2019 "State of the Streets"
Final Report

Prepared for:

Village of Dixmoor, Illinois &
Chicago Metropolitan Agency for Planning

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1   EXECUTIVE SUMMARY

1.1   History

In May of 2019, the Chicago Metropolitan Agency for Planning (CMAP) retained the services of Gorrondona and Associates, Inc. (G&AI) to implement a pavement management system for the Village of Dixmoor that will enable the Village to manage its roadway network in a more proactive, cost-effective, and sustainable way. To accomplish this objective, G&AI: 1) assessed the condition of the Village's roadways, 2) implemented and customized a pavement management system for the Village, and 3) developed near- and long-term pavement maintenance and rehabilitation (M&R) recommendations for the Village's roadways.

During June of 2019, G&AI's state-of-the-art PathRunner pavement condition data collection system (shown in Figure 1) was deployed to capture continuous, high-resolution pavement cracking, rutting, and roughness data of the Village's roads. Collected data were entered into the PAVER Pavement Management System (PAVER), and baseline pavement condition scores were determined for each roadway.

Figure 1. PathRunner pavement condition data collection system.

In September of 2019, preliminary results of the condition survey were presented to the Village. G&AI has since worked with the Village to collect additional pavement M&R records and M&R unit cost data with which to calibrate the PAVER system so that it is specific to the Village.

The collected pavement condition data along with both the historical M&R data and unit prices provided by the Village were used to develop network-level M&R recommendations presented herein for the Village's consideration.

1.2   The PAVER Pavement Management System

PAVER stores two primary "measures" of pavement condition. The most obvious measure of pavement condition is the **International Roughness Index (IRI)**, which describes the rideability (i.e., smoothness) of the roadway as experienced by the driver.

The second measure of pavement condition is the **Pavement Condition Index (PCI)**, which provides an indication of both the structural integrity and surface operational condition of the roadway. PAVER uses PCI values to determine the most cost-effective level of M&R likely needed. PAVER prioritizes funding for life-extending, lower-cost preventive maintenance activities (e.g., crack sealing, slurry seals, and localized patching) above more costly funding of last resort major M&R activities, such as resurfacing and reconstruction. This prioritization in the PAVER algorithm seeks a proactive and cost-effective approach to pavement management with the avoidance of – unless necessary – more costly reactive practices.

In addition to routinely collected IRI and PCI data, PAVER stores pavement inventory information, historical M&R records, and M&R unit cost data. The system uses this information to predict future
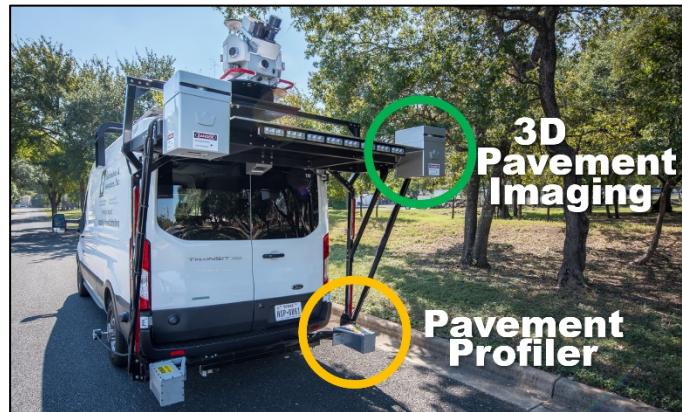
pavement conditions and identify network-level deterioration trends and M&R needs over time. It will also allow the Village to evaluate if present M&R methods are performing as expected.

1.3   Purpose and scope

The purpose of this project is to implement a comprehensive pavement management system for the Village's roadways. The scope of this project includes all roadways managed by the Village, which total approximately 11.2 centerline miles. This pavement management system will serve as a primary tool to assist the Village in more efficiently allocating its pavement M&R funding.

To this end, G&AI:
1. Developed an inventory of the Village's roadways in PAVER. The PAVER inventory contains pavement surface type, functional classification, M&R unit costs, and historical M&R data. *Note: Inventory development is a one-time effort that can be used by the Village if the PAVER system is retained, only requiring updates to address changes to the Village's roadway network and changes in M&R unit costs.*
2. Performed a pavement condition survey of the Village's roadways. This survey was used to determine PCI and IRI values for analysis purposes and will serve as an initial baseline of roadway conditions.
3. Used the condition survey with the developed PAVER inventory to determine the impact of different funding levels on the Village's roadways and identify potential network-level pavement M&R needs.

1.4   Results

Pavement Condition Index (PCI) and **International Roughness Index (IRI)** values were determined for each roadway. PCI values provide an indication of both the structural integrity and surface operational condition of a pavement. PCI values range from 0 (a failed pavement) to 100 (a pavement in excellent condition). Table 1 shows the categories chosen to represent the Village's PCI assessment criteria, which includes typical pavement distresses and levels of M&R needed within each category.

Table 1. Village's pavement condition categories.

Category	Typical Distresses and Typical Level of M&R Needed	PCI Range
Good	Longitudinal and transverse cracking and weathering of surface **Preventive maintenance:** *Crack sealing and surface treatments*	86-100
Satisfactory	More extensive longitudinal and transverse cracking and weathering of surface **Preventive maintenance:** *Crack sealing and surface treatments*	71-85
Fair	Extensive longitudinal and transverse cracking, early stage alligator (fatigue) cracking, early stage rutting, and weathering of surface **Global preventive maintenance and localized repairs:** *Localized surface and/or full-depth patching, surface treatments, and thin overlays*	56-70
Poor	More extensive and severe longitudinal and transverse cracking, alligator (fatigue) cracking, rutting, and weathering of surface **Major rehabilitation:** *Localized full-depth patching, mill and overlays, and traditional overlays*	41-55
Very Poor	More extensive and more severe longitudinal and transverse cracking, alligator (fatigue) cracking, rutting, weathering of surface, potholes **Major rehabilitation:** *Full-depth patching, mill and overlays, traditional overlays, and reconstruction*	26-40
Serious	Extensive and severe failure of pavement surface **Major rehabilitation:** *Reconstruction*	11-25
Failed	Complete failure of pavement surface **Major rehabilitation:** *Reconstruction*	0-10

At the time of G&AI's June 2019 inspection, the Village's pavements were found to have an average PCI of 46, indicating that the Village's roadways are in overall "poor" condition.

IRI values measure the roughness (vertical displacement over a fixed interval reported in inches per mile) of a roadway pavement:

- IRI values less than 200 inches/mile indicate "smooth" pavement.
- IRI values between 200 and 400 inches/mile indicate a "marginally rough" pavement.
- IRI values greater than 400 inches/mile indicate "rough" pavement.

The Village's roadways were found to have an average IRI value of 366 inches/mile, which indicates overall "marginally rough" pavement.

Maps 1 and 2, following this executive summary, show PCI and IRI categories for each roadway, respectively.

The causes of pavement deterioration as quantified by the PCI may be divided into three general categories:
- Vehicle load related.
- Climate/durability related.
- Other (construction defects and material issues).

The deterioration observed on the Village's pavements at the time of inspection was caused by a mixture of vehicle load- and climate-related distresses. Vehicle load-related distresses, including alligator cracking and rutting, were pronounced on many of the Village's roadways and contributed most to lower PCI values. Significant climate-related distresses, including block cracking and weathering, were also observed on the Village's roadways.

1.5 Recommendations

For the Village to get the most return on their investment from the PAVER Pavement Management System, the system must be considered a living entity. The Village should:

1. Implement pavement preservation techniques to cost-effectively extend the life of its roadways.
2. Determine when resurfacing is no longer a cost-effective option and reconstruction is needed.
3. Annually update M&R activities performed on Village roadways in the PAVER database.
4. Annually update M&R unit costs (or whenever economic conditions cause changes in unit prices).
5. Commit future funding to the routine collection of pavement condition data (all roadways should be inspected on a two- to three-year cycle).
6. Use collected pavement condition data to assess the performance of the roadways and applied M&R activities.

With such attention, PAVER will become a repository of accurate, up-to-date data and the primary tool that the Village uses for more cost-effectively programming M&R funding.
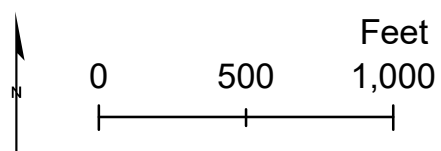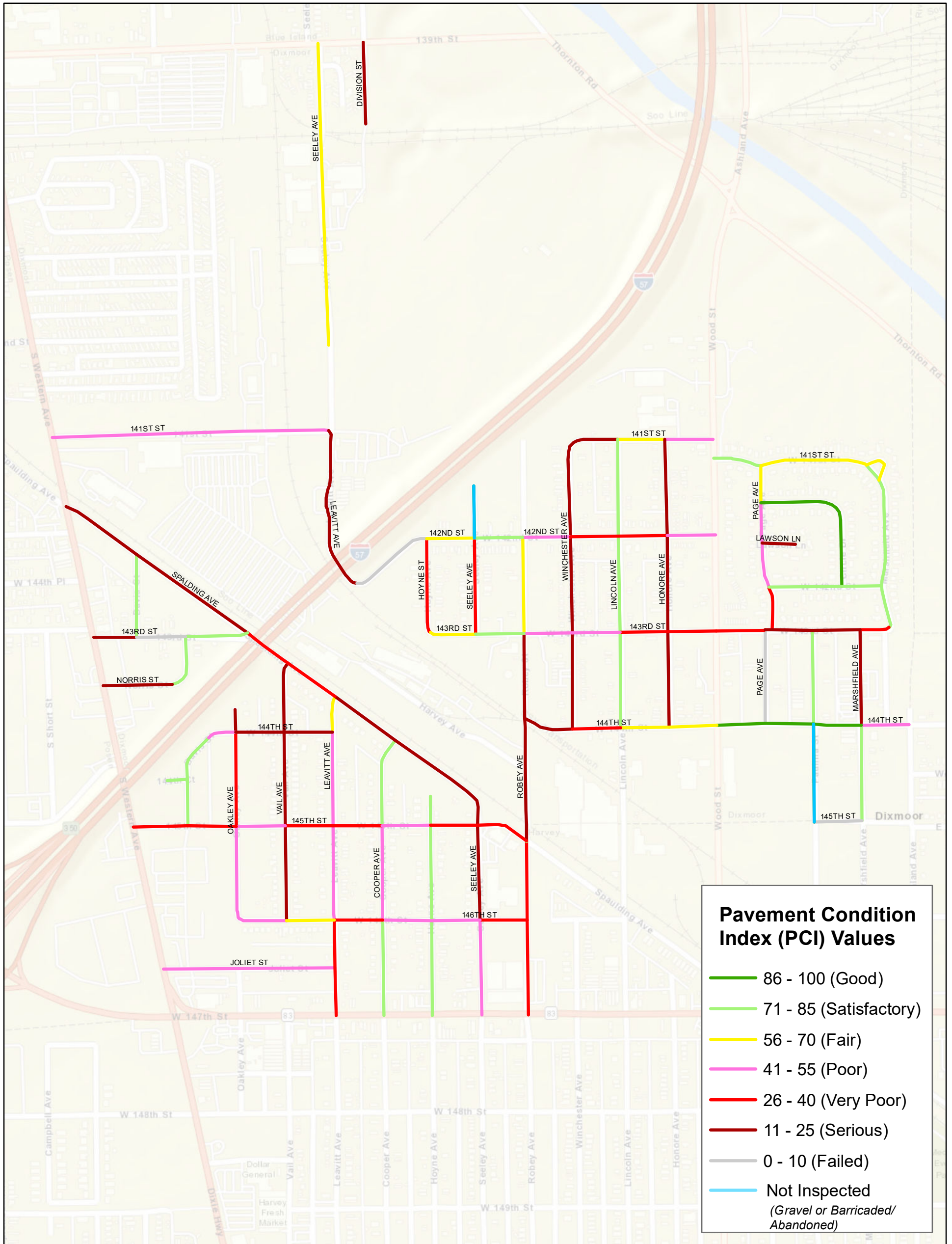
Pavement Condition Index (PCI) Values

- 86 - 100 (Good)
- 71 - 85 (Satisfactory)
- 56 - 70 (Fair)
- 41 - 55 (Poor)
- 26 - 40 (Very Poor)
- 11 - 25 (Serious)
- 0 - 10 (Failed)
- Not Inspected
  (Gravel or Barricaded/ Abandoned)

Feet

0   500   1,000

Village of Dixmoor, Illinois

Pavement Management Program

Map 1:
Pavement Condition Index
(PCI) Values

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International Roughness Index (IRI) Values

— 0 - 200 (Smooth)
— 201 - 400 (Marginal)
— > 400 (Rough)
— Not Inspected
(Gravel or Barricaded/Abandoned)

Feet
0   500   1,000

Village of Dixmoor, Illinois

Pavement Management Program

Map 2:
International Roughness
Index (IRI) Values
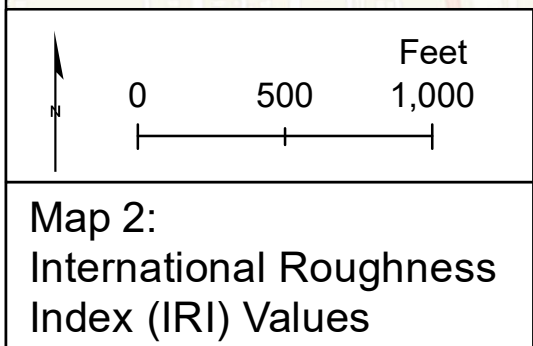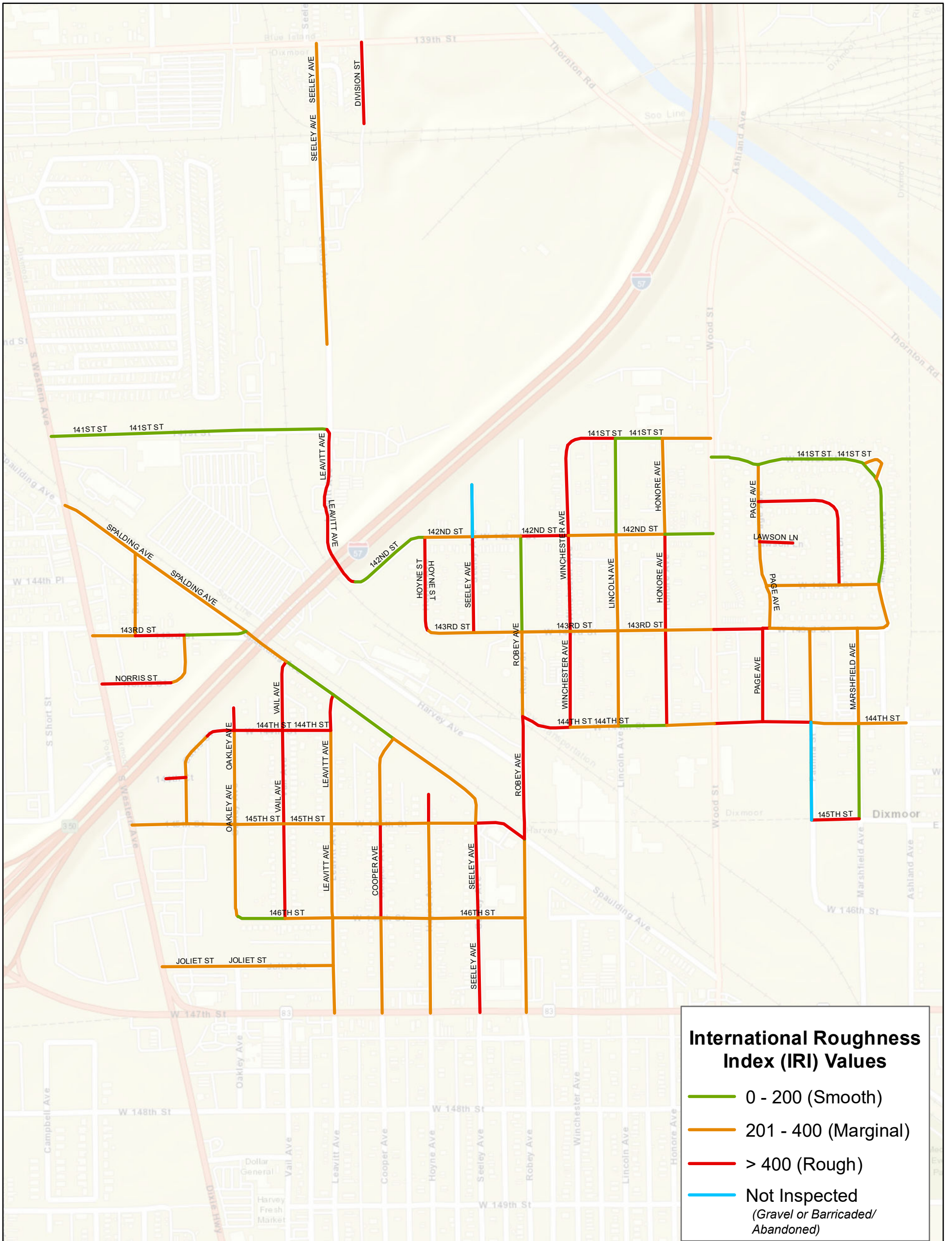
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2   INTRODUCTION

2.1   Foreword

This section of the report expands on the Executive Summary and provides the reader with information pertaining to the creation and implementation of this pavement management system for the Village.

At the core of a modern pavement management system is a geocentric database that contains pavement inventory and condition information. Combined with up-to-date M&R unit cost data, calibrated deterioration models, and owner-specific M&R practices, this information is used by analysis tools in the pavement management system to predict future pavement conditions, develop multi-year M&R plans, and forecast anticipated funding needs.

This section provides a conceptual overview of pavement management and follows with the benefits and costs of implementing a pavement management system. Implementation of the Village's pavement management system is detailed in Sections 3, 4 and 5. This section closes with an overview of effective preventive maintenance strategies that should be considered by the Village.

2.2   Background, scope, and objectives

In May of 2019, the Chicago Metropolitan Agency for Planning (CMAP) retained the services of Gorrondona and Associates, Inc. (G&AI) to assess the existing condition of the roadways maintained by the Village. The primary objectives of this project are to implement a comprehensive and Village-wide pavement management system, perform a network-level pavement condition survey, and identify future pavement M&R needs.

The project will provide the Village with a better understanding of the current condition of its roadways and network-level recommendations for future M&R based on the results of the pavement condition survey. Moving forward, the pavement management system will continue to serve as a repository for pavement condition data, historical M&R records, and pavement condition deterioration trends.

The PAVER Pavement Management System was implemented for the Village, and a state-of-the-art PathRunner pavement condition data collection system was deployed to capture continuous, high-resolution pavement cracking, rutting, and roughness data of the Village's roadways in June of 2019.

G&AI has since developed the PAVER inventory database and worked with the Village to collect additional pavement maintenance and rehabilitation (M&R) records and M&R unit cost data with which to calibrate the PAVER database so that it is Village specific. These M&R records and M&R unit costs, along with the collected pavement condition data, have been used to identify present network-level M&R needs.

2.3   Project tasks

To successfully accomplish the objectives of this project, G&AI performed the following tasks, which are covered in greater detail in Sections 3, 4, and 5 of this report, respectively:

1. Pavement management system implementation
   G&AI developed an inventory of the Village's roadway pavements and implemented PAVER.

2. Pavement condition survey
   G&AI performed a network-level pavement condition survey on the roadway pavements using a state-of-the-art pavement imaging and profiling data collection system. The pavement condition survey was performed in June of 2019.

3. M&R analyses
   G&AI reviewed the collected condition data and determined the impact of several funding scenarios on the Village's roadways and identified potential pavement M&R needs using PAVER.

The 3D pavement imaging and profiling technology used to assess the condition of the Village's roadway pavements is the most comprehensive available. This technology has evolved rapidly over the past several years, and it is now used across the United States by more than half of the state DOTs. Unlike the inherently subjective windshield pavement condition surveys of years past, high resolution cracking, rutting, and roughness condition data were captured continuously for each of the Village's roadways surveyed.

The collected data were then analyzed using a hybrid methodology that incorporates both automated crack detection and classification along with manual quality control. This approach yields a complete set of pavement condition data that may be used for both network-level (high-level budgeting) multi-year M&R planning as well as project-level (estimating M&R quantities) analyses. The collected data were then entered into and analyzed using the PAVER Pavement Management System. Continuously developed by the US Army Corps of Engineers, PAVER is a sophisticated, non-proprietary system widely used by municipal agencies across the United States and around the world.

2.4   Conceptual overview of pavement management

The use of a pavement management system is intended to provide municipal agencies with a systematic process for cost-effectively managing their pavement network, which may include roadways, parking lots, and alleys. The American Public Works Association (APWA) defines pavement management in the following way:

Pavement management is a systematic method for routinely collecting, storing, and retrieving the kind of decision-making information needed to make maximum use of limited maintenance (and construction) dollars.

Combined with local knowledge and practical judgment, the recommendations from a pavement management system may be used to help make better pavement M&R decisions.

At the core of a pavement management system is the method for assessing pavement condition. The most widely used method for assessing pavement condition is the Pavement Condition Index (PCI), which is industry standard practice and defined in ASTM D6433. The PCI method outlines a process for more objectively assessing the condition of a pavement based on visual observations and measurements that take place during a field inspection. These observations and measurements are then distilled into a PCI

value that ranges between 0 and 100. A PCI value of 0 indicates a failed pavement, and a PCI value of 100 indicates a pavement in good condition.

PCI values help determine the level of M&R needed to cost-effectively maintain or rehabilitate the pavement. These values may also be used to prioritize roadway improvements for the purpose of developing strategic capital improvement programs. When a pavement is in good condition, preventive maintenance can be applied to extend the life of the pavement. However, once a pavement falls below critical condition, preventive maintenance may no longer be cost effective, and more significant and perhaps more costly rehabilitation strategies should be considered.

The "Critical PCI" value for a pavement is the PCI value below which cost-effective preventive maintenance is no longer a viable option, and more significant rehabilitation and sometimes reconstruction may be necessary. As shown in Figure 2, the primary objective of pavement management is to preserve pavements in good condition above the Critical PCI with less costly preventive M&R rather than allow them to deteriorate below the Critical PCI, resulting in the need for more costly major M&R (rehabilitation or reconstruction).
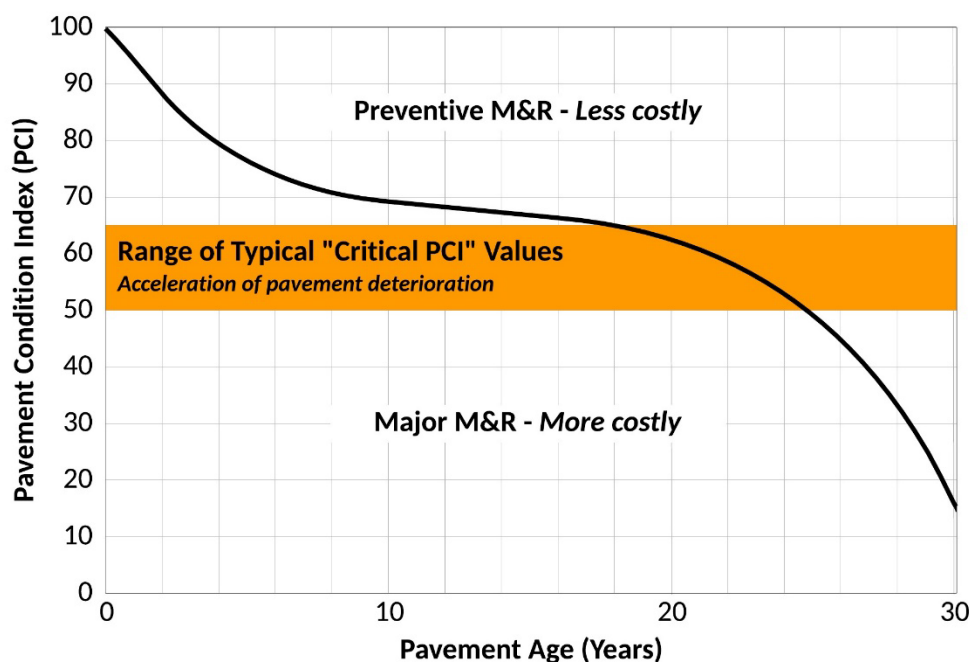
Figure 2. Example of the correct timing of preventive and major M&R relative to the Critical PCI.

The Critical PCI value is determined based on the repeated measurement of pavement condition over time as well as agency-specific M&R policies. Critical PCI values typically range between 50 and 65 (as shown in Figure 2) because the acceleration of pavement deterioration, and subsequent need for more costly M&R, typically occurs then. Setting a higher Critical PCI value simply results in pavements being recommended for major M&R earlier. Some agencies set higher Critical PCI values for their arterial roadways than for their local roadways to ensure that the roadways most heavily traveled (and often at higher speeds) are maintained to a higher standard.

The PAVER system default Critical PCI value of 55 has been used for the Village's roadways. The Village may change this value as more condition data and historical M&R data are captured and the

deterioration rates of the Village's roadways are better understood. Typically, two to three PCI inspections are needed to converge on acceptable Critical PCI values. The Village may choose to set Critical PCI values for each functional classification of roadway based on desired policy goals.

When the appropriate preventive maintenance treatments (e.g., crack sealing, seal coats, and patching) are undertaken at the correct times during a pavement's service life, these relatively inexpensive preventive M&R treatments can extend the service life of the pavement, as shown in Figure 3.
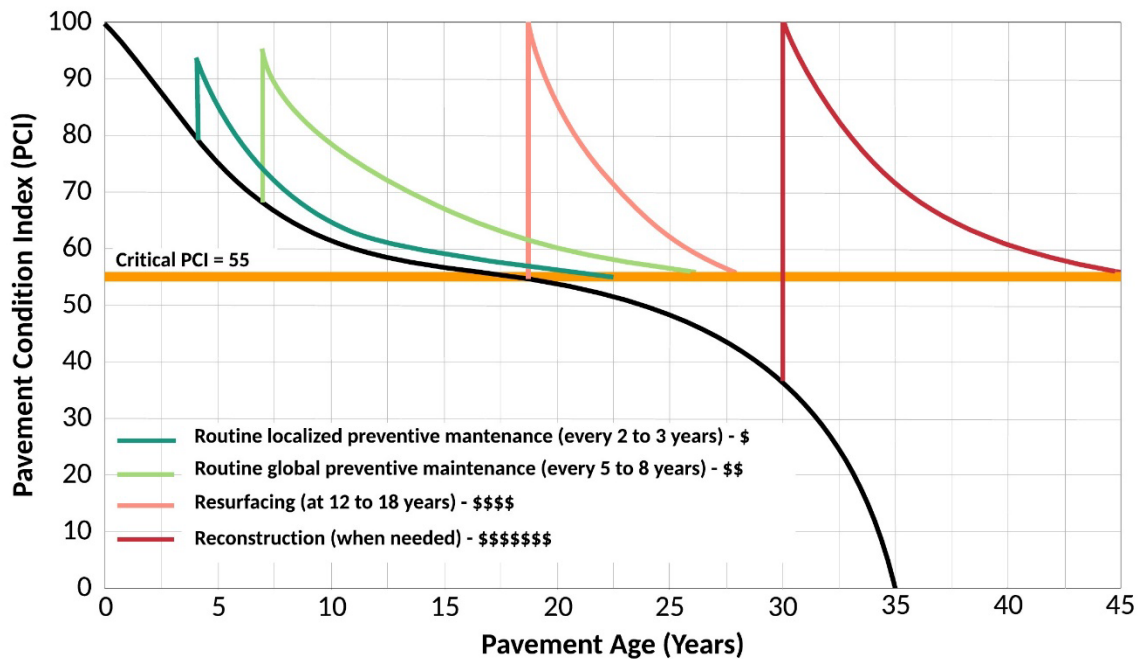
Figure 3. Example of the increasing prices and decreasing benefits of M&R.

It is important to note that the IRI, which provides a useful measure of pavement smoothness, does not correlate well to the level of M&R needed to correct smoothness issues. Consequently, IRI values are not considered when forecasting future M&R needs. Instead, IRI values are used in pavement management systems to identify pavements requiring a special inspection, or they may be used in conjunction with PCI values when prioritizing M&R projects.

As pavement management concepts have gained traction, computer-based pavement management systems have been developed to assist agencies in more optimally managing their pavements. Pavement management systems currently rely on a detailed pavement inventory, routine pavement condition assessments, pavement performance modeling, and sophisticated analysis tools that can forecast future pavement condition and estimate future M&R needs and costs.

2.5   Benefits and costs of implementing a pavement management system

Pavement management systems provide:
- A centralized location for storing pavement condition and inventory data, including construction, maintenance, and rehabilitation records.
- Decision-making support tools for:
    - ✓ Evaluating maintenance and rehabilitation alternatives.
    - ✓ Analyzing the consequences of alternative funding levels on pavement conditions.

    ✓ Improved scheduling and coordination of pavement M&R projects and other infrastructure projects.
- Analysis tools for evaluating the effectiveness of historical methods of rehabilitation.
- Reporting tools for distilling complex data and justifying funding needs to elected officials.

The benefits of implementing and maintaining a pavement management system improve over time as more data are entered into the system. The costs associated with maintaining a pavement management system include:
- Pavement inventory data collection and routine updates (typically performed annually following the end of the paving season).
- Routine pavement condition data collection (arterials and collectors are typically surveyed every other year and local roadways are surveyed on a three-year cycle).
- Evaluating pavement performance and developing M&R plans (typically performed annually following the end of the paving season – or following a condition survey – to determine candidate roadways for the next paving season).
- Software acquisition, installation, system maintenance, and updates.
- Staff training, as needed.

To ensure the success of a pavement management system, agencies should develop a plan for staffing, maintaining, and funding the system appropriately.

2.6   Incorporating pavement preservation strategies

The implementation of a pavement management system has the added benefit of assisting agencies in determining which pavements may be candidates for preventive maintenance. The use of preventive maintenance early in the life of a pavement, before any significant deterioration, has been demonstrated to be a cost-effective way to extend a pavement's service life.

In the Federal Highway Administration (FHWA) publication, Pavement Preservation, A Road Map to the Future, preventive maintenance is defined as:

> *"...the planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without significantly increasing the structural capacity)."*

The FHWA adds that preventive maintenance:

> *"...is typically applied to pavements in good condition having significant remaining service life. As a major component of pavement preservation, preventive maintenance is a strategy of extending the service life by applying cost-effective treatments to the surface or near-surface of structurally sound pavements."*

The following preventive maintenance treatments have been demonstrated to be effective when applied at the right time during a pavement's service life:
- Crack sealing, crack filling, and joint sealing of flexible and rigid pavements
- Patching and edge repairs
- Chip seals, fog seals, and slurry seals
- Micro-surfacing
- Thin "functional" and "maintenance" overlay projects

Too frequently these activities are incorrectly applied as "stop-gap" or "cosmetic" treatments for pavements in poor condition rather than as true preservation activities. Preventive maintenance strategies should be applied to pavements that are in relatively good condition, and the activities should be planned and applied systematically following either the resurfacing or reconstruction of a pavement. The following FHWA website provides additional information for pavement preservation: https://www.fhwa.dot.gov/pavement/preservation/.

2.7 Summary

This section provided the reader with background information pertaining to the creation and implementation of the non-proprietary PAVER Pavement Management System for the Village. The section provided a conceptual overview of pavement management and discussed:

1. The benefits the Village will see from the implementation of the pavement management system.
2. The costs expected to be incurred with the maintenance of the system.
3. The additional functionality beyond the obvious support the system can provide by objectively assisting the Village in optimizing the allocation of its M&R funding.

Implementation of the Village's pavement management system is detailed in Sections 3, 4, and 5. This section closed with an overview of effective preventive maintenance strategies that should be considered by the Village moving forward.

3   PAVEMENT MANAGEMENT SYSTEM IMPLEMENTATION

3.1   Foreword

This section discusses the first task of this project: Implementing a
pavement management system. One of the CMAP's primary desires
was to have a non-proprietary pavement management system for
participating agencies. This section provides an overview of the
PAVER Pavement Management System, a brief description of the
modules available to the Village in PAVER, and insight into the
PAVER database development. *(Note: The information presented
in the section may be supplemented by the PAVER User Manual,
which is available as a navigable PDF file in the PAVER software.)*

3.2   Objective

The objective of this task was to implement a pavement management system for the Village's roadway
pavements. G&AI implemented the PAVER Pavement Management System, which is developed and
continually updated by the US Army Corps of Engineers. This task required developing an inventory of
the Village's roadway pavements and collecting current pavement condition data and entering it in
PAVER.

3.3   PAVER Pavement Management System overview

The PAVER pavement management system assists agencies in determining when, where, and what level
of pavement M&R is required and approximately how much it will cost. The system provides a suite of
pavement management tools, or "modules", that will help the Village with the following tasks:

- Developing and organizing their pavement inventory.
- Assessing the current condition of their pavements.
- Developing models to predict future pavement conditions.
- Reporting on past and future pavement performance.
- Developing scenarios for M&R based on either funding or pavement condition goals.
- Planning M&R projects.

PAVER modules include:

- Inventory
- M&R history
- Inspection
- Prediction modeling
- Condition analysis
- M&R planning
- Project planning
- Reporting

A brief description of these modules is presented in the following sub-sections. The PAVER software and licenses were purchased for the Village from Colorado State University (CSU) and should be renewed annually. Current pricing for PAVER may be found at: www.paver.colostate.edu.

3.3.1 Inventory and maintenance and rehabilitation (M&R) history modules

The PAVER **Inventory** and **M&R History** modules, shown in Figure 4 and Figure 5, are based on a hierarchical structure composed of networks (groups of roadways managed with one source of funding), branches (specific roadways), and sections. Sections are the smallest area for which conditions are reported and M&R activities recommended. Sections typically conform to existing GIS segmentation and are commonly defined from intersection to intersection by default.
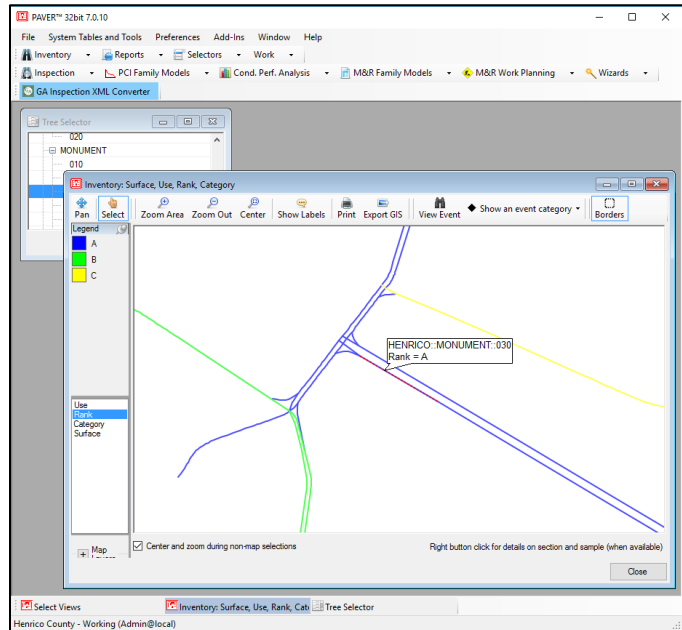
Figure 4. Example roadway functional classifications (ranks) stored in the Inventory module.

One network is defined for the Village and each roadway is a branch. Pavement sections are defined within each branch following the Village's existing GIS segmentation in the Illinois Roadway Information System (IRIS). This structure allows the Village to easily organize their inventory and historical M&R data and provides a simple and efficient way for rolling-up data to higher levels of the pavement hierarchy. The Village provided G&AI with historical M&R records, and this information was entered in PAVER.

3.3.2 Inspection module

PAVER uses the PCI as the primary measure of pavement condition. The **Inspection** module, shown in Figure 6, enables agencies to store raw pavement condition survey data and then calculate PCI values. IRI values are also stored in the **Inspection** module.

3.3.3 Prediction modeling module

The **Prediction Modeling** module in PAVER enables the user to group pavements of similar construction that are subjected to similar traffic, weather, and any other factors affecting pavement performance into "families." Historical pavement condition data are used to build models that can be used to predict future pavement performance. The **Prediction Modeling** module is a hands-on module and prediction models should be
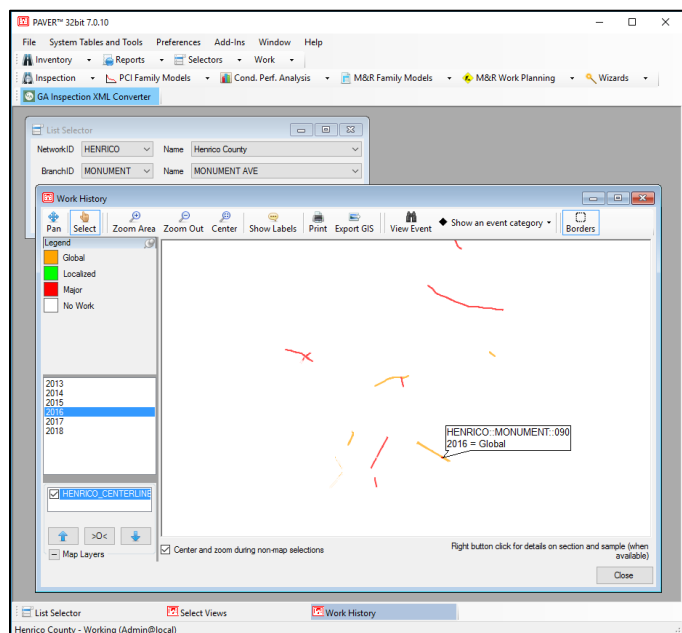
Figure 5. Example historical M&R records stored in the M&R History module.

updated by the Village following each condition survey. If historical pavement condition data are not available, PAVER provides default pavement prediction curves (shown in Figure 7) and allows the user to develop site specific prediction models.

3.3.4 Condition analysis module

The **Condition Analysis** module allows the Village to view the condition of the entire pavement network or any subset of the network over time. The module reports past conditions based on interpolated values between historical condition data, and it reports projected conditions based on the application of prediction models developed using the **Prediction Modeling** module.

3.3.5 M&R planning module

The **M&R Planning** module can determine the consequence of a predetermined funding level on pavement conditions and estimate the

Figure 6. Example PCI values in the Inspection module.

resulting backlog of major work. This information assists in determining funding requirements to meet specific Village pavement condition goals. These capabilities will enable the Village to develop more optimal M&R programs based on available resources and to justify M&R needs.

3.3.6 Reporting module

Each previously described module of PAVER can generate various reports that will assist the Village in analyzing, interpreting, and presenting pavement data. In addition to module-specific reports, PAVER also comes equipped with several "canned" reports, which include:

- GIS reports – *Internal/external reporting of inventory and condition data*
- Summary Charts – *Simple graphs and data tables of inventory and inspection data*
- Inspection Reports – *Summary of collected pavement condition data*
- Work History – *Summary of historical maintenance, repair, and rehabilitation data*
- Branch Listing – *Summary of overall pavement inventory data*
- Branch Condition – *Summary of overall pavement condition data*
- Section Condition – *Summary of individual section data*

Figure 7. Example deterioration trend developed using the Prediction Modeling module.

PAVER can generate on-the-fly "user-defined" reports, which can be tailored to meet the Village's specific reporting needs. PAVER's user-defined reporting capability enables the user to extract any data stored in the system and export it to a GIS shapefile, spreadsheet, or text file.

3.4 Summary

This section discussed the first task of this project: Implementing a pavement management system. This section provided an overview of the non-proprietary PAVER Pavement Management System, a brief description of the modules available to the Village in PAVER, and insight into the PAVER database development. The Village's PAVER database has been developed to include specific and relevant data pertaining to the Village's roadway pavement network. PAVER's suite of analysis and planning tools will enable the Village to more effectively manage its roadway pavement network.

4   PAVEMENT INVENTORY

4.1   Foreword

This section describes the Village's roadway pavement inventory as it exists in the PAVER Pavement Management System. The data sources used in developing the inventory are discussed in this section, and summary data are presented.

4.2   Objective

The objective of this task was to develop a comprehensive inventory of the Village's roadway pavements for inclusion in PAVER. The roadway pavement inventory provides the underlying data on which analysis and reporting is performed with PAVER. In addition, the inventory provides the framework in which all routinely collected pavement condition data and historical work data are stored.

Moving forward, the Village should update the pavement inventory in PAVER to reflect the addition, realignment, widening, and/or removal of roadways managed by the Village. Typically, these types of changes are infrequent and may be done annually or prior to performing any analysis or reporting tasks with PAVER.

4.3   PAVER inventory development

The Village's PAVER inventory was based on the IRIS GIS provided by CMAP. Relevant pavement data available in the IRIS GIS were supplemented with aerial imagery and field observations and entered in the Village's PAVER database. These data included: number of lanes, pavement surface type, approximate roadway width, and from/to intersections for each pavement section.

Roadways were also assigned "ranks" (i.e., priorities) of primary (P), secondary (S), and tertiary (T). Federal aid eligible roads were assigned the rank of primary, since these tend to be the more heavily trafficked roadways. Residential roads were assigned the rank of secondary, and unpaved roadways and roadways in industrial zones were assigned the rank of tertiary.

A shapefile generated from the Village's GIS was linked to the PAVER database. This enables the Village to conveniently navigate the roadways within PAVER and generate a variety of map-based inventory and condition reports in PAVER. Historical M&R records provided by the Village were entered in the PAVER database as well as unit cost data.

4.4   Inventory summary

The Village's roadway network consists of approximately 11.2 centerline miles of predominantly asphalt surfaced, two-lane roadways. Table 2 shows the distribution of the Village's roadway network in mileage and area by pavement rank, and Table 3 shows the distribution by pavement surface type. *Note: The Village does not have any Federal aid eligible roads and therefore no roadways with the rank of primary.*

Table 2. Roadway summary data by pavement rank.

Rank	Centerline Miles	Lane Miles	Area (SY)
Secondary, S	11.10	22.19	162,964
Tertiary, T	0.12	0.25	1,462
Total	**11.22**	**22.44**	**164,426**

Table 3. Roadway summary data by pavement surface type.

Surface Type	Centerline Miles	Lane Miles	Area (SY)
Asphalt, AC	11.10	22.19	162,964
Gravel, GR	0.12	0.25	1,462
Total	**11.22**	**22.44**	**164,426**

Appendix A maps A-1 and A-2 present pavement rank and surface type data graphically.

5   PAVEMENT CONDITION INSPECTION

5.1   Foreword

This section discusses the second task of this project: Performing a comprehensive pavement condition survey of the Village's roadways. The condition survey included the collection of high-resolution pavement imagery and profile measurements using a state-of-the-art PathRunner pavement condition survey system. The collected data were analyzed and PCI and IRI values were calculated for each of the Village's roadways surveyed. This section describes the pavement condition survey system, the data collection methodology, how the collected data were analyzed, and a discussion of field observations. It concludes with several examples of pavement conditions from the Village's roadways.

5.2   Objective

The objective of the pavement condition survey is to assess the existing structural integrity and surface operational condition of the Village's roadways. The survey provides a comprehensive snapshot of pavement conditions at the time of data collection.

Moving forward, the Village should perform pavement condition surveys on a routine basis to objectively monitor pavement performance, determine near-term M&R needs, evaluate the effectiveness of M&R activities, develop pavement deterioration trends, and forecast near- and long-term pavement M&R needs.

5.3   Pavement condition data acquisition

G&AI deployed a state-of-the-art PathRunner pavement data collection system to capture high-resolution pavement imagery and surface data necessary to assess the condition of the Village's roadways. The PathRunner system is shown in Figure 8.
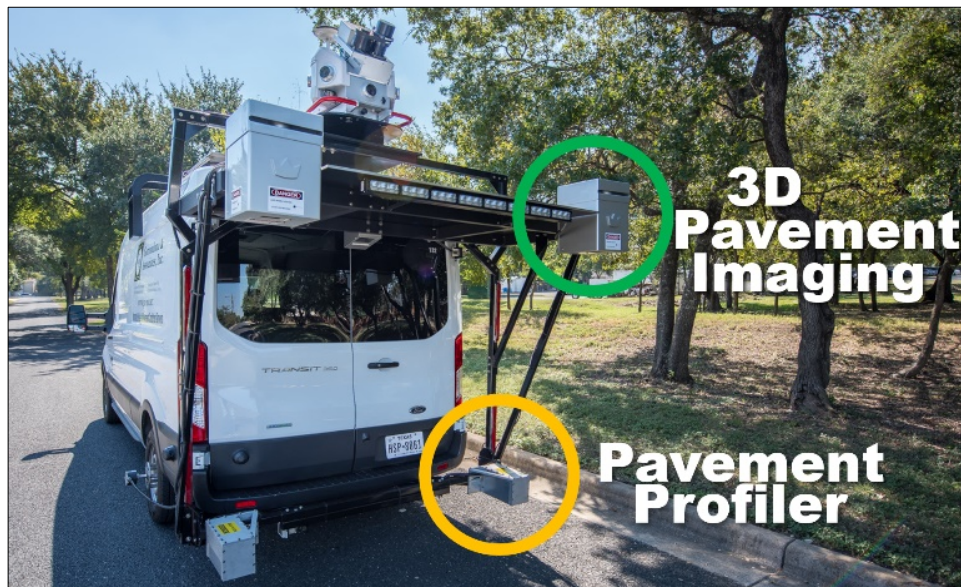
Figure 8. PathRunner pavement condition data collection system.

The PathRunner was driven on all roadways within the Village. By agreement with CMAP, only a single lane of two-lane roadways was collected and only the outmost lanes of four-lane and greater roadways were collected. Based on G&AI's experience, contiguous lanes are usually of similar character, and this

inspection approach was deemed to be cost effective for the Village while still providing sufficiently detailed information to assess existing pavement conditions. The PathRunner system continuously collected the following data for each roadway:

- High-resolution 2D and 3D pavement images for evaluating pavement distresses and determining Pavement Condition Index (PCI) values.
- Transverse profiles to measure rutting.
- Longitudinal profiles to calculate International Roughness Index (IRI) values.
- High-resolution, forward-facing, right-of-way images for manual review of all data.

These data were processed using automated tools verified by manual review to assess pavement conditions, and the results were entered in the Village's PAVER database.

5.4   Pavement Condition Index (PCI) method

The pavement condition survey was performed following the PCI method. The PCI method is based on a set of definitions and procedures for measuring pavement distress types, severities, and quantities during a field inspection. This information is then distilled into a PCI value, which provides an indication of the structural integrity and surface operational condition (roughness) for a pavement section. The PCI method is widely used and provides a significantly more objective and repeatable method for assessing pavement condition than inherently subjective windshield surveys commonly used in the past.

The Village's roadway network consists primarily of asphalt pavements with only a few concrete and gravel roadways. During a PCI inspection, several distress types are identified and evaluated for asphalt pavements, as shown in Table 4. The severity and quantity of each observed distress is recorded, and these data are then input into the PCI algorithm to calculate a PCI value, as shown in Figure 9.

Table 4. Asphalt and concrete pavement distress types.

Asphalt Pavement Distresses		Concrete Pavement Distresses	
Distress	**Cause**	**Distress**	**Cause**
Alligator Cracking	Load	Blowup/Buckling	Climate/Durability
Bleeding	Other	Corner Break	Load
Block Cracking	Climate/Durability	Divided Slab	Load
Bumps and Sags	Other	Durability ("D") Cracking	Climate/Durability
Corrugation	Other	Faulting	Other
Depression	Other	Joint Seal Damage	Climate/Durability
Edge Cracking	Load	Lane/Shoulder Drop-Off	Other
Joint Reflection Cracking	Climate/Durability	Linear Cracking	Load
Lane/Shoulder Drop-Off	Other	Patching, Large and Utility Cuts	Other
Longitudinal and Transverse Cracking	Climate/Durability	Patching, Small	Other
Patching and Utility Cut Patching	Other	Polished Aggregate	Other
Polished Aggregate	Other	Popouts	Other
Pothole	Load	Pumping	Other
Railroad Crossing	Other	Punchout	Load
Rutting	Load	Railroad Crossing	Other
Shoving	Other	Scaling, Map Cracking, and Crazing	Other
Slippage Cracking	Other	Shrinkage Cracks	Climate/Durability
Swell	Other	Spalling, Corner	Climate/Durability
Raveling	Climate/Durability	Spalling, Joint	Climate/Durability
Weathering	Climate/Durability		
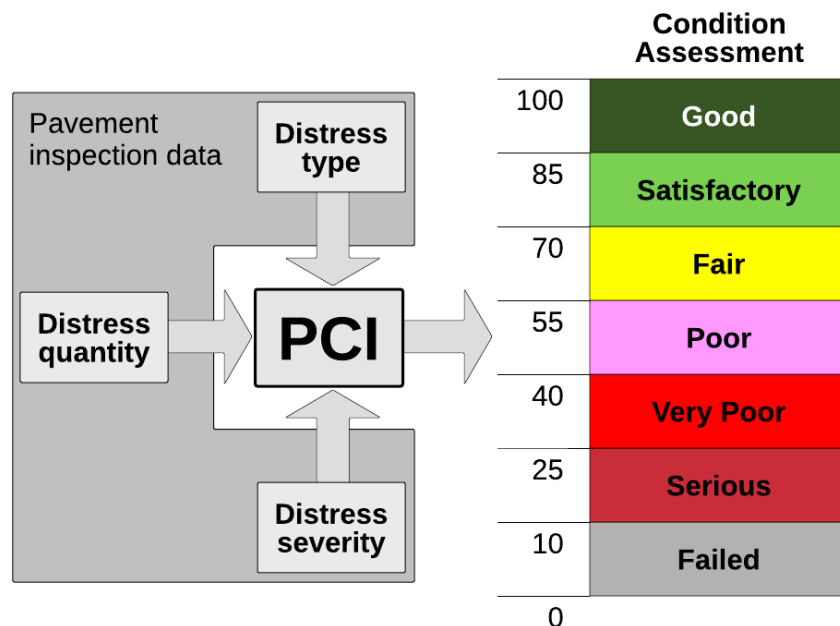
Figure 9. PCI inputs and the Village's assessment scale.

If properly designed and constructed, a new pavement begins its service life with a PCI of 100. Because of distress caused by vehicle loads, environmental factors, and aging, a pavement deteriorates over time. For each combination of distress type, severity level, and quantity observed during the inspection, points

are deducted from the initial value of 100, thereby decreasing the PCI. When multiple distresses are present, the "deduct values" are modified such that the impact of multiple distresses is not unnecessarily compounded. Due to the complexity of the PCI algorithm, PCI values are typically computed using a pavement management software package, such as PAVER. It is important to note that the PCI method does not directly measure the load carrying capacity or the rideability of a pavement. Structural testing combined with coring is needed to determine permissible pavement loadings.

5.5 Pavement Condition Index (PCI) data interpretation

The PathRunner system captures 2D and 3D images of the roadway surface from which pavement surface distresses are evaluated. During the data collection effort, G&AI extracted pavement distress data from georeferenced digital images and rutting measurements from transverse profile measurement to determine PCI values. This process involves four distinct steps:

1. **AutoCrack Software** – This software detects cracking in the pavement imagery.
2. **AutoClass Software** – This software classifies the type of cracking detected.
3. **Manual image rating** – G&AI's team of trained and experienced raters review the imagery and identify any distress types that the automated crack detection and classification software did not observe or incorrectly identified. Performing this manual image rating is considered the Quality Control (QC) review assuring detailed accuracy and completeness of the ratings.

Steps 1 and 2: *Initial Automated Crack Detection and Rutting Analyses*

4. **Quality Assurance (QA) rating** – An independent team of G&AI's raters and project engineers perform a systematic QA review of the rated data to ensure proper evaluation of the collected imagery prior to import into PAVER.

The QC and QA ratings are the most important steps in the project. G&AI uses the PathView software for evaluating distresses using both automated algorithms and manual supplemental rating. All QC/QA is performed by highly trained and experienced engineers and technicians using PathView. The same software system has been used for more than 25 state DOTs and several municipal agency pavement condition survey projects and is a well proven review tool.

In addition to capturing 2D and 3D imagery from which pavement surface
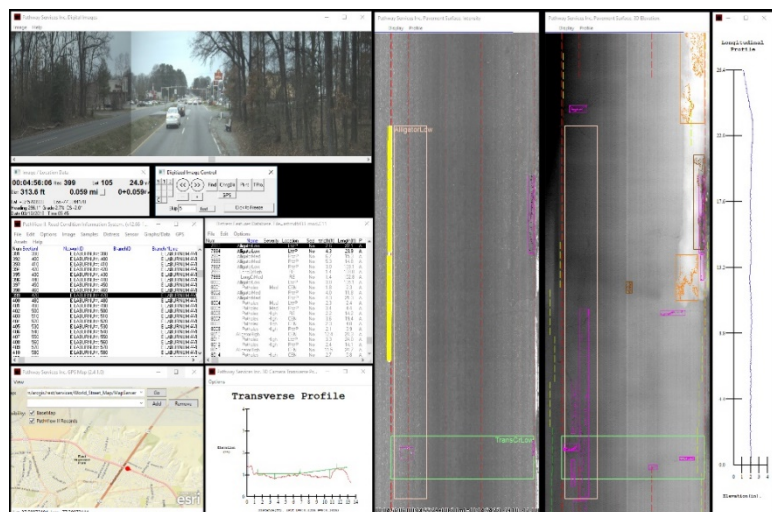
Steps 3 and 4: *Manual Rating and QC/QA of Pavements using PathView*

distresses are evaluated, the PathRunner system also captures high-resolution longitudinal and transverse profiles of the roadway surface at 2mm intervals. The longitudinal profile data are analyzed to determine the IRI values, or the "roughness" of the roadway, and the transverse profiles are used to measure rutting.

5.6   Existing pavement conditions and field observations

The collected pavement survey data were used to calculate a PCI value for each pavement section in the Village. Table 5 shows the pavement condition assessment criteria used to analyze the pavement network.

Table 5. Village's pavement condition categories.

Category	Typical Distresses and Typical Level of M&R Needed	PCI Range
Good	Longitudinal and transverse cracking and weathering of surface **Preventive maintenance:** *Crack sealing and surface treatments*	86-100
Satisfactory	More extensive longitudinal and transverse cracking and weathering of surface **Preventive maintenance:** *Crack sealing and surface treatments*	71-85
Fair	Extensive longitudinal and transverse cracking, early stage alligator (fatigue) cracking, early stage rutting, and weathering of surface **Global preventive maintenance and localized repairs:** *Localized surface and/or full-depth patching, surface treatments, and thin overlays*	56-70
Poor	More extensive and severe longitudinal and transverse cracking, alligator (fatigue) cracking, rutting, and weathering of surface **Major rehabilitation:** *Localized full-depth patching, mill and overlays, and traditional overlays*	41-55
Very Poor	More extensive and more severe longitudinal and transverse cracking, alligator (fatigue) cracking, rutting, weathering of surface, potholes **Major rehabilitation:** *Full-depth patching, mill and overlays, traditional overlays, and reconstruction*	26-40
Serious	Extensive and severe failure of pavement surface **Major rehabilitation:** *Reconstruction*	11-25
Failed	Complete failure of pavement surface **Major rehabilitation:** *Reconstruction*	0-10

At the time of G&AI's June 2019 inspection, the Village's pavements were found be in overall "poor" condition and have an average PCI of 46. The condition distribution of the Village's pavements at the time of inspection is shown in Figure 10, and detailed condition maps can be found in Appendix A.
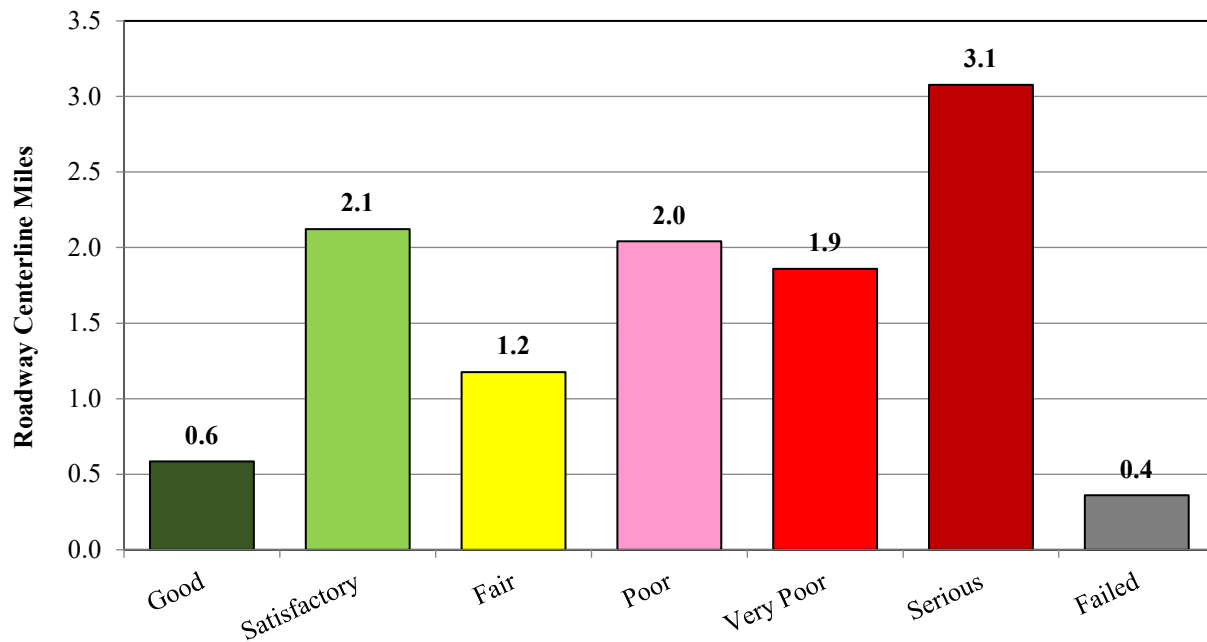
Figure 10. Village's roadway pavement condition distribution by PCI category.
(Note: Excludes gravel roadways.)

Pavement condition data summarized by pavement ranks and surface types are presented in the following two tables, respectively.

Table 6. Roadway summary condition data by pavement rank.

Rank	Centerline Miles	Lane Miles	Area (SY)	PCI	IRI
Secondary, S	11.10	22.19	162,964	46	366
Tertiary, T	0.12	0.25	1,462	--*	--*
Total	**11.22**	**22.44**	**164,426**	**46**	**366**

Note: Tertiary roads were gravel and PCI values are not applicable.

Table 7. Roadway summary condition data by pavement surface type.

Surface Type	Centerline Miles	Lane Miles	Area (SY)	PCI	IRI
Asphalt, AC	11.10	22.19	162,964	46	366
Gravel, GR	0.12	0.25	1,462	--*	--*
Total	**11.22**	**22.44**	**164,426**	**46**	**366**

Note: PCI values are not applicable to gravel roads.

The causes of pavement deterioration as quantified by the PCI may be divided into three general categories:
- Vehicle load related.
- Climate/durability related.
- Other (construction defects and material issues).

Pavement deterioration and ultimate failure is a complex process that often involves a combination of several deterioration mechanisms working together. The deterioration observed on the Village's pavements was caused primarily by a mixture of load- and climate-related distresses. Vehicle load-related distresses, including alligator cracking and rutting, were pronounced on many of the Village's roadways and accounted for most of the distress negatively impacting overall roadway conditions. In addition, climate-related distresses, including longitudinal and transverse cracking and block cracking, were found across the Village's pavement inventory.

In practice, visually observed pavement distresses collected during a network-level condition survey are used to determine the likely mechanism(s) contributing to the deterioration of a roadway. However, prior to developing a specific M&R strategy, the root cause of pavement deterioration should be determined. Determining the root cause of pavement deterioration may be accomplished through an appropriate combination of traffic load analyses, drainage investigations, structural testing, coring, and material testing.

For example, vehicle load-related distresses such as alligator cracking may be addressed through load analyses and material testing. Contributing root causes may range from the roadway consistently exposed to loads in excess of its design loading to the pavement section having simply reached the end of its design life. Climate/durability-related distresses, such as transverse cracking, may result from a combination of freeze/thaw cycling and oxidation (embrittlement) of the asphalt layer. The cause(s) of "other" distresses may be determined through a combination of coring, boring, and material testing.

In addition to PCI values, IRI values were determined for each of the Village's roadways. IRI values, reported in inches per mile, describe the amount of roughness in both wheel paths over a given length of pavement. The IRI is a standard measure of roughness used worldwide. The Village's IRI assessment scale is shown in Table 8.

**Table 8: Village's
IRI assessment criteria.**

Category	IRI Value
Smooth	0-200
Marginal	201-400
Rough	>401

At the time of G&AI's June 2019 inspection, the Village's pavements were found to be in overall "marginally rough" condition, with an average IRI of 366 inches/mile. Detailed condition maps can be found in Appendix A.

It is worth noting that IRI and PCI values do not necessarily correlate with one another. A roadway can ride well yet still be structurally deficient and in need of major M&R, and vice versa. For example, asphalt-surfaced roadways supported by structurally adequate base (e.g., crushed rock) and subgrade (e.g., existing soil) layers may exhibit extensive cracking in the asphalt surface layer due to fatigue failure of the asphalt. In situations such as these, removal of the existing asphalt layer and replacement with a thicker layer may be enough to rehabilitate the pavement. Conversely, a roadway that rides poorly may be structurally adequate and may only require minimal rehabilitation. Poor construction practices may unfortunately lead to roughness being "built into" an otherwise structurally adequate roadway at the time of construction. Roadways exhibiting this type of roughness may require grinding and/or an additional surface course to remedy the issue.

5.7   Example pavement conditions through the Village

Figure 11 illustrates a variety of pavement conditions observed throughout the Village during the June 2019 survey. The figure includes PCI and IRI values for each pavement section along with observed distress types and recommended M&R.

Location + History	PCI *(IRI)*	Recommended M&R Activity (Typical)
Davis Ave. *Near 144th St. (Section 10)* *Last resurfacing date 2010*	74 *(319)*	Preventive maintenance *Seal joints between pavement and curb and gutter + surface treatment*
Robey Ave. *Near 143rd St. (Section 50)* *Last resurfacing date 2010*	66 *(193)*	Preventive maintenance *Seal cracks, paving lane joint and joints between pavement and curb and gutter + surface treatment*
Joliet St. *West of Leavitt Ave. (Section 10)* *Last resurfacing date unknown*	55 *(289)*	Major M&R *Localized patching + cold mill and overlay*
Leavitt Ave. *Near W. 147th St. (Section 30)* *Last resurfacing date unknown*	53 *(332)*	Major M&R *Localized structural patching + cold mill and overlay or reconstruction*
Vail Ave. *South of 145th St. (Section 10)* *Last resurfacing date unknown*	19 *(595)*	Major M&R *Localized structural patching + cold mill and overlay or reconstruction*

| | 142nd St.
Near Hoyne St.
(Section 10)

Last resurfacing date unknown | 2
(>1,000) | Major M&R

Reconstruction |

Figure 11. Pavement conditions observed during PCI inspection.

A distress observed on some of the Village's pavements was unsealed paving lane seams (cracks), as shown in several of the photos above. If left unsealed, paving lane seams can deteriorate rapidly and significantly reduce the life of the pavement. By sealing paving lane seams immediately following paving and routinely resealing them, this type of deterioration may be minimized or prevented.

5.8   Summary

This section presented an overview of the methodology used to perform the 2019 pavement condition survey and the results of the survey. A state-of-the-art PathRunner pavement condition survey system was deployed to collect pavement imagery and profile data on the Village's roadways. The collected data were analyzed, and PCI values and IRI values were determined for each of the roadways surveyed. The Village's roadways were found to be in overall "poor" condition with an average PCI of 46. Furthermore, the Village's roadways were found to be in overall "marginally rough" condition, with an average IRI of 366 inches/mile.

6   MAINTENANCE AND REHABILITATION FUNDING ANALYSES

6.1   Foreword

This section discusses the third task of this project: M&R needs analyses. This section discusses the results of the analyses performed for the Village's consideration, assumptions which shaped the analyses, and results of the analyses. The recommendations of these analyses are provided in this section and in Appendixes A through D.

6.2   Objective

The M&R Planning module in PAVER provides *raw recommendations* of when and where pavement M&R activities are needed and approximately how much they will cost. The Village should use these raw recommendations to develop programmatic M&R plans for the Village's roadway network. These programmatic plans may be generated based on anticipated annual funding or with the goal of maintaining or achieving a desired pavement condition.

For the Village's roadways, two preliminary M&R analyses were performed:
- A series of **five-year analyses** was performed to determine the impact of several funding levels on overall roadway conditions. The analyses included:
    - Assessing the impact of the Village's existing funding level.
    - Determining the annual funding level needed to maintain the Village's existing overall average roadway condition.
    - Determining the annual funding level needed to modestly increase the Village's overall average roadway condition to 65.
    - Determining the annual funding level needed to eliminate the Village's major M&R backlog over a five-year period.
- A **one-year analysis** was performed to identify pavements that may benefit from preventive maintenance activities, such as crack sealing or localized patching. Only pavements with a PCI of 65 or better were considered in this analysis.

The purpose of these analyses is to determine the appropriate funding level needed to manage the Village's roadways and provide general recommendations that will assist the Village in developing and evolving its M&R program. Additional analyses may be performed to assess either the impact of anticipated funding levels or to determine the funding levels needed to achieve a desired overall, network-average condition.

6.3   Assumptions

The M&R analyses were based on the results of the June 2019 Pavement Condition Index (PCI) survey and the pavement inventory and historical work records provided by the Village and stored in the Village's PAVER database. The following assumptions were made in our analyses.

- Pavements considered candidates for preventive maintenance were determined based on their overall PCI values and the distresses observed on the pavement at the time of inspection. Pavements with PCI values of 65 or better were considered candidates for preventive maintenance.
- Recommended preventive maintenance policies for asphalt and concrete pavements are shown in Appendix D Tables D-1 and D-2, respectively. The policy tables show what type of repair activity should be applied to each distress type and severity combination. Table D-3

presents estimated unit costs for the maintenance activities recommended in tables D-1 and
D-2.

- A pavement deterioration rate of approximately four points per year was assumed based on
  the performance of the Village's resurfaced roads, which equates to a pavement life between
  resurfacings of approximately eleven years. This deterioration rate will be refined as more
  historical work records are entered in PAVER and more PCI inspection data become
  available over time.

- A Critical PCI value (the PCI value below which a pavement is considered a candidate for
  major M&R) of 55 was assumed for all pavement sections. Pavements at or below the
  Critical PCI during the five-year analysis period triggered major M&R recommendations.
  *(Note: A PCI value of 55 has been initially chosen for all the Village's roadways as this
  numerical value straddles the "Fair" to "Poor" condition categories in the Village's PCI
  scale. Performing major M&R on pavements that are closer to a PCI of 55, rather than
  waiting for these pavements to deteriorate further is generally more cost effective.)*

- Unit costs used in these analyses were based on bid tabs provided by the Village and by costs
  reported by nearby villages.
  - ✓ Asphalt resurfacing ranged from approximately $1.50 to more than $5.00 a square
    foot depending on roadway condition (i.e., lower PCI values may result in more
    patching and thicker resurfacing). Reconstruction was set at $6.50 a square foot.
  - ✓ Concrete slab replacement costs ranged from $5.00 to $15.00 a square foot
    depending on roadway condition (i.e., lower PCI values result in more slab
    replacement). Reconstruction was set at $20.00 a square foot.

- All analyses began on the first of the year, and an inflation rate of 3% was assumed.

6.4   Results

The results of the PAVER M&R analyses are shown in the following two figures. Figure 12 illustrates the
estimated five-year change in pavement condition resulting from the analyzed funding scenarios, and
Figure 13 depicts the estimated change in the Village's major M&R backlog for each funding scenario.
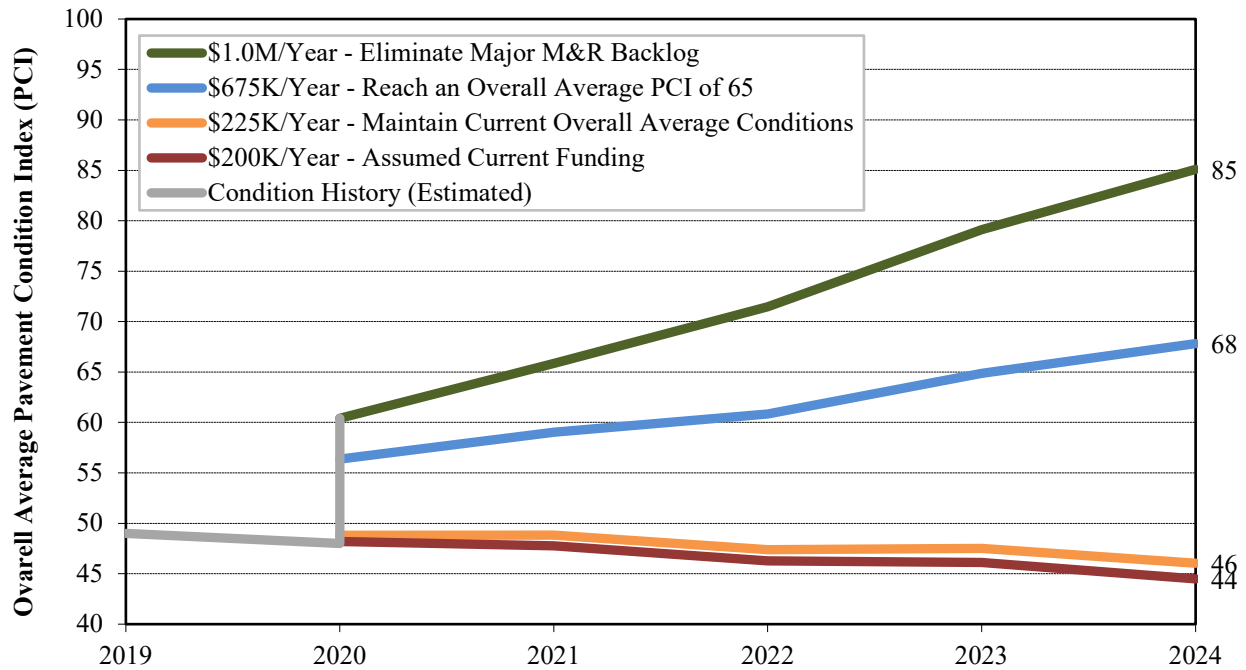
Figure 12: Impact of funding levels on overall pavement conditions by year.
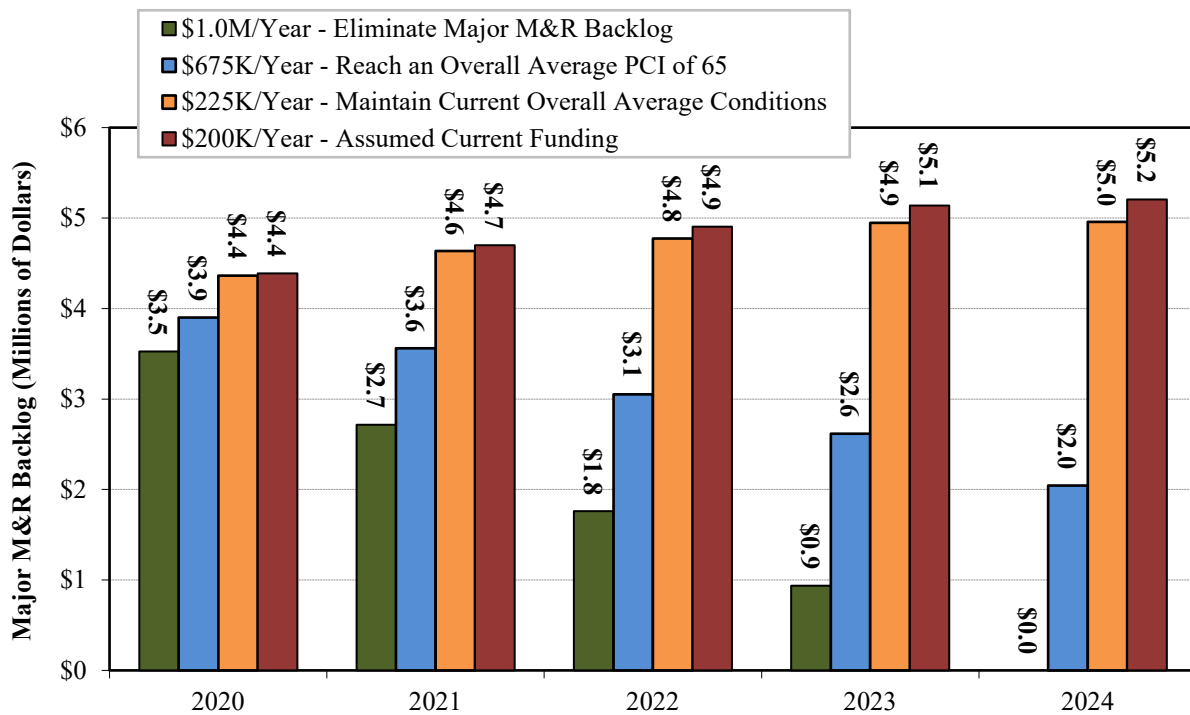
Figure 13: Impact of funding levels on major M&R backlog by year.

The consequences of the annual funding scenarios are shown in Table 9. This table illustrates the concept of "total cost." By treating both the total annual M&R expenditures and the remaining major M&R backlog at the end of the five-year period as costs to the Village, the benefit of increasing annual funding – which results in a smaller major M&R backlog – is clearly illustrated. Consequently, eliminating the major M&R backlog over a five-year period results in the lowest total cost to the Village.

Table 9. Estimated Five-year Pavement M&R Costs

Funding Scenario	Total Five-Year M&R Costs (2020-2024)	Remaining M&R Backlog[1] (2024)	Total Five-year Cost[2]	Projected PCI (2024)
$200K/YR (Assumed Current Funding)	$1.0M	$5.2M	$6.2M	44
Maintain Existing Overall Average Conditions ($225K/YR)	$1.13M	$4.96M	$6.08M	46
Increase Overall Average PCI to 65 ($675K/YR)	$3.37M	$2.04M	$5.41M	68
Backlog Elimination ($1.0M/YR)	$5.0M	$0M	$5.0M	85

1) "M&R Backlog" equals the lump-sum cost to resurface/reconstruct all pavements at or below their critical PCI value.
2) "Total five-year cost" equals the sum of the five-year major M&R expenditures plus the remaining major M&R backlog at the end of the five-year analysis period.

Appendix A maps A-5 and A-6 present major M&R recommendations. Map A-5 shows all roadways recommended for major M&R over the upcoming five years based on the Village's existing funding level. Map A-6 shows all roadways recommended for major M&R over the upcoming five years given an unlimited budget. The maps show which roadways are recommended each year by PAVER. These recommendations do not consider geographic proximity. Consequently, these recommendations should be grouped into practical projects during the Village's planning process.

Map A-7 shows all roads that are candidates for preventive maintenance, such as crack sealing and localized patching. While crack sealing can be an effective treatment for preserving roadways in good condition, its utility diminishes when applied to roadways that are already in poor condition or are exhibiting signs of structural failure.

Appendix B presents tabular data showing the estimated cost to repair each of the roads recommended for major M&R over the next five years based on the Village's existing funding level. Appendix C presents similar data assuming unlimited funding. *The costs presented in Appendixes B and C should be considered rough estimates only and should not be considered engineering estimates.* These costs are based on a simple relationship between predicted PCI value and typical level of major M&R. Unit costs used in developing these relationships were based on bid tabs provided by the Village and by costs reported by neighboring Villages.

Appendix E presents tabular data showing one-year estimated costs to apply preventive maintenance to each of the candidate roadways (i.e., roadways with PCI values of 65 or better). The total one-year preventive maintenance cost is estimated to be approximately $27,000, as shown in Table 10. *The estimated costs presented in Appendix E should be considered rough estimates based on the assumed unit costs only and should not be considered engineering estimates.*

Table 10. Preventive Maintenance Summary

Maintenance Type	Quantity	Units	Est. Cost
Crack Sealing - AC	10,613	FT	$10,613
Patching - AC Deep	1,315	SF	$14,466
Patching - AC Shallow	340	SF	$1,869
		Total:	**$26,948**

7   SUMMARY AND RECOMMENDATIONS

7.1   Summary

A pavement condition survey was performed in June 2019 on the Village's roadways. The results of the survey provide a snapshot of roadway conditions at the time of the survey. The PAVER Pavement Management System was implemented for the Village's roadways and was populated with collected pavement condition data and available M&R history data provided by the Village.

For the Village to get the most return on investment out of the PAVER Pavement Management System, the system must be considered a living entity and be updated regularly with M&R activities as they are performed, M&R unit cost data, and routinely collected pavement condition data. With such attention, PAVER becomes a repository of accurate, up-to-date data and can aid the Village in more cost-effectively programming M&R funding and objectively analyzing the true cost-effectiveness of presently employed M&R activities.

Five-year M&R funding analyses were performed on the Village's roadways using PAVER to: 1) evaluate the adequacy of the Village's existing funding level, 2) estimate the funding level needed to maintain the Village's existing roadway conditions, 3) estimate the funding level needed to modestly raise the overall condition of the Village's roadways, and 4) estimate the funding level needed to eliminate the Village's backlog of major M&R.

It was determined that the Village's existing funding level for major M&R is likely inadequate to maintain the current condition of the Village's roadway pavements. To maintain existing conditions, a slight increase in funding will likely be needed.

Based on this initial set of PCI data collection and analysis on the Village's roadways, G&AI respectfully offers the following broad recommendations.

7.2   Recommendations

7.2.1   Implement pavement preservation techniques

As discussed in Section 2.6, preventive maintenance activities, such as crack sealing, localized patching, and surface treatments, can cost-effectively extend the life of a pavement. The Village should incorporate these strategies into its M&R planning.

The Village does not appear to have an active crack sealing program for its roadways. Moisture penetrates unsealed cracks and compromises the base structure of the pavement. Freeze/thaw cycling exacerbates the damage. Sealing cracks on roadways that are in relatively good condition is a simple, cost-effective method for pavement preservation. Crack sealing is a preventive maintenance activity and should not be applied on roadways that require major M&R.

Furthermore, the Village should focus on applying routine preventive maintenance to newly resurfaced or reconstructed roadways. It was observed that some paving lane seams throughout the Village had not been sealed. Like crack sealing, sealing the paving lane seams is a simple method for pavement preservation, and it may be included in construction specifications.

7.2.2   Determine when pavements should be reconstructed rather than resurfaced

As the Village's asphalt-surfaced pavements age and are resurfaced multiple times, the performance of successive resurfacing projects will diminish. These "diminishing returns" occur because the sublayers of the pavement (the pavement structure below the asphalt surface) continue to deteriorate due to moisture infiltration, freeze-thaw damage, and damage due to vehicular loading. The M&R history and performance of resurfaced roadways should be closely tracked to determine the optimal number of resurfacing projects that may be performed prior to reconstructing the pavement.

7.2.3   Perform regular pavement condition inspections – every three years

To capitalize on the pavement condition survey and better track the condition of its pavements, the Village should continue to perform PCI surveys on a regular, three-year cycle. Doing so will enable the Village to:
1. Better track the deterioration of its pavements over time,
2. Identify pavement deterioration trends and use these trends to better predict future pavement conditions and then strategically apply M&R funding, and
3. Assess and track the effectiveness of its pavement preservation and major M&R activities.

The deterioration trends developed for this project were based on only one set of inspection data. Additional inspection data will help validate these trends and will improve forecasts, which may impact forecasted pavement conditions and recommended future M&R funding needs.

7.2.4   Routinely update the PAVER pavement management system

The PAVER system should be updated annually following the paving season to capture major M&R activities, routine maintenance activities, and pavement inventory changes (new roadways, jurisdictional changes, realignments). PAVER relies on updated inventory and work history data in order to generate meaningful recommendations.

7.2.5   Increase funding for pavement maintenance and rehabilitation

Based on the results of the pavement condition survey and forecasts of future pavement condition, the Village's current level of funding is likely inadequate to maintain the overall current condition of the Village's roadways. Managing a pavement network at an overall average PCI between 70 and 80 is more cost effective since funding is spent on less costly preventive maintenance and preservation activities rather than more expensive major M&R. As the Village moves forward, it is recommended that additional funding be allocated for M&R to improve the overall condition of the roadways so that they may be managed more cost-effectively.

7.2.6   Prioritize existing M&R funding to maximize shared benefit

Currently, the Village's roadway M&R funding needs exceed available funding. The Village should focus major M&R activities on its most trafficked roadways. Doing so will maximize the overall shared benefit of the funds spent.

APPENDIX A – PAVEMENT INVENTORY, CONDITION, AND RECOMMENDED M&R MAPS

Map A-1: Pavement Ranks
Map A-2: Pavement Surface Types
Map A-3: Pavement Condition Index (PCI) values
Map A-4: International Roughness Index (IRI) values
Map A-5: Five-year major M&R recommendations – *Recommendations assuming current funding*
Map A-6: Five-year major M&R recommendations – *Recommendations assuming unlimited funding*
Map A-7: Pavement preservation candidates – *Current recommendations*
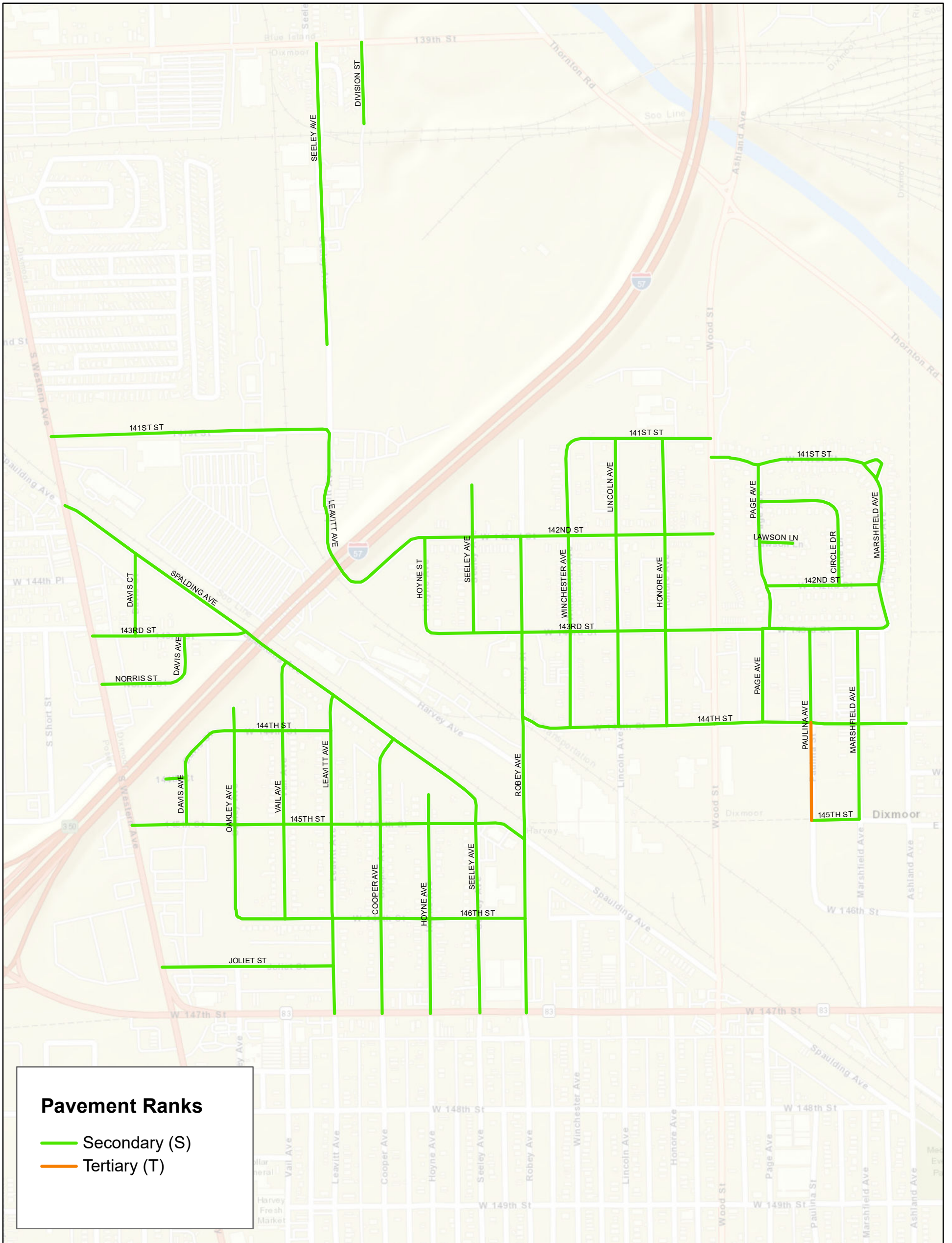
Pavement Ranks

— Secondary (S)
— Tertiary (T)

Feet
0   500   1,000
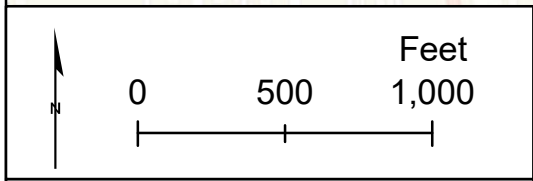
Map A-1:
Pavement Ranks

Village of Dixmoor, Illinois

Pavement Management Program

G&A Gorrondona & Associates, Inc.

Urban GIS
your world, your way

Pavement Surface Type

— Asphalt
— Gravel

Feet

0   500   1,000

Village of Dixmoor, Illinois

Pavement Management Program

Map A-2:
Pavement Surface Types

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Pavement Condition Index (PCI) Values

86 - 100 (Good)
71 - 85 (Satisfactory)
56 - 70 (Fair)
41 - 55 (Poor)
26 - 40 (Very Poor)
11 - 25 (Serious)
0 - 10 (Failed)
Not Inspected
(Gravel or Barricaded/ Abandoned)

Feet
0   500   1,000

Village of Dixmoor, Illinois
Pavement Management Program

Map A-3:
Pavement Condition Index (PCI) Values

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International Roughness Index (IRI) Values

International Roughness
Index (IRI) Values

Legend	
0 - 200 (Smooth)	
201 - 400 (Marginal)	
> 400 (Rough)	
Not Inspected	

(Gravel or Barricaded/Abandoned)

Feet

0   500   1,000

Village of Dixmoor, Illinois

Pavement Management Program

Map A-4:
International Roughness
Index (IRI) Values

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All Major M&R Needs
(Assumes current funding.)

— FY20
— FY21
— FY22
— FY23
— FY24

Feet
0   500   1,000
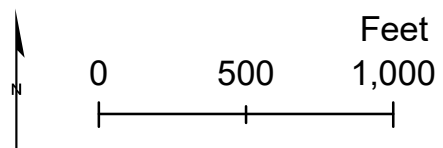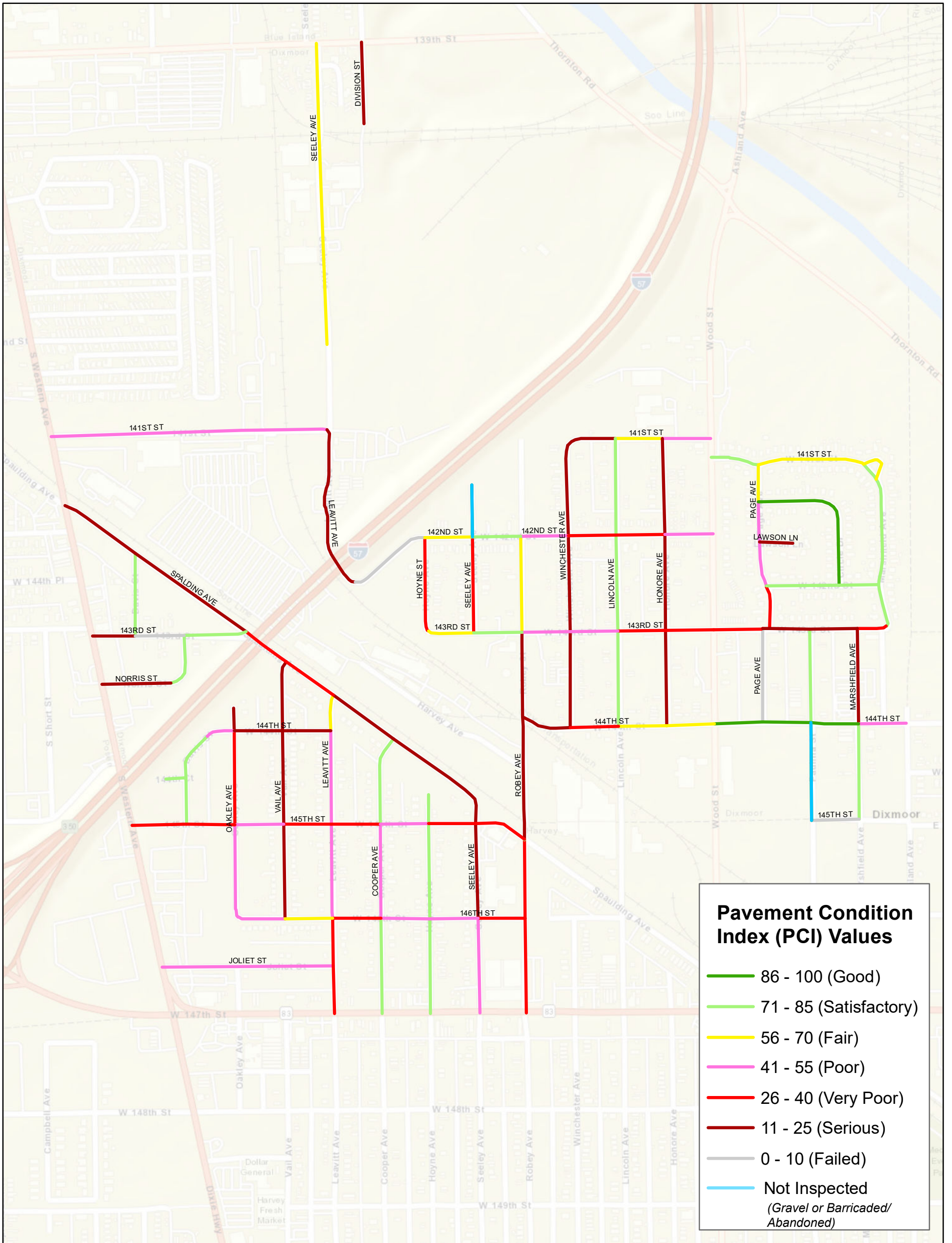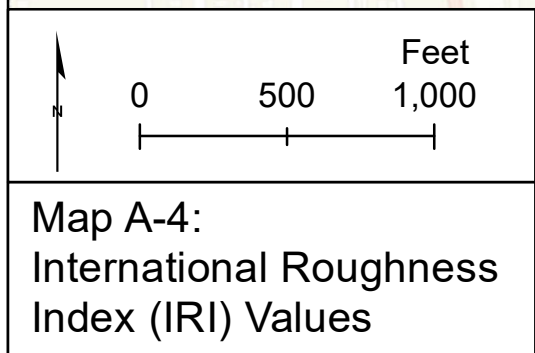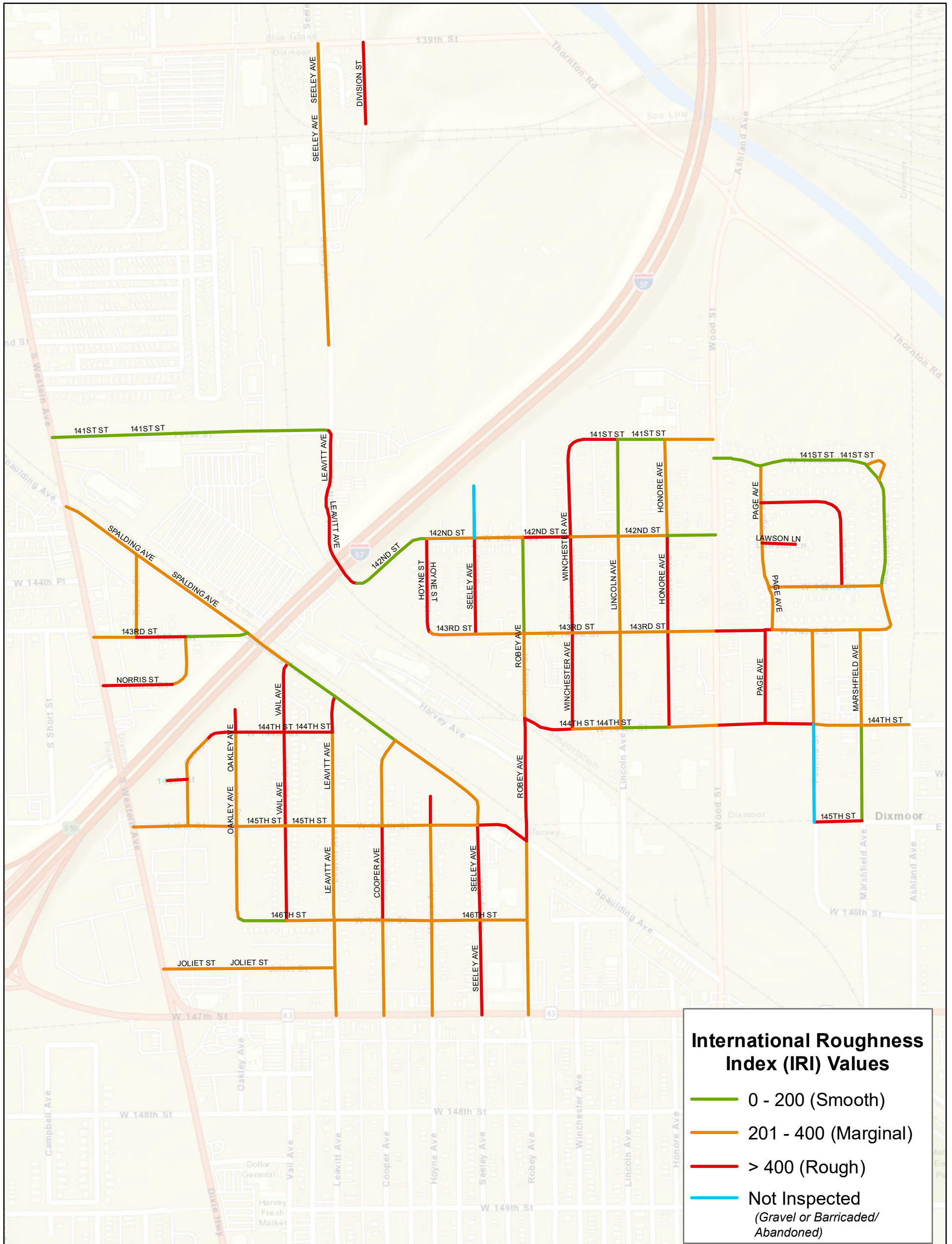
Village of Dixmoor, Illinois

Pavement Management Program
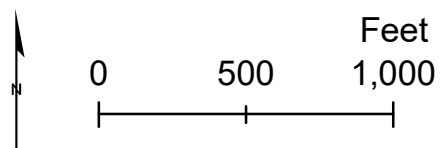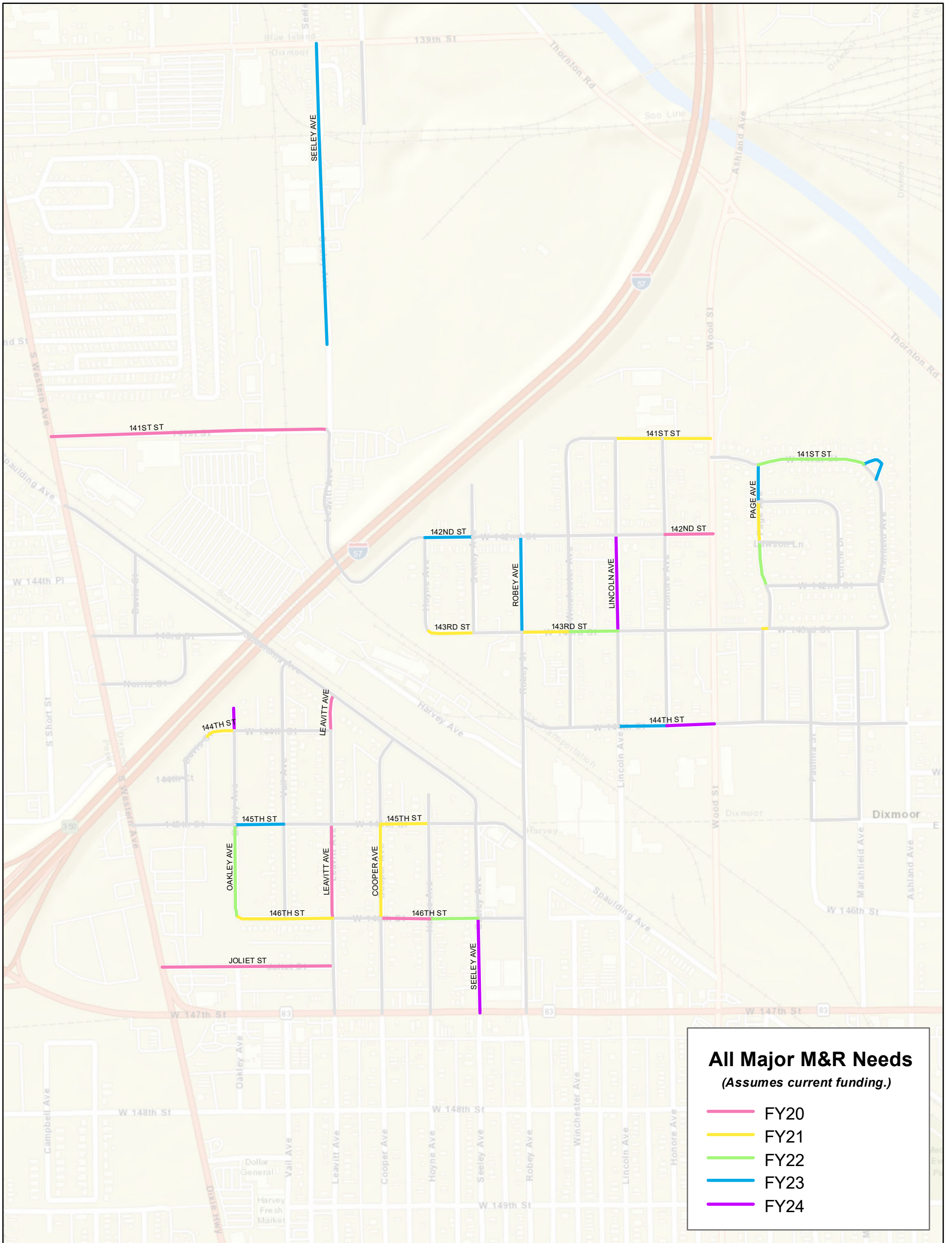
Map A-5:
All Major M&R Needs
(Assumes current funding.)

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All Major M&R Needs
(Assumes unlimited funding.)

———	FY20
———	FY21
———	FY22
———	FY23
———	FY24

Feet

0   500   1,000

Village of Dixmoor, Illinois

Pavement Management Program
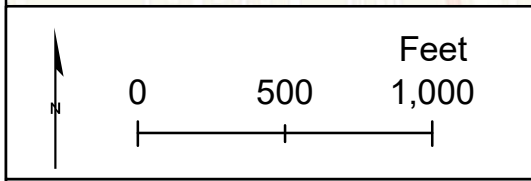
Map A-6:
All Major M&R Needs
(Assumes unlimited funding.)

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Pavement Preservation Candidates

— Candidate for Preservation

Village of Dixmoor, Illinois

Pavement Management Program

Map A-7:
Pavement Preservation
Candidates

Feet
0   500   1,000
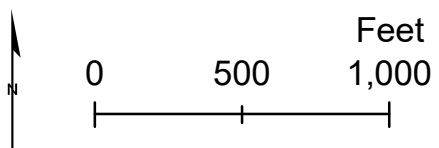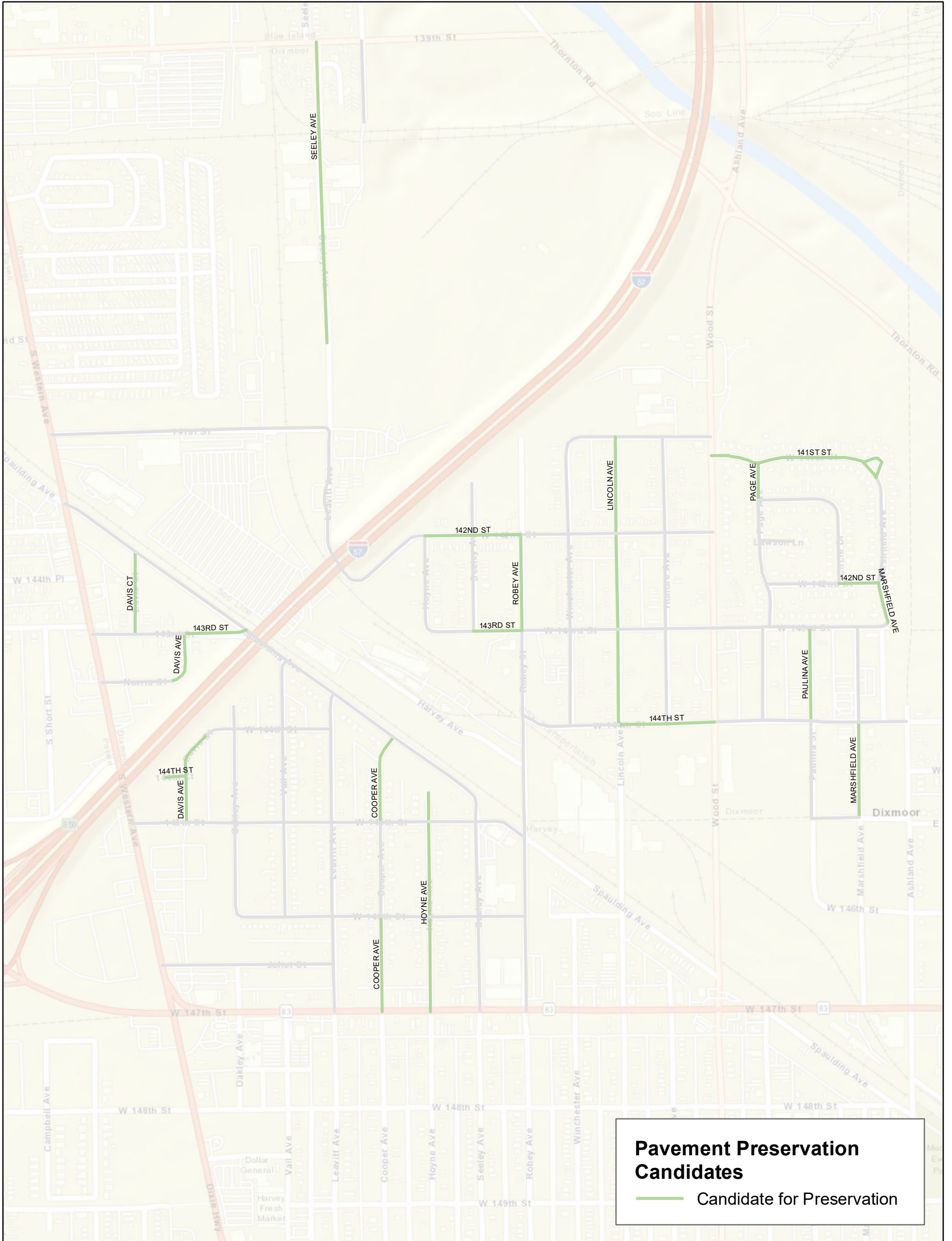
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APPENDIX B – TABULATED 5-YEAR MAJOR M&R RECOMMENDATIONS AND ESTIMATED COSTS – *ASSUMING CURRENT FUNDING*

Pavement ID	Road Name	From	To	Area	PCI	Year	Cost
DXMOR::141ST ST::10	141ST STREET	WESTERN AVENUE	LEAVITT AVENUE	80,023	52	2020	$ 109,313
DXMOR::142ND ST::70	142ND STREET	HONORE AVENUE	WOOD STREET	6,725	53	2020	$ 8,682
DXMOR::146TH ST::40	146TH STREET	COOPER AVENUE	HOYNE AVENUE	6,696	52	2020	$ 9,147
DXMOR::JLT ST::10	JOLIET STREET	WESTERN AVENUE	LEAVITT AVENUE	24,891	53	2020	$ 32,133
DXMOR::LVTT AVE::30	LEAVITT AVENUE	146TH STREET	145TH STREET	21,383	51	2020	$ 30,814
DXMOR::LVTT AVE::50	LEAVITT AVENUE	144TH STREET	SPALDING AVENUE	4,470	55	2020	$ 5,099
DXMOR::141ST ST::30	141ST STREET	LINCOLN AVENUE	HONORE AVENUE	10,756	52	2021	$ 15,201
DXMOR::141ST ST::40	141ST STREET	HONORE AVENUE	WOOD STREET	11,069	46	2021	$ 21,994
DXMOR::143RD ST::110	143RD STREET	PAGE AVENUE	PAGE AVENUE	1,456	13	2021	$ 9,749
DXMOR::143RD ST::40	143RD STREET	HOYNE STREET	SEELEY AVENUE	6,661	55	2021	$ 7,868
DXMOR::143RD ST::60	143RD STREET	ROBEY AVENUE	WINCHESTER AVENUE	8,371	43	2021	$ 19,219
DXMOR::144TH ST::20	144TH STREET	DAVIS AVENUE	OAKLEY AVENUE	3,325	45	2021	$ 6,950
DXMOR::145TH ST::60	145TH STREET	COOPER AVENUE	HOYNE AVENUE	7,070	44	2021	$ 15,505
DXMOR::146TH ST::10	146TH STREET	OAKLEY AVENUE	VAIL AVENUE	10,480	44	2021	$ 22,983
DXMOR::146TH ST::20	146TH STREET	VAIL AVENUE	LEAVITT AVENUE	10,880	55	2021	$ 12,852
DXMOR::CPR AVE::20	COOPER AVENUE	146TH STREET	145TH STREET	21,488	44	2021	$ 47,123
DXMOR::PG AVE::40	PAGE AVENUE	LAWSON LANE	CIRCLE DRIVE	6,717	46	2021	$ 13,347
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	55	2022	$ 21,768
DXMOR::143RD ST::70	143RD STREET	WINCHESTER AVENUE	LINCOLN AVENUE	8,291	39	2022	$ 25,004
DXMOR::146TH ST::50	146TH STREET	HOYNE AVENUE	SEELEY AVENUE	6,679	35	2022	$ 27,229
DXMOR::KLY AVE::10	OAKLEY AVENUE	146TH STREET	145TH STREET	21,109	36	2022	$ 80,453
DXMOR::PG AVE::30	PAGE AVENUE	142ND STREET	LAWSON LANE	7,385	33	2022	$ 34,024
DXMOR::141ST ST::80	141ST STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	6,146	53	2023	$ 8,786
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	52	2023	$ 9,943
DXMOR::144TH ST::70	144TH STREET	LINCOLN AVENUE	HONORE AVENUE	6,679	55	2023	$ 8,452
DXMOR::145TH ST::30	145TH STREET	OAKLEY AVENUE	VAIL AVENUE	7,409	28	2023	$ 43,431
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	6,068	54	2023	$ 8,176
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	52	2023	$ 20,041
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	55	2023	$ 84,251
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	6,591	51	2024	$ 10,300
DXMOR::KLY AVE::30	OAKLEY AVENUE	144TH STREET	END	2,827	1	2024	$ 20,682
DXMOR::LNCLN AVE::30	LINCOLN AVENUE	143RD STREET	142ND STREET	13,947	54	2024	$ 18,262
DXMOR::SLY AVE::10	SEELEY AVENUE	147TH STREET	146TH STREET	21,560	24	2024	$ 144,997

APPENDIX C – TABULATED 5-YEAR MAJOR M&R RECOMMENDATIONS AND ESTIMATED COSTS – *ASSUMING UNLIMITED FUNDING*

Pavement ID	Road Name	From	To	Area	PCI	Year	Cost
DXMOR::141ST ST::10	141ST STREET	WESTERN AVENUE	LEAVITT AVENUE	80,023	52	2020	$ 109,313
DXMOR::141ST ST::40	141ST STREET	HONORE AVENUE	WOOD STREET	11,069	50	2020	$ 16,839
DXMOR::142ND ST::40	142ND STREET	ROBEY AVENUE	WINCHESTER AVENUE	6,569	40	2020	$ 16,769
DXMOR::142ND ST::50	142ND STREET	WINCHESTER AVENUE	LINCOLN AVENUE	6,640	36	2020	$ 23,587
DXMOR::142ND ST::60	142ND STREET	LINCOLN AVENUE	HONORE AVENUE	6,694	31	2020	$ 32,150
DXMOR::142ND ST::70	142ND STREET	HONORE AVENUE	WOOD STREET	6,725	53	2020	$ 8,682
DXMOR::143RD ST::110	143RD STREET	PAGE AVENUE	PAGE AVENUE	1,456	17	2020	$ 9,465
DXMOR::143RD ST::140	143RD STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	6,731	33	2020	$ 28,962
DXMOR::143RD ST::60	143RD STREET	ROBEY AVENUE	WINCHESTER AVENUE	8,371	47	2020	$ 15,245
DXMOR::143RD ST::70	143RD STREET	WINCHESTER AVENUE	LINCOLN AVENUE	8,291	47	2020	$ 15,101
DXMOR::143RD ST::80	143RD STREET	LINCOLN AVENUE	HONORE AVENUE	8,143	32	2020	$ 37,072
DXMOR::143RD ST::90	143RD STREET	HONORE AVENUE	WOOD STREET	8,355	38	2020	$ 25,504
DXMOR::144TH ST::120	144TH STREET	MARSHFIELD AVENUE	ASHLAND AVENUE	7,897	39	2020	$ 22,132
DXMOR::144TH ST::20	144TH STREET	DAVIS AVENUE	OAKLEY AVENUE	3,325	49	2020	$ 5,391
DXMOR::145TH ST::10	145TH STREET	WESTERN AVENUE	DAVIS AVENUE	8,258	37	2020	$ 27,273
DXMOR::145TH ST::20	145TH STREET	DAVIS AVENUE	OAKLEY AVENUE	7,389	37	2020	$ 24,401
DXMOR::145TH ST::30	145TH STREET	OAKLEY AVENUE	VAIL AVENUE	7,409	40	2020	$ 18,911
DXMOR::145TH ST::40	145TH STREET	VAIL AVENUE	LEAVITT AVENUE	7,269	35	2020	$ 27,640
DXMOR::145TH ST::60	145TH STREET	COOPER AVENUE	HOYNE AVENUE	7,070	48	2020	$ 12,170
DXMOR::145TH ST::80	145TH STREET	SEELEY AVENUE	ROBEY AVENUE	13,002	31	2020	$ 62,441
DXMOR::146TH ST::10	146TH STREET	OAKLEY AVENUE	VAIL AVENUE	10,480	48	2020	$ 18,039
DXMOR::146TH ST::30	146TH STREET	LEAVITT AVENUE	COOPER AVENUE	6,729	34	2020	$ 27,269
DXMOR::146TH ST::40	146TH STREET	COOPER AVENUE	HOYNE AVENUE	6,696	52	2020	$ 9,147
DXMOR::146TH ST::50	146TH STREET	HOYNE AVENUE	SEELEY AVENUE	6,679	43	2020	$ 14,836
DXMOR::CPR AVE::20	COOPER AVENUE	146TH STREET	145TH STREET	21,488	48	2020	$ 36,987
DXMOR::JLT ST::10	JOLIET STREET	WESTERN AVENUE	LEAVITT AVENUE	24,891	53	2020	$ 32,133
DXMOR::KLY AVE::10	OAKLEY AVENUE	146TH STREET	145TH STREET	21,109	44	2020	$ 44,776
DXMOR::KLY AVE::30	OAKLEY AVENUE	144TH STREET	END	2,827	17	2020	$ 18,376
DXMOR::LVTT AVE::20	LEAVITT AVENUE	JOLIET STREET	146TH STREET	10,855	35	2020	$ 41,278
DXMOR::LVTT AVE::30	LEAVITT AVENUE	146TH STREET	145TH STREET	21,383	51	2020	$ 30,814
DXMOR::LVTT AVE::40	LEAVITT AVENUE	145TH STREET	144TH STREET	12,961	40	2020	$ 33,084
DXMOR::LVTT AVE::50	LEAVITT AVENUE	144TH STREET	SPALDING AVENUE	4,470	55	2020	$ 5,099
DXMOR::PG AVE::20	PAGE AVENUE	143RD STREET	142ND STREET	7,236	34	2020	$ 29,323
DXMOR::PG AVE::30	PAGE AVENUE	142ND STREET	LAWSON LANE	7,385	41	2020	$ 17,880
DXMOR::PG AVE::40	PAGE AVENUE	LAWSON LANE	CIRCLE DRIVE	6,717	50	2020	$ 10,219
DXMOR::RBY AVE::20	ROBEY AVENUE	146TH STREET	145TH STREET	13,060	38	2020	$ 39,865
DXMOR::SLY AVE::10	SEELEY AVENUE	147TH STREET	146TH STREET	21,560	40	2020	$ 55,033
DXMOR::SLY AVE::30	SEELEY AVENUE	143RD STREET	142ND STREET	13,262	33	2020	$ 57,060
DXMOR::141ST ST::30	141ST STREET	LINCOLN AVENUE	HONORE AVENUE	10,756	52	2021	$ 15,201
DXMOR::143RD ST::10	143RD STREET	WESTERN AVENUE	DAVIS COURT	5,964	17	2021	$ 39,930
DXMOR::143RD ST::100	143RD STREET	WOOD STREET	PAGE AVENUE	11,257	22	2021	$ 72,393
DXMOR::143RD ST::40	143RD STREET	HOYNE STREET	SEELEY AVENUE	6,661	55	2021	$ 7,868
DXMOR::144TH ST::40	144TH STREET	VAIL AVENUE	LEAVITT AVENUE	6,300	11	2021	$ 42,179
DXMOR::144TH ST::60	144TH STREET	WINCHESTER AVENUE	LINCOLN AVENUE	6,697	23	2021	$ 42,035
DXMOR::145TH ST::50	145TH STREET	LEAVITT AVENUE	COOPER AVENUE	7,058	22	2021	$ 45,392
DXMOR::145TH ST::70	145TH STREET	HOYNE AVENUE	SEELEY AVENUE	6,841	26	2021	$ 39,770
DXMOR::146TH ST::20	146TH STREET	VAIL AVENUE	LEAVITT AVENUE	10,880	55	2021	$ 12,852
DXMOR::146TH ST::60	146TH STREET	SEELEY AVENUE	ROBEY AVENUE	6,572	27	2021	$ 37,186
DXMOR::HYN ST::10	HOYNE STREET	143RD STREET	142ND STREET	13,032	23	2021	$ 81,797
DXMOR::KLY AVE::20	OAKLEY AVENUE	145TH STREET	144TH STREET	12,979	20	2021	$ 86,901
DXMOR::LVTT AVE::10	LEAVITT AVENUE	147TH STREET	JOLIET STREET	10,933	24	2021	$ 66,935
DXMOR::RBY AVE::10	ROBEY AVENUE	147TH STREET	146TH STREET	21,601	20	2021	$ 144,625
DXMOR::SPLDNG AVE::30	SPALDING AVENUE	143RD STREET	VAIL AVENUE	8,319	20	2021	$ 55,696
DXMOR::SPLDNG AVE::40	SPALDING AVENUE	VAIL AVENUE	LEAVITT AVENUE	9,592	22	2021	$ 61,685
DXMOR::SPLDNG AVE::50	SPALDING AVENUE	LEAVITT AVENUE	COOPER AVENUE	12,325	19	2021	$ 82,519

Pavement ID	Road Name	From	To	Area	PCI	Year	Cost
DXMOR::SPLDNG AVE::60	SPALDING AVENUE	COOPER AVENUE	145TH STREET	18,270	19	2021	$ 122,325
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	55	2022	$ 21,768
DXMOR::144TH ST::50	144TH STREET	ROBEY AVENUE	WINCHESTER AVENUE	6,928	8	2022	$ 47,774
DXMOR::DVSN ST::10	DIVISION STREET	139TH STREET	END	17,955	14	2022	$ 123,822
DXMOR::HNR AVE::10	HONORE AVENUE	144TH STREET	143RD STREET	12,475	10	2022	$ 86,035
DXMOR::LVTT AVE::60	LEAVITT AVENUE	142ND STREET	141ST STREET	36,389	14	2022	$ 250,952
DXMOR::LWSN LN::10	LAWSON LANE	PAGE AVENUE	END	5,085	5	2022	$ 35,068
DXMOR::RBY AVE::30	ROBEY AVENUE	145TH STREET	144TH STREET	27,898	12	2022	$ 192,391
DXMOR::SLY AVE::20	SEELEY AVENUE	146TH STREET	145TH STREET	21,698	14	2022	$ 149,634
DXMOR::VL AVE::10	VAIL AVENUE	146TH STREET	145TH STREET	21,511	9	2022	$ 148,350
DXMOR::141ST ST::80	141ST STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	6,146	53	2023	$ 8,786
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	52	2023	$ 9,943
DXMOR::144TH ST::70	144TH STREET	LINCOLN AVENUE	HONORE AVENUE	6,679	55	2023	$ 8,452
DXMOR::HNR AVE::30	HONORE AVENUE	142ND STREET	141ST STREET	15,250	1	2023	$ 108,324
DXMOR::MSHFLD AVE::20	MARSHFIELD AVENUE	144TH STREET	143RD STREET	15,847	2	2023	$ 112,566
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	6,068	54	2023	$ 8,176
DXMOR::RBY AVE::40	ROBEY AVENUE	144TH STREET	143RD STREET	14,059	5	2023	$ 99,867
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	52	2023	$ 20,041
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	55	2023	$ 84,251
DXMOR::SPLDNG AVE::10	SPALDING AVENUE	WESTERN AVENUE	DAVIS COURT	14,076	5	2023	$ 99,988
DXMOR::VL AVE::20	VAIL AVENUE	145TH STREET	144TH STREET	21,330	5	2023	$ 151,513
DXMOR::VL AVE::30	VAIL AVENUE	144TH STREET	SPALDING AVENUE	15,899	4	2023	$ 112,936
DXMOR::WNCHST AVE::20	WINCHESTER AVENUE	143RD STREET	142ND STREET	13,935	4	2023	$ 98,980
DXMOR::WNCHST AVE::30	WINCHESTER AVENUE	142ND STREET	141ST STREET	13,083	2	2023	$ 92,931
DXMOR::141ST ST::20	141ST STREET	WINCHESTER AVENUE	LINCOLN AVENUE	6,924	0	2024	$ 50,655
DXMOR::142ND ST::10	142ND STREET	LEAVITT AVENUE	HOYNE STREET	14,870	0	2024	$ 108,790
DXMOR::143RD ST::120	143RD STREET	PAGE AVENUE	PAULINA AVENUE	9,225	0	2024	$ 67,494
DXMOR::143RD ST::130	143RD STREET	PAULINA AVENUE	MARSHFIELD AVENUE	10,906	0	2024	$ 79,790
DXMOR::143RD ST::20	143RD STREET	DAVIS COURT	DAVIS AVENUE	6,743	0	2024	$ 49,331
DXMOR::144TH ST::30	144TH STREET	OAKLEY AVENUE	VAIL AVENUE	6,370	0	2024	$ 46,602
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	6,591	51	2024	$ 10,300
DXMOR::145TH ST::100	145TH STREET	PAULINA AVENUE	MARSHFIELD AVENUE	6,600	0	2024	$ 48,287
DXMOR::HNR AVE::20	HONORE AVENUE	143RD STREET	142ND STREET	12,631	0	2024	$ 92,409
DXMOR::LNCLN AVE::30	LINCOLN AVENUE	143RD STREET	142ND STREET	13,947	54	2024	$ 18,262
DXMOR::NORRIS ST::10	NORRIS STREET	WESTERN AVENUE	DAVIS AVENUE	9,051	0	2024	$ 66,219
DXMOR::PG AVE::10	PAGE AVENUE	144TH STREET	143RD STREET	12,247	0	2024	$ 89,603
DXMOR::SPLDNG AVE::20	SPALDING AVENUE	DAVIS COURT	143RD STREET	22,529	0	2024	$ 164,832
DXMOR::WNCHST AVE::10	WINCHESTER AVENUE	144TH STREET	143RD STREET	13,926	0	2024	$ 101,884

APPENDIX D – PAVEMENT MAINTENANCE POLICIES AND UNIT COSTS

Table D-1. Recommended Asphalt Pavement Maintenance Policy.

Pavement Distress	Severity	Recommended Maintenance Type	Units
Alligator Cracking	Medium	Patching - AC Deep	SF
Alligator Cracking	High	Patching - AC Deep	SF
Block Cracking	Low	Crack Sealing - AC	FT
Block Cracking	Medium	Crack Sealing - AC	FT
Block Cracking	High	Patching - AC Shallow	SF
Bumps and Sags	Medium	Patching - AC Shallow	SF
Bumps and Sags	High	Patching - AC Deep	SF
Corrugation	Medium	Patching - AC Shallow	SF
Corrugation	High	Patching - AC Deep	SF
Depressions	Medium	Patching - AC Deep	SF
Depressions	High	Patching - AC Deep	SF
Edge Cracking	Low	Crack Sealing - AC	FT
Edge Cracking	Medium	Crack Sealing - AC	FT
Edge Cracking	High	Patching - AC Shallow	SF
Joint Reflection Cracking	Low	Crack Sealing - AC	FT
Joint Reflection Cracking	Medium	Crack Sealing - AC	FT
Joint Reflection Cracking	High	Patching - AC Shallow	SF
Lane/Shoulder Dropoff	Medium	Shoulder leveling	FT
Lane/Shoulder Dropoff	High	Shoulder leveling	FT
Long. and Trans. Cracking	Low	Crack Sealing - AC	FT
Long. and Trans. Cracking	Medium	Crack Sealing - AC	FT
Long. and Trans. Cracking	High	Patching - AC Shallow	SF
Patching and Utility Cuts	High	Patching - AC Deep	SF
Potholes	Low	Patching - AC Deep	SF
Potholes	Medium	Patching - AC Deep	SF
Potholes	High	Patching - AC Deep	SF
Rutting	Medium	Patching - AC Shallow	SF
Rutting	High	Patching - AC Deep	SF
Shoving	Medium	Grinding (Localized)	FT
Shoving	High	Grinding (Localized)	FT
Slippage Cracking	Low	Crack Sealing - AC	FT
Slippage Cracking	Medium	Patching - AC Shallow	SF
Slippage Cracking	High	Patching - AC Shallow	SF
Blow ups	Medium	Patching - PCC Full Depth	SF
Blow ups	High	Patching - PCC Full Depth	SF

Table D-2. Recommended Concrete Pavement Maintenance Policy.

Pavement Distress	Severity	Recommended Maintenance Type	Units
Corner Breaks	Low	Crack Sealing - PCC	FT
Corner Breaks	Medium	Patching - PCC Full Depth	FT
Corner Breaks	High	Patching - PCC Full Depth	SF
Divided (Shattered) Slabs	Low	Crack Sealing - PCC	FT
Divided (Shattered) Slabs	Medium	Slab Replacement - PCC	SF
Divided (Shattered) Slabs	High	Slab Replacement - PCC	SF
Durability (D) Cracking	Medium	Patching - PCC Full Depth	SF
Durability (D) Cracking	High	Slab Replacement - PCC	SF
Faulting	Medium	Grinding (Localized)	FT
Faulting	High	Grinding (Localized)	FT
Joint Seal Damage	Medium	Joint Seal (Localized)	FT
Joint Seal Damage	High	Joint Seal (Localized)	FT
Lane/Shoulder Dropoff	Medium	Shoulder leveling	FT
Lane/Shoulder Dropoff	High	Shoulder leveling	FT
Linear Cracking	Low	Crack Sealing - PCC	FT
Linear Cracking	Medium	Crack Sealing - PCC	FT
Linear Cracking	High	Patching - PCC Partial Depth	SF
Patches, Large	High	Patching - PCC Full Depth	SF
Patches, Small	High	Patching - PCC Partial Depth	SF
Punchouts	Medium	Patching - PCC Full Depth	SF
Punchouts	High	Slab Replacement - PCC	SF
Scaling	High	Slab Replacement - PCC	SF
Corner Spalls	Medium	Patching - PCC Partial Depth	SF
Corner Spalls	High	Patching - PCC Partial Depth	SF
Joint Spalls	Medium	Patching - PCC Partial Depth	SF
Joint Spalls	High	Patching - PCC Partial Depth	SF

Table D-3. Estimate Unit Cost for Maintenance Activities.

Maintenance Type	Est. Unit Cost	Units
Crack Sealing - AC	$1.00	FT
Joint Seal - Silicon	$2.75	FT
Crack Sealing - PCC	$1.50	FT
Grinding (Localized)	$4.00	FT
Joint Seal (Localized)	$1.50	FT
Patching - AC Deep	$11.00	SF
Patching - AC Leveling	$1.20	SF
Patching - AC Shallow	$5.50	SF
Patching - PCC Full Depth	$30.00	SF
Patching - PCC Partial Depth	$7.00	SF
Shoulder leveling	$1.20	FT
Slab Replacement - PCC	$20.00	SF

APPENDIX E – TABULATED PREVENTIVE MAINTENANCE RECOMMENDATIONS

Pavement ID	Road Name	From	To	Area	Distress Type	Density	Maint. Activity	Cost
DXMOR::141ST ST::50	141ST STREET	WOOD STREET	141ST STREET	3,192	L & T CR	2.0%	Crack Sealing - AC	$65
DXMOR::141ST ST::60	141ST STREET	141ST STREET	PAGE AVENUE	4,788	L & T CR	0.5%	Crack Sealing - AC	$24
DXMOR::141ST ST::60	141ST STREET	141ST STREET	PAGE AVENUE	4,788	L & T CR	2.5%	Crack Sealing - AC	$122
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	L & T CR	2.3%	Crack Sealing - AC	$414
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	BLOCK CR	3.7%	Crack Sealing - AC	$202
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	L & T CR	2.9%	Crack Sealing - AC	$513
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	ALLIGATOR CR	0.7%	Crack Sealing - AC	$54
DXMOR::141ST ST::80	141ST STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	6,146	L & T CR	5.9%	Crack Sealing - AC	$365
DXMOR::141ST ST::80	141ST STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	6,146	L & T CR	4.0%	Crack Sealing - AC	$243
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	ALLIGATOR CR	0.4%	Crack Sealing - AC	$15
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	L & T CR	4.3%	Crack Sealing - AC	$284
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	L & T CR	1.5%	Crack Sealing - AC	$102
DXMOR::142ND ST::30	142ND STREET	SEELEY AVENUE	ROBEY AVENUE	6,629	L & T CR	4.9%	Crack Sealing - AC	$326
DXMOR::142ND ST::30	142ND STREET	SEELEY AVENUE	ROBEY AVENUE	6,629	L & T CR	2.1%	Crack Sealing - AC	$142
DXMOR::142ND ST::90	142ND STREET	CIRCLE DRIVE	MARSHFIELD AVENUE	6,242	L & T CR	1.5%	Crack Sealing - AC	$94
DXMOR::143RD ST::30	143RD STREET	DAVIS AVENUE	SPALDING AVENUE	8,597	L & T CR	0.5%	Crack Sealing - AC	$45
DXMOR::143RD ST::30	143RD STREET	DAVIS AVENUE	SPALDING AVENUE	8,597	L & T CR	1.3%	Crack Sealing - AC	$114
DXMOR::143RD ST::50	143RD STREET	SEELEY AVENUE	ROBEY AVENUE	6,963	L & T CR	0.6%	Crack Sealing - AC	$43
DXMOR::143RD ST::50	143RD STREET	SEELEY AVENUE	ROBEY AVENUE	6,963	L & T CR	2.1%	Crack Sealing - AC	$148
DXMOR::144TH ST::10	144TH STREET	DAVIS COURT	END	1,904	L & T CR	0.5%	Crack Sealing - AC	$10
DXMOR::144TH ST::70	144TH STREET	LINCOLN AVENUE	HONORE AVENUE	6,679	L & T CR	6.7%	Crack Sealing - AC	$448
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	6,591	L & T CR	4.0%	Crack Sealing - AC	$264
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	6,591	L & T CR	3.7%	Crack Sealing - AC	$245
DXMOR::CPR AVE::10	COOPER AVENUE	147TH STREET	146TH STREET	21,707	L & T CR	0.5%	Crack Sealing - AC	$100
DXMOR::CPR AVE::10	COOPER AVENUE	147TH STREET	146TH STREET	21,707	L & T CR	0.3%	Crack Sealing - AC	$67
DXMOR::CPR AVE::30	COOPER AVENUE	145TH STREET	SPALDING AVENUE	20,347	BLOCK CR	3.1%	Crack Sealing - AC	$195
DXMOR::DVS AVE::10	DAVIS AVENUE	145TH STREET	144TH STREET	6,142	L & T CR	0.6%	Crack Sealing - AC	$38
DXMOR::DVS AVE::10	DAVIS AVENUE	145TH STREET	144TH STREET	6,142	L & T CR	0.3%	Crack Sealing - AC	$19
DXMOR::DVS AVE::20	DAVIS AVENUE	144TH STREET	DAVIS AVENUE	6,484	L & T CR	1.5%	Crack Sealing - AC	$97
DXMOR::DVS AVE::20	DAVIS AVENUE	144TH STREET	DAVIS AVENUE	6,484	L & T CR	1.8%	Crack Sealing - AC	$116
DXMOR::DVS AVE::30	DAVIS AVENUE	NORRIS STREET	143RD STREET	7,604	L & T CR	1.8%	Crack Sealing - AC	$139
DXMOR::DVS AVE::30	DAVIS AVENUE	NORRIS STREET	143RD STREET	7,604	L & T CR	4.0%	Crack Sealing - AC	$301
DXMOR::HYN AVE::10	HOYNE AVENUE	147TH STREET	146TH STREET	13,703	L & T CR	0.5%	Crack Sealing - AC	$64
DXMOR::HYN AVE::10	HOYNE AVENUE	147TH STREET	146TH STREET	13,703	L & T CR	0.6%	Crack Sealing - AC	$86
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	13,867	ALLIGATOR CR	1.0%	Crack Sealing - AC	$56
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	13,867	L & T CR	0.5%	Crack Sealing - AC	$63
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	13,867	L & T CR	1.1%	Crack Sealing - AC	$149
DXMOR::HYN AVE::30	HOYNE AVENUE	145TH STREET	END	4,713	L & T CR	2.0%	Crack Sealing - AC	$95
DXMOR::HYN AVE::30	HOYNE AVENUE	145TH STREET	END	4,713	L & T CR	2.5%	Crack Sealing - AC	$118
DXMOR::LNCLN AVE::20	LINCOLN AVENUE	144TH STREET	143RD STREET	13,813	L & T CR	0.3%	Crack Sealing - AC	$43
DXMOR::LNCLN AVE::20	LINCOLN AVENUE	144TH STREET	143RD STREET	13,813	L & T CR	0.2%	Crack Sealing - AC	$21
DXMOR::LNCLN AVE::40	LINCOLN AVENUE	142ND STREET	141ST STREET	14,013	L & T CR	0.2%	Crack Sealing - AC	$21
DXMOR::MSHFLD AVE::10	MARSHFIELD AVENUE	144TH STREET	END	13,175	L & T CR	0.3%	Crack Sealing - AC	$41
DXMOR::MSHFLD AVE::10	MARSHFIELD AVENUE	144TH STREET	END	13,175	L & T CR	2.0%	Crack Sealing - AC	$265
DXMOR::MSHFLD AVE::30	MARSHFIELD AVENUE	142ND STREET	143RD STREET	6,786	L & T CR	0.3%	Crack Sealing - AC	$23

Pavement ID	Road Name	From	To	Area	Distress Type	Density	Maint. Activity	Cost
DXMOR::MSHFLD AVE::50	MARSHFIELD AVENUE	141ST STREET	141ST STREET	3,277	L & T CR	0.5%	Crack Sealing - AC	$16
DXMOR::MSHFLD AVE::50	MARSHFIELD AVENUE	141ST STREET	141ST STREET	3,277	L & T CR	0.5%	Crack Sealing - AC	$16
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	6,068	ALLIGATOR CR	0.6%	Crack Sealing - AC	$20
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	6,068	L & T CR	4.0%	Crack Sealing - AC	$243
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	6,068	L & T CR	4.8%	Crack Sealing - AC	$290
DXMOR::PLN AVE::10	PAULINA AVENUE	144TH STREET	143RD STREET	12,281	BLOCK CR	3.7%	Crack Sealing - AC	$140
DXMOR::PLN AVE::10	PAULINA AVENUE	144TH STREET	143RD STREET	12,281	L & T CR	0.5%	Crack Sealing - AC	$60
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	BLOCK CR	10.5%	Crack Sealing - AC	$426
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	BLOCK CR	4.2%	Crack Sealing - AC	$171
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	L & T CR	1.9%	Crack Sealing - AC	$247
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	L & T CR	2.3%	Crack Sealing - AC	$311
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	13,258	ALLIGATOR CR	1.1%	Crack Sealing - AC	$59
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	L & T CR	2.8%	Crack Sealing - AC	$1,860
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	L & T CR	0.5%	Crack Sealing - AC	$357
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	17,810	ALLIGATOR CR	1.3%	Patching - AC Deep	$3,346
DXMOR::143RD ST::30	143RD STREET	DAVIS AVENUE	SPALDING AVENUE	8,597	POTHOLE	0.0%	Patching - AC Deep	$229
DXMOR::143RD ST::50	143RD STREET	SEELEY AVENUE	ROBEY AVENUE	6,963	ALLIGATOR CR	0.2%	Patching - AC Deep	$298
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	6,591	ALLIGATOR CR	0.1%	Patching - AC Deep	$281
DXMOR::DVS AVE::10	DAVIS AVENUE	145TH STREET	144TH STREET	6,142	ALLIGATOR CR	1.2%	Patching - AC Deep	$1,244
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	13,867	ALLIGATOR CR	0.2%	Patching - AC Deep	$550
DXMOR::LNCLN AVE::30	LINCOLN AVENUE	143RD STREET	142ND STREET	13,947	ALLIGATOR CR	0.5%	Patching - AC Deep	$1,185
DXMOR::PLN AVE::10	PAULINA AVENUE	144TH STREET	143RD STREET	12,281	POTHOLE	0.0%	Patching - AC Deep	$101
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	ALLIGATOR CR	0.8%	Patching - AC Deep	$7,070
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	POTHOLE	0.0%	Patching - AC Deep	$163
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	6,578	RUTTING	0.4%	Patching - AC Shallow	$137
DXMOR::DVS AVE::20	DAVIS AVENUE	144TH STREET	DAVIS AVENUE	6,484	RUTTING	0.1%	Patching - AC Shallow	$34
DXMOR::DVS CT::10	DAVIS COURT	143RD STREET	SPALDING AVENUE	11,450	RUTTING	0.2%	Patching - AC Shallow	$119
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	13,867	RUTTING	0.1%	Patching - AC Shallow	$75
DXMOR::LNCLN AVE::30	LINCOLN AVENUE	143RD STREET	142ND STREET	13,947	RUTTING	0.3%	Patching - AC Shallow	$209
DXMOR::MSHFLD AVE::30	MARSHFIELD AVENUE	142ND STREET	143RD STREET	6,786	RUTTING	0.1%	Patching - AC Shallow	$39
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	66,577	RUTTING	0.3%	Patching - AC Shallow	$1,257

APPENDIX F – PAVEMENT INVENTORY AND CONDITION TABULAR DATA

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
DXMOR::141ST ST::10	141ST STREET	WESTERN AVENUE	LEAVITT AVENUE	Asphalt	S	1,905	42	80,023	54	196
DXMOR::141ST ST::20	141ST STREET	WINCHESTER AVENUE	LINCOLN AVENUE	Asphalt	S	346	20	6,924	13	424
DXMOR::141ST ST::30	141ST STREET	LINCOLN AVENUE	HONORE AVENUE	Asphalt	S	326	33	10,756	58	163
DXMOR::141ST ST::40	141ST STREET	HONORE AVENUE	WOOD STREET	Asphalt	S	335	33	11,069	52	260
DXMOR::141ST ST::50	141ST STREET	WOOD STREET	141ST STREET	Asphalt	S	133	24	3,192	83	159
DXMOR::141ST ST::60	141ST STREET	141ST STREET	PAGE AVENUE	Asphalt	S	200	24	4,788	78	153
DXMOR::141ST ST::70	141ST STREET	PAGE AVENUE	141ST STREET	Asphalt	S	742	24	17,810	65	166
DXMOR::141ST ST::80	141ST STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	Asphalt	S	256	24	6,146	67	264
DXMOR::142ND ST::10	142ND STREET	LEAVITT AVENUE	HOYNE STREET	Asphalt	S	595	25	14,870	2	1,000
DXMOR::142ND ST::20	142ND STREET	HOYNE STREET	SEELEY AVENUE	Asphalt	S	329	20	6,578	66	249
DXMOR::142ND ST::30	142ND STREET	SEELEY AVENUE	ROBEY AVENUE	Asphalt	S	331	20	6,629	75	300
DXMOR::142ND ST::40	142ND STREET	ROBEY AVENUE	WINCHESTER AVENUE	Asphalt	S	328	20	6,569	42	535
DXMOR::142ND ST::50	142ND STREET	WINCHESTER AVENUE	LINCOLN AVENUE	Asphalt	S	332	20	6,640	38	288
DXMOR::142ND ST::60	142ND STREET	LINCOLN AVENUE	HONORE AVENUE	Asphalt	S	335	20	6,694	33	371
DXMOR::142ND ST::70	142ND STREET	HONORE AVENUE	WOOD STREET	Asphalt	S	336	20	6,725	55	196
DXMOR::142ND ST::80	142ND STREET	PAGE AVENUE	CIRCLE DRIVE	Asphalt	S	506	23	11,631	83	229
DXMOR::142ND ST::90	142ND STREET	CIRCLE DRIVE	MARSHFIELD AVENUE	Asphalt	S	271	23	6,242	84	250
DXMOR::143RD ST::10	143RD STREET	WESTERN AVENUE	DAVIS COURT	Asphalt	S	298	20	5,964	23	352
DXMOR::143RD ST::100	143RD STREET	WOOD STREET	PAGE AVENUE	Asphalt	S	341	33	11,257	28	482
DXMOR::143RD ST::110	143RD STREET	PAGE AVENUE	PAGE AVENUE	Asphalt	S	44	33	1,456	19	573
DXMOR::143RD ST::120	143RD STREET	PAGE AVENUE	PAULINA AVENUE	Asphalt	S	280	33	9,225	13	308
DXMOR::143RD ST::130	143RD STREET	PAULINA AVENUE	MARSHFIELD AVENUE	Asphalt	S	330	33	10,906	12	353
DXMOR::143RD ST::140	143RD STREET	MARSHFIELD AVENUE	MARSHFIELD AVENUE	Asphalt	S	204	33	6,731	35	364
DXMOR::143RD ST::20	143RD STREET	DAVIS COURT	DAVIS AVENUE	Asphalt	S	337	20	6,743	8	580
DXMOR::143RD ST::30	143RD STREET	DAVIS AVENUE	SPALDING AVENUE	Asphalt	S	430	20	8,597	74	189
DXMOR::143RD ST::40	143RD STREET	HOYNE STREET	SEELEY AVENUE	Asphalt	S	317	21	6,661	61	240
DXMOR::143RD ST::50	143RD STREET	SEELEY AVENUE	ROBEY AVENUE	Asphalt	S	332	21	6,963	79	299
DXMOR::143RD ST::60	143RD STREET	ROBEY AVENUE	WINCHESTER AVENUE	Asphalt	S	335	25	8,371	49	317
DXMOR::143RD ST::70	143RD STREET	WINCHESTER AVENUE	LINCOLN AVENUE	Asphalt	S	332	25	8,291	49	274
DXMOR::143RD ST::80	143RD STREET	LINCOLN AVENUE	HONORE AVENUE	Asphalt	S	326	25	8,143	34	216
DXMOR::143RD ST::90	143RD STREET	HONORE AVENUE	WOOD STREET	Asphalt	S	334	25	8,355	40	203
DXMOR::144TH ST::10	144TH STREET	DAVIS COURT	END	Asphalt	S	136	14	1,904	83	570
DXMOR::144TH ST::100	144TH STREET	PAGE AVENUE	PAULINA AVENUE	Asphalt	S	333	25	8,333	100	667
DXMOR::144TH ST::110	144TH STREET	PAULINA AVENUE	MARSHFIELD AVENUE	Asphalt	S	330	24	7,930	100	377
DXMOR::144TH ST::120	144TH STREET	MARSHFIELD AVENUE	ASHLAND AVENUE	Asphalt	S	329	24	7,897	41	215
DXMOR::144TH ST::20	144TH STREET	DAVIS AVENUE	OAKLEY AVENUE	Asphalt	S	196	17	3,325	51	439
DXMOR::144TH ST::30	144TH STREET	OAKLEY AVENUE	VAIL AVENUE	Asphalt	S	335	19	6,370	11	491
DXMOR::144TH ST::40	144TH STREET	VAIL AVENUE	LEAVITT AVENUE	Asphalt	S	332	19	6,300	17	525
DXMOR::144TH ST::50	144TH STREET	ROBEY AVENUE	WINCHESTER AVENUE	Asphalt	S	346	20	6,928	18	447
DXMOR::144TH ST::60	144TH STREET	WINCHESTER AVENUE	LINCOLN AVENUE	Asphalt	S	335	20	6,697	29	366
DXMOR::144TH ST::70	144TH STREET	LINCOLN AVENUE	HONORE AVENUE	Asphalt	S	334	20	6,679	69	153

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
DXMOR::144TH ST::80	144TH STREET	HONORE AVENUE	WOOD STREET	Asphalt	S	330	20	6,591	70	228
DXMOR::144TH ST::90	144TH STREET	WOOD STREET	PAGE AVENUE	Asphalt	S	331	25	8,270	100	831
DXMOR::145TH ST::10	145TH STREET	WESTERN AVENUE	DAVIS AVENUE	Asphalt	S	375	22	8,258	39	333
DXMOR::145TH ST::100	145TH STREET	PAULINA AVENUE	MARSHFIELD AVENUE	Asphalt	S	330	20	6,600	8	-
DXMOR::145TH ST::20	145TH STREET	DAVIS AVENUE	OAKLEY AVENUE	Asphalt	S	336	22	7,389	39	214
DXMOR::145TH ST::30	145TH STREET	OAKLEY AVENUE	VAIL AVENUE	Asphalt	S	337	22	7,409	42	236
DXMOR::145TH ST::40	145TH STREET	VAIL AVENUE	LEAVITT AVENUE	Asphalt	S	330	22	7,269	37	208
DXMOR::145TH ST::50	145TH STREET	LEAVITT AVENUE	COOPER AVENUE	Asphalt	S	336	21	7,058	28	252
DXMOR::145TH ST::60	145TH STREET	COOPER AVENUE	HOYNE AVENUE	Asphalt	S	337	21	7,070	50	236
DXMOR::145TH ST::70	145TH STREET	HOYNE AVENUE	SEELEY AVENUE	Asphalt	S	326	21	6,841	32	318
DXMOR::145TH ST::80	145TH STREET	SEELEY AVENUE	ROBEY AVENUE	Asphalt	S	371	35	13,002	33	501
DXMOR::145TH ST::90	145TH STREET	ROBEY AVENUE	END	Asphalt	S	3	30	96	85	124
DXMOR::146TH ST::10	146TH STREET	OAKLEY AVENUE	VAIL AVENUE	Asphalt	S	327	32	10,480	50	126
DXMOR::146TH ST::20	146TH STREET	VAIL AVENUE	LEAVITT AVENUE	Asphalt	S	330	33	10,880	61	308
DXMOR::146TH ST::30	146TH STREET	LEAVITT AVENUE	COOPER AVENUE	Asphalt	S	336	20	6,729	36	311
DXMOR::146TH ST::40	146TH STREET	COOPER AVENUE	HOYNE AVENUE	Asphalt	S	335	20	6,696	54	264
DXMOR::146TH ST::50	146TH STREET	HOYNE AVENUE	SEELEY AVENUE	Asphalt	S	334	20	6,679	45	226
DXMOR::146TH ST::60	146TH STREET	SEELEY AVENUE	ROBEY AVENUE	Asphalt	S	329	20	6,572	33	337
DXMOR::CPR AVE::10	COOPER AVENUE	147TH STREET	146TH STREET	Asphalt	S	658	33	21,707	83	264
DXMOR::CPR AVE::20	COOPER AVENUE	146TH STREET	145TH STREET	Asphalt	S	651	33	21,488	50	682
DXMOR::CPR AVE::30	COOPER AVENUE	145TH STREET	SPALDING AVENUE	Asphalt	S	617	33	20,347	83	309
DXMOR::CRCL DR::10	CIRCLE DRIVE	PAGE AVENUE	142ND STREET	Asphalt	S	1,078	24	25,876	100	434
DXMOR::DVS AVE::10	DAVIS AVENUE	145TH STREET	144TH STREET	Asphalt	S	323	19	6,142	74	319
DXMOR::DVS AVE::20	DAVIS AVENUE	144TH STREET	DAVIS AVENUE	Asphalt	S	341	19	6,484	77	222
DXMOR::DVS AVE::30	DAVIS AVENUE	NORRIS STREET	143RD STREET	Asphalt	S	380	20	7,604	76	207
DXMOR::DVS CT::10	DAVIS COURT	143RD STREET	SPALDING AVENUE	Asphalt	S	572	20	11,450	79	245
DXMOR::DVSN ST::10	DIVISION STREET	139TH STREET	END	Asphalt	S	561	32	17,955	24	616
DXMOR::HNR AVE::10	HONORE AVENUE	144TH STREET	143RD STREET	Asphalt	S	657	19	12,475	20	498
DXMOR::HNR AVE::20	HONORE AVENUE	143RD STREET	142ND STREET	Asphalt	S	665	19	12,631	12	477
DXMOR::HNR AVE::30	HONORE AVENUE	142ND STREET	141ST STREET	Asphalt	S	663	23	15,250	15	367
DXMOR::HYN AVE::10	HOYNE AVENUE	147TH STREET	146TH STREET	Asphalt	S	653	21	13,703	79	283
DXMOR::HYN AVE::20	HOYNE AVENUE	146TH STREET	145TH STREET	Asphalt	S	660	21	13,867	76	298
DXMOR::HYN AVE::30	HOYNE AVENUE	145TH STREET	END	Asphalt	S	196	24	4,713	75	438
DXMOR::HYN ST::10	HOYNE STREET	143RD STREET	142ND STREET	Asphalt	S	652	20	13,032	29	429
DXMOR::JLT ST::10	JOLIET STREET	WESTERN AVENUE	LEAVITT AVENUE	Asphalt	S	1,185	21	24,891	55	289
DXMOR::KLY AVE::10	OAKLEY AVENUE	146TH STREET	145TH STREET	Asphalt	S	640	33	21,109	46	301
DXMOR::KLY AVE::20	OAKLEY AVENUE	145TH STREET	144TH STREET	Asphalt	S	649	20	12,979	26	386
DXMOR::KLY AVE::30	OAKLEY AVENUE	144TH STREET	END	Asphalt	S	157	18	2,827	19	865
DXMOR::LNCLN AVE::20	LINCOLN AVENUE	144TH STREET	143RD STREET	Asphalt	S	658	21	13,813	82	270
DXMOR::LNCLN AVE::30	LINCOLN AVENUE	143RD STREET	142ND STREET	Asphalt	S	664	21	13,947	73	209
DXMOR::LNCLN AVE::40	LINCOLN AVENUE	142ND STREET	141ST STREET	Asphalt	S	667	21	14,013	78	199

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
DXMOR::LVTT AVE::10	LEAVITT AVENUE	147TH STREET	JOLIET STREET	Asphalt	S	331	33	10,933	30	303
DXMOR::LVTT AVE::20	LEAVITT AVENUE	JOLIET STREET	146TH STREET	Asphalt	S	329	33	10,855	37	341
DXMOR::LVTT AVE::30	LEAVITT AVENUE	146TH STREET	145TH STREET	Asphalt	S	648	33	21,383	53	332
DXMOR::LVTT AVE::40	LEAVITT AVENUE	145TH STREET	144TH STREET	Asphalt	S	648	20	12,961	42	387
DXMOR::LVTT AVE::50	LEAVITT AVENUE	144TH STREET	SPALDING AVENUE	Asphalt	S	248	18	4,470	57	460
DXMOR::LVTT AVE::60	LEAVITT AVENUE	142ND STREET	141ST STREET	Asphalt	S	1,137	32	36,389	24	876
DXMOR::LWSN LN::10	LAWSON LANE	PAGE AVENUE	END	Asphalt	S	231	22	5,085	15	593
DXMOR::MSHFLD AVE::10	MARSHFIELD AVENUE	144TH STREET	END	Asphalt	S	659	20	13,175	82	197
DXMOR::MSHFLD AVE::20	MARSHFIELD AVENUE	144TH STREET	143RD STREET	Asphalt	S	660	24	15,847	16	235
DXMOR::MSHFLD AVE::30	MARSHFIELD AVENUE	142ND STREET	143RD STREET	Asphalt	S	295	23	6,786	82	264
DXMOR::MSHFLD AVE::40	MARSHFIELD AVENUE	141ST STREET	142ND STREET	Asphalt	S	737	24	17,676	84	172
DXMOR::MSHFLD AVE::50	MARSHFIELD AVENUE	141ST STREET	141ST STREET	Asphalt	S	137	24	3,277	83	198
DXMOR::NORRIS ST::10	NORRIS STREET	WESTERN AVENUE	DAVIS AVENUE	Asphalt	S	476	19	9,051	12	465
DXMOR::PG AVE::10	PAGE AVENUE	144TH STREET	143RD STREET	Asphalt	S	645	19	12,247	5	610
DXMOR::PG AVE::20	PAGE AVENUE	143RD STREET	142ND STREET	Asphalt	S	301	24	7,236	36	382
DXMOR::PG AVE::30	PAGE AVENUE	142ND STREET	LAWSON LANE	Asphalt	S	308	24	7,385	43	311
DXMOR::PG AVE::40	PAGE AVENUE	LAWSON LANE	CIRCLE DRIVE	Asphalt	S	280	24	6,717	52	267
DXMOR::PG AVE::50	PAGE AVENUE	CIRCLE DRIVE	141ST STREET	Asphalt	S	253	24	6,068	68	359
DXMOR::PLN AVE::10	PAULINA AVENUE	144TH STREET	143RD STREET	Asphalt	S	646	19	12,281	76	273
DXMOR::PLN AVE::20	PAULINA AVENUE	144TH STREET	145TH STREET	Gravel	T	658	20	13,160	Gravel	Gravel
DXMOR::RBY AVE::10	ROBEY AVENUE	147TH STREET	146TH STREET	Asphalt	S	655	33	21,601	26	340
DXMOR::RBY AVE::20	ROBEY AVENUE	146TH STREET	145TH STREET	Asphalt	S	544	24	13,060	40	254
DXMOR::RBY AVE::30	ROBEY AVENUE	145TH STREET	144TH STREET	Asphalt	S	845	33	27,898	22	698
DXMOR::RBY AVE::40	ROBEY AVENUE	144TH STREET	143RD STREET	Asphalt	S	586	24	14,059	19	389
DXMOR::RBY AVE::50	ROBEY AVENUE	143RD STREET	142ND STREET	Asphalt	S	663	20	13,258	66	193
DXMOR::SLY AVE::10	SEELEY AVENUE	147TH STREET	146TH STREET	Asphalt	S	653	33	21,560	42	452
DXMOR::SLY AVE::20	SEELEY AVENUE	146TH STREET	145TH STREET	Asphalt	S	658	33	21,698	24	488
DXMOR::SLY AVE::30	SEELEY AVENUE	143RD STREET	142ND STREET	Asphalt	S	663	20	13,262	35	508
DXMOR::SLY AVE::40	SEELEY AVENUE	142ND STREET	END	Asphalt	S	358	10	3,580	Barricaded.	Barricaded.
DXMOR::SLY AVE::50	SEELEY AVENUE	START	139TH STREET	Asphalt	S	2,081	32	66,577	69	285
DXMOR::SPLDNG AVE::10	SPALDING AVENUE	WESTERN AVENUE	DAVIS COURT	Asphalt	S	587	24	14,076	19	247
DXMOR::SPLDNG AVE::20	SPALDING AVENUE	DAVIS COURT	143RD STREET	Asphalt	S	939	24	22,529	13	206
DXMOR::SPLDNG AVE::30	SPALDING AVENUE	143RD STREET	VAIL AVENUE	Asphalt	S	347	24	8,319	26	284
DXMOR::SPLDNG AVE::40	SPALDING AVENUE	VAIL AVENUE	LEAVITT AVENUE	Asphalt	S	400	24	9,592	28	150
DXMOR::SPLDNG AVE::50	SPALDING AVENUE	LEAVITT AVENUE	COOPER AVENUE	Asphalt	S	514	24	12,325	25	168
DXMOR::SPLDNG AVE::60	SPALDING AVENUE	COOPER AVENUE	145TH STREET	Asphalt	S	870	21	18,270	25	319
DXMOR::VL AVE::10	VAIL AVENUE	146TH STREET	145TH STREET	Asphalt	S	652	33	21,511	19	595
DXMOR::VL AVE::20	VAIL AVENUE	145TH STREET	144TH STREET	Asphalt	S	646	33	21,330	19	553
DXMOR::VL AVE::30	VAIL AVENUE	144TH STREET	SPALDING AVENUE	Asphalt	S	482	33	15,899	18	481
DXMOR::WNCHST AVE::10	WINCHESTER AVENUE	144TH STREET	143RD STREET	Asphalt	S	663	21	13,926	14	425
DXMOR::WNCHST AVE::20	WINCHESTER AVENUE	143RD STREET	142ND STREET	Asphalt	S	664	21	13,935	18	579

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
DXMOR::WNCHST AVE::30	WINCHESTER AVENUE	142ND STREET	141ST STREET	Asphalt	S	623	21	13,083	16	565