Pheasant Trl
Wander Way
Hunters Path
Hawthorne Dr
Oakdale Ter
Sterling Cir
Oakmont
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community



Major M&R
Backlog Elimination
No Major M&R
2022
2023
2024
2025
2026
N
0
0.1
0.2
0.4
0.6
0.8
Miles
Silver Lake
Oakwood Hills
Chalet Hills Golf Club
Oakwood Hills Park
Oakwood Hills Fen
Prairie Grove Cemetery
Fel Pro RR Conservation Area
Silver Creek
Lake Killarney
IL Route 176
176
Behan Rd
Mills Pond Rd
Buhl Rd
Whippoorwill Dr
Marguerite St
Louise St
Nunda Ave
Lavergne Ave
Highland Ave
Wildwood Dr
Beach St
Bay View Dr
Linden Rd
Valley View Rd
Crystal Lake Rd
Rawson Bridge Rd
W Rawson Bridge Rd
Silver Lake Trl
Hillcrest Rd
Hilly Way
Robert Rd
S Lake Shore Dr
South Ln
Creek Ln
Dublin
Londonderry Dr
Acorn
North Beach
South Beach
Pheasant Trl
Wander Way
Hunters Path
Hawthorne Dr
Wood Dr
Oakdale Ter
Sterling Cir
Parkstone Dr
Oakmont
Foxford Hills Golf Club
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community



Localized Maintenance Plan (2022)
Do Nothing
Preventive
StopGap
N
0 0.1 0.2 0.4 0.6 0.8
Miles
Marguerite St
Louise St
Lavergne Ave
Highland Ave
Wildwood Dr
May St
Bay View Dr
Beach St
Nunda Ave
Mills Pond Rd
Whippoorwill Dr
Buhl Rd
IL Route 176
176
Prairie Grove Cemetery
Behan Rd
Behan Rd
Linden Rd
Valley View Rd
Oakwood Hills
Silver Creek
Oakwood Hills Park
Oakwood Hills Fen
Silver Creek
Silver Lake
Chalet Hills Golf Club
Oakwood Hills
South Beach
Oakwood Hills
Lake Killarney
S Lake Shore Dr
Robert Rd
Silver Lake Trl
Hilly Way
Hillcrest Rd
Acorn
Rawson Bridge Rd
Londonderry Dr
Shannon Dr
Lake Killarney Park
Sun Valley Dr
Limerick Dr
Dublin Dr
Creek Ln
South Ln
Crystal Lake Rd
Wood Dr
Lakewood Dr
Highland Dr
Silver Lake
Crystal Lake Rd
Fel Pro RR Conservation Area
Foxford Hills Golf Club
Parkstone Dr
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