2019 “State of the Streets”
Final Report

Prepared for:

Village of Posen, 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 Posen 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.

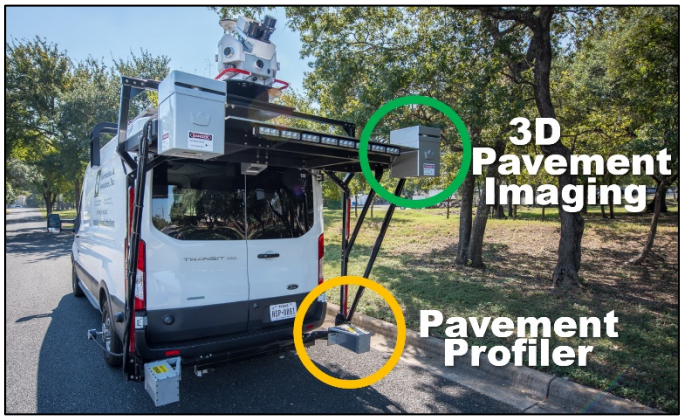


Figure 1. PathRunner pavement condition data collection system.

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 15.37 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 44, 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 337 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).

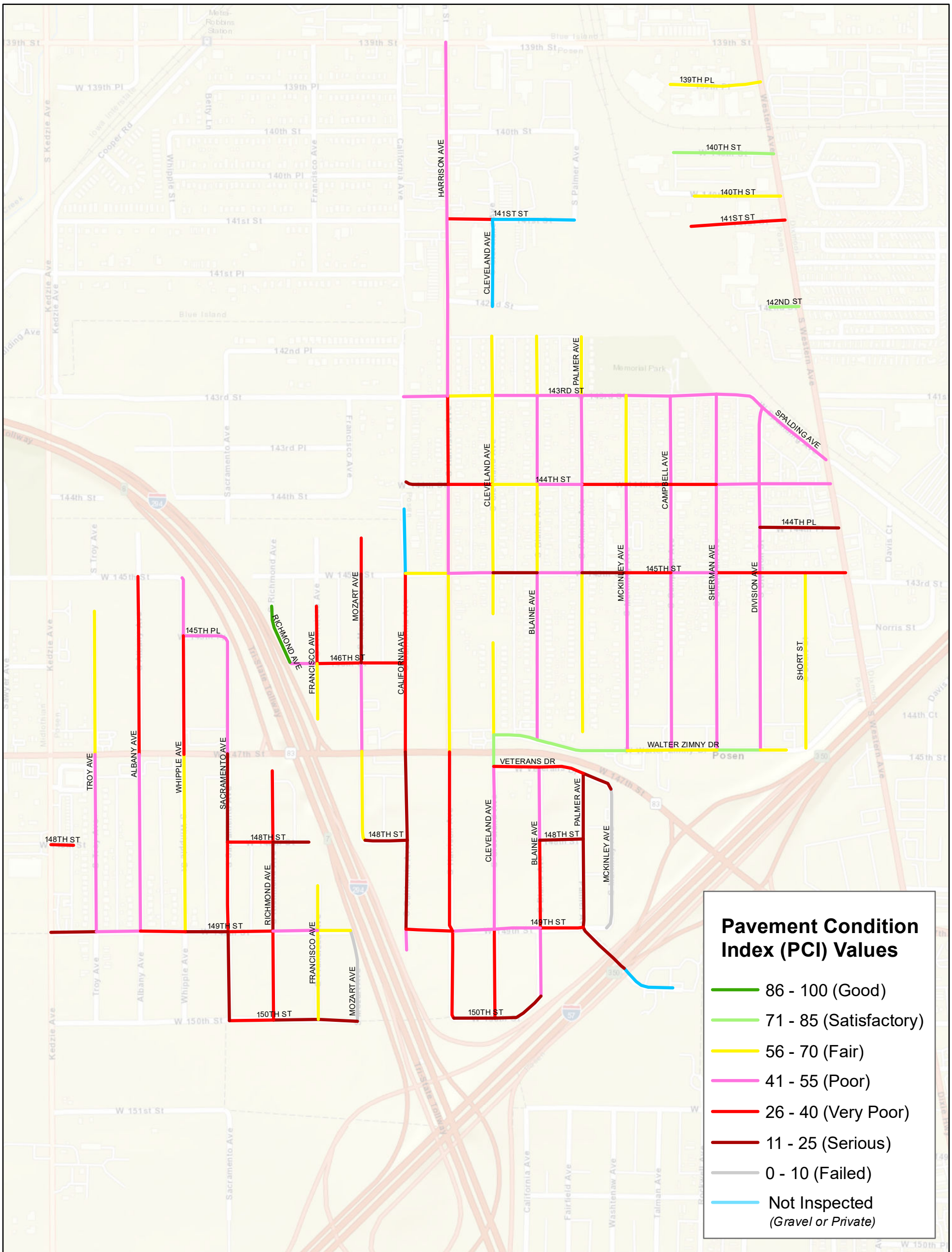
The deterioration observed on the Village's pavements at the time of inspection was caused by a mixture of vehicle load- and climate-related distresses. Vehicle load-related distresses, including alligator cracking and rutting, were pronounced on many of the Village's roadways and contributed most to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



Map 1:
Pavement Condition Index (PCI) Values

Village of Posen, Illinois

Pavement Management Program

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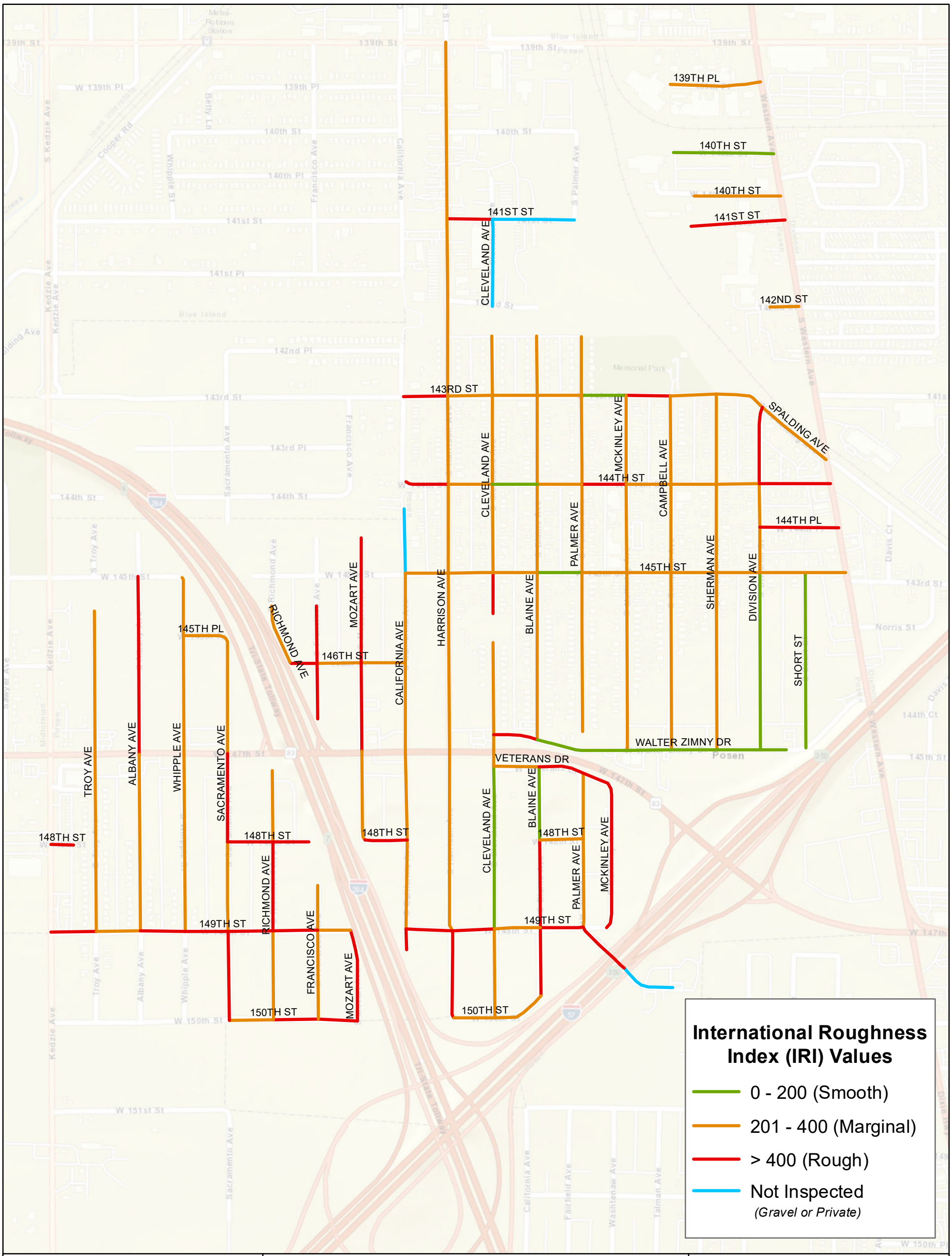

Map 2:
International Roughness Index (IRI) Values

Village of Posen, Illinois

Pavement Management Program

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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).

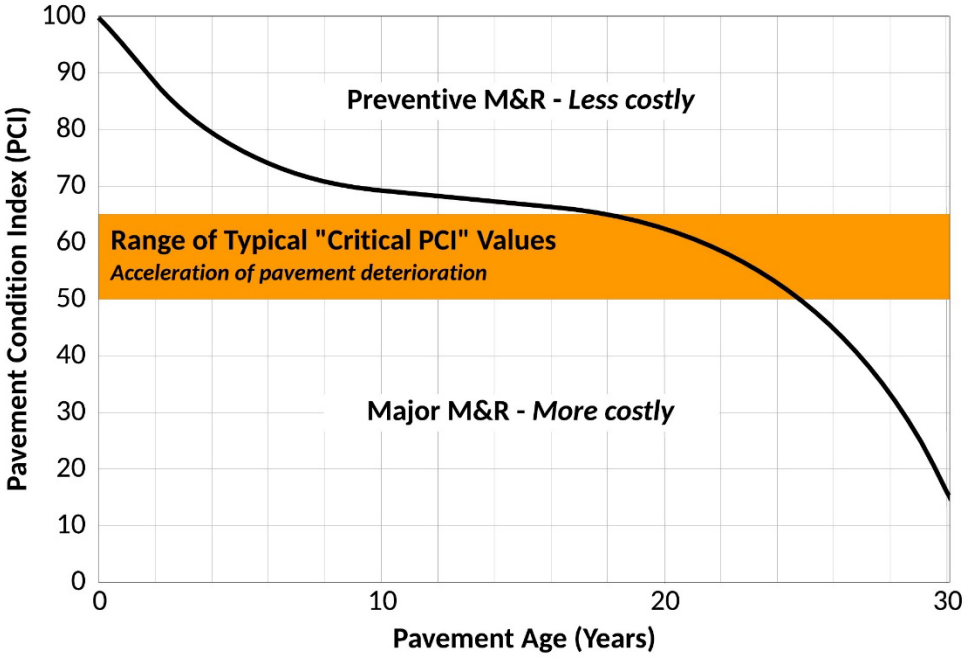


Figure 2. Example of the correct timing of preventive and major M&R relative to the Critical PCI.

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.

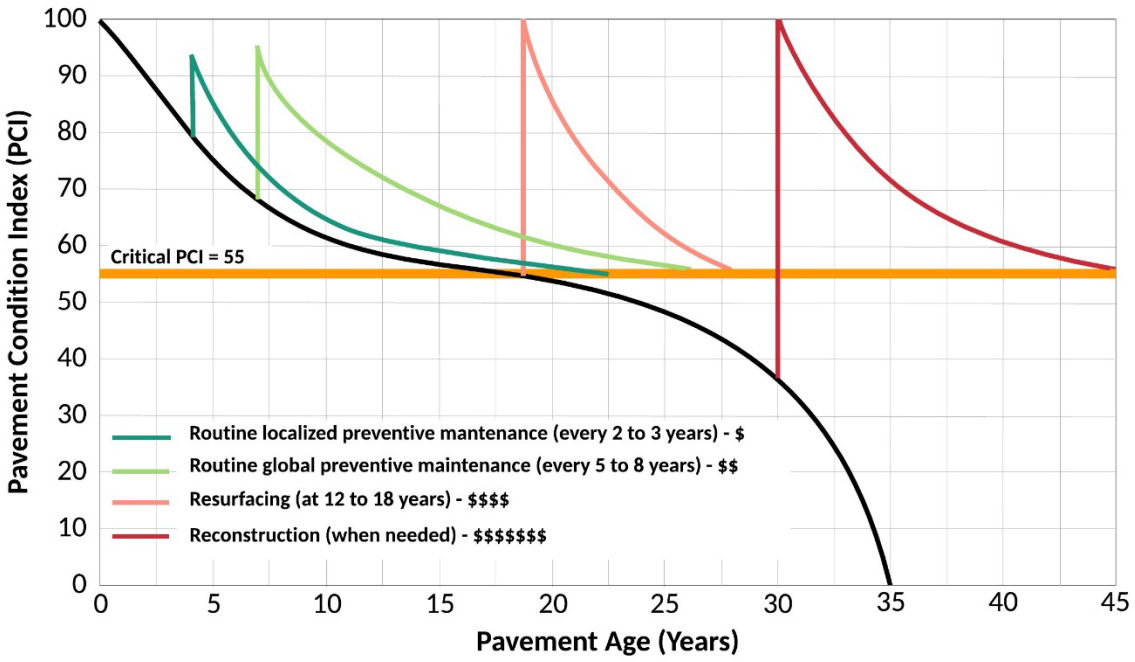


Figure 3. Example of the increasing prices and decreasing benefits of M&R.

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.

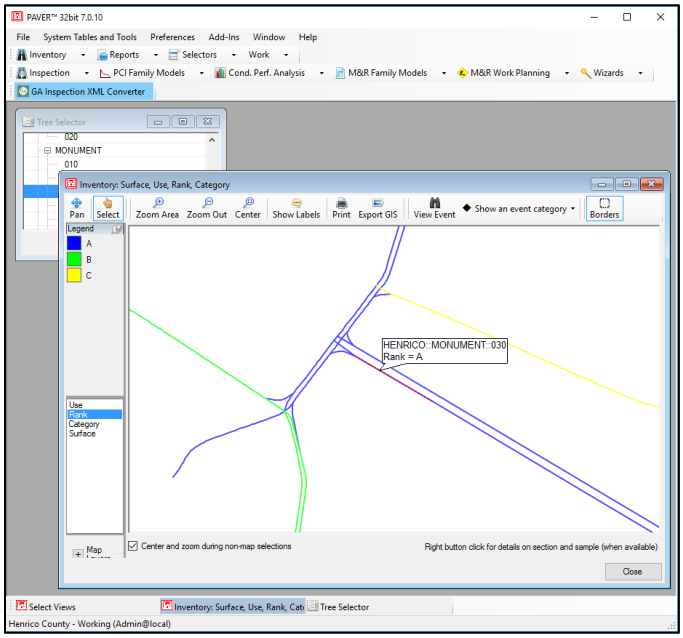


Figure 4. Example roadway functional classifications (ranks) stored in the Inventory module.

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

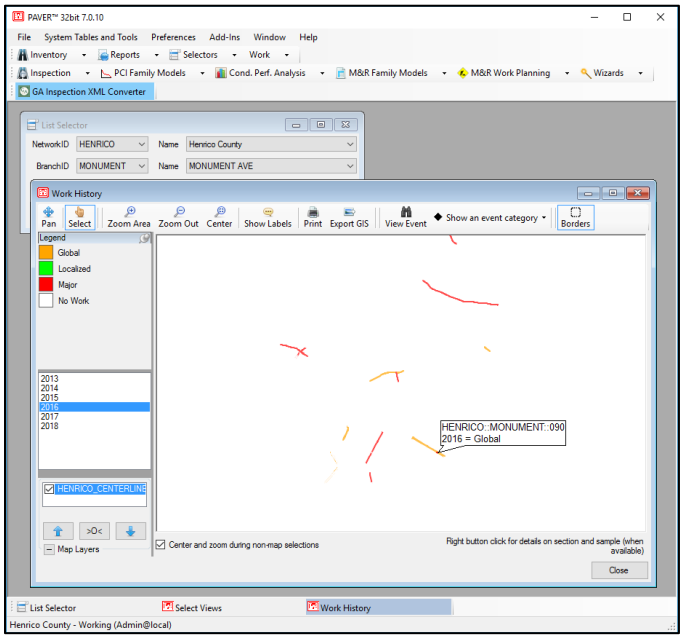


Figure 5. Example historical M&R records stored in the M&R History module.

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.

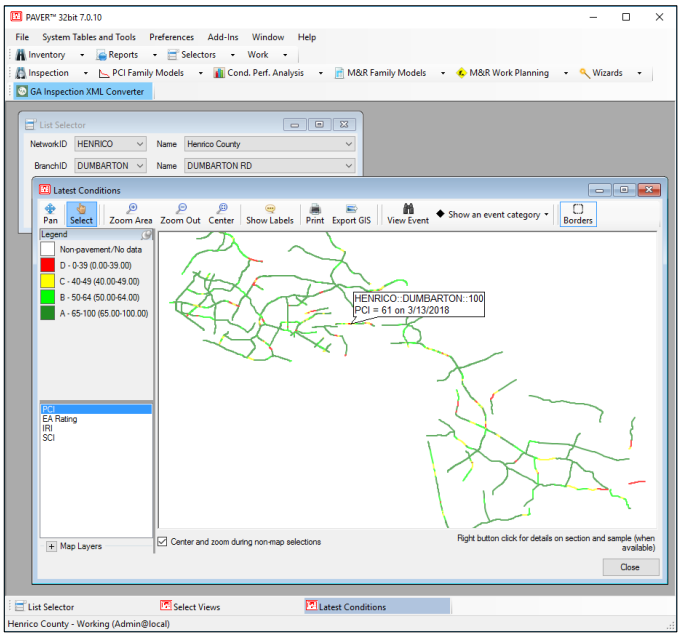


Figure 6. Example PCI values in the Inspection module.

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 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*

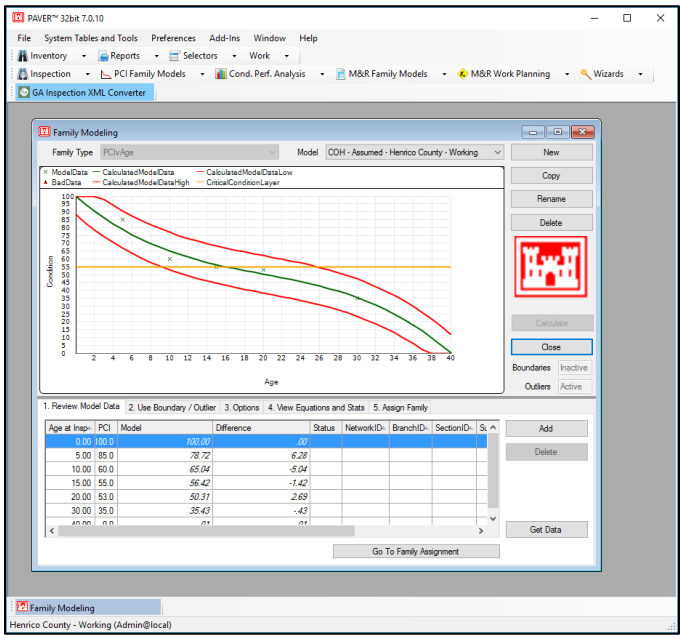


Figure 7. Example deterioration trend developed using the Prediction Modeling module.

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 15.37 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	15.16	29.96	284,317
Tertiary, T	0.21	0.36	2,934
Total	**15.37**	**30.32**	**287,251**

Table 3. Roadway summary data by pavement surface type.

Surface Type	Centerline Miles	Lane Miles	Area (SY)
Asphalt, AC	15.16	29.96	284,317
Gravel, GR	0.21	0.36	2,934
Total	**15.37**	**30.32**	**287,251**

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.

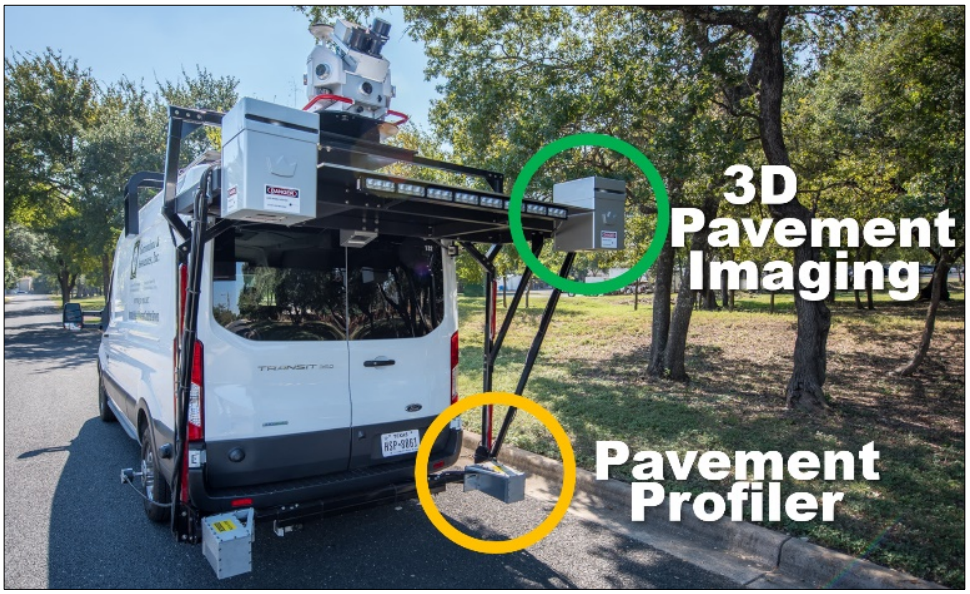


Figure 8. PathRunner pavement condition data collection system.

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	
Distress	**Cause**
Alligator Cracking	Load
Bleeding	Other
Block Cracking	Climate/Durability
Bumps and Sags	Other
Corrugation	Other
Depression	Other
Edge Cracking	Load
Joint Reflection Cracking	Climate/Durability
Lane/Shoulder Drop-Off	Other
Longitudinal and Transverse Cracking	Climate/Durability
Patching and Utility Cut Patching	Other
Polished Aggregate	Other
Pothole	Load
Railroad Crossing	Other
Rutting	Load
Shoving	Other
Slippage Cracking	Other
Swell	Other
Raveling	Climate/Durability
Weathering	Climate/Durability

Concrete Pavement Distresses	
Distress	**Cause**
Blowup/Buckling	Climate/Durability
Corner Break	Load
Divided Slab	Load
Durability ("D") Cracking	Climate/Durability
Faulting	Other
Joint Seal Damage	Climate/Durability
Lane/Shoulder Drop-Off	Other
Linear Cracking	Load
Patching, Large and Utility Cuts	Other
Patching, Small	Other
Polished Aggregate	Other
Popouts	Other
Pumping	Other
Punchout	Load
Railroad Crossing	Other
Scaling, Map Cracking, and Crazing	Other
Shrinkage Cracks	Climate/Durability
Spalling, Corner	Climate/Durability
Spalling, Joint	Climate/Durability

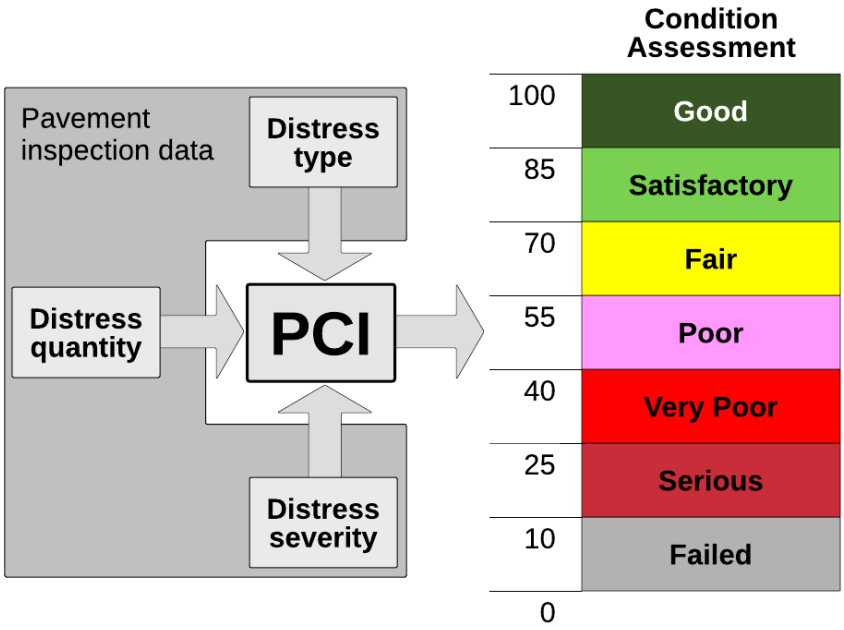


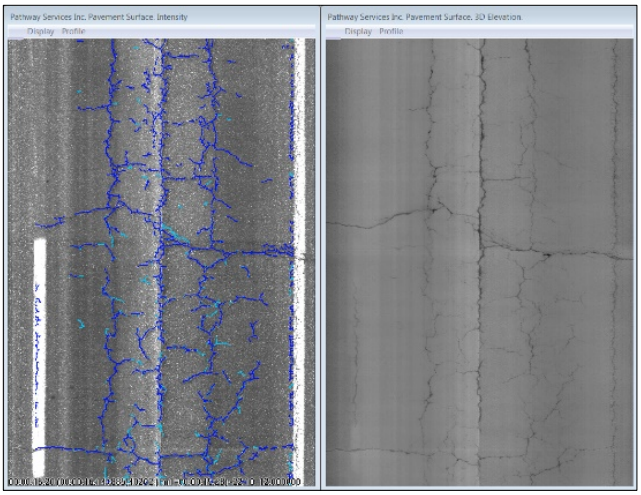
Figure 9. PCI inputs and the Village's assessment scale.

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

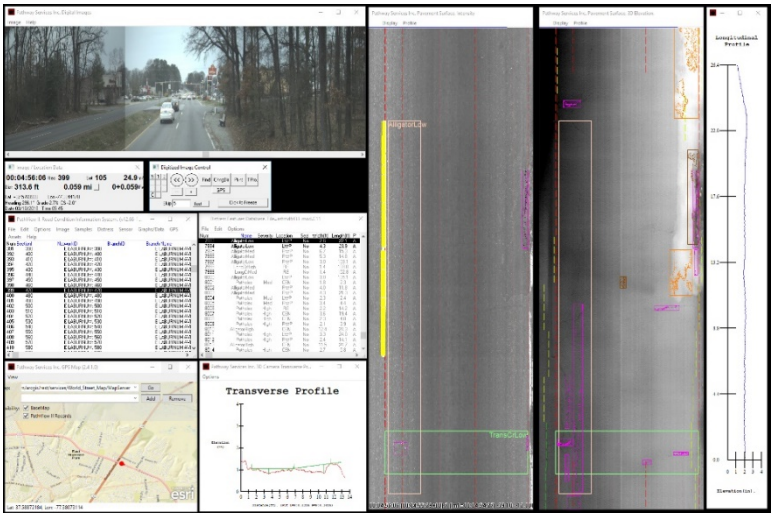
The PathRunner system captures 2D and 3D images of the roadway surface from which pavement surface distresses are evaluated. During the data collection effort, G&AI extracted pavement distress data from georeferenced digital images and rutting measurements from transverse profile measurement to determine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



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

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.
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.



Steps 3 and 4: ***Manual Rating and QC/QA of Pavements using PathView***

In addition to capturing 2D and 3D imagery from which pavement surface

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 44. 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.

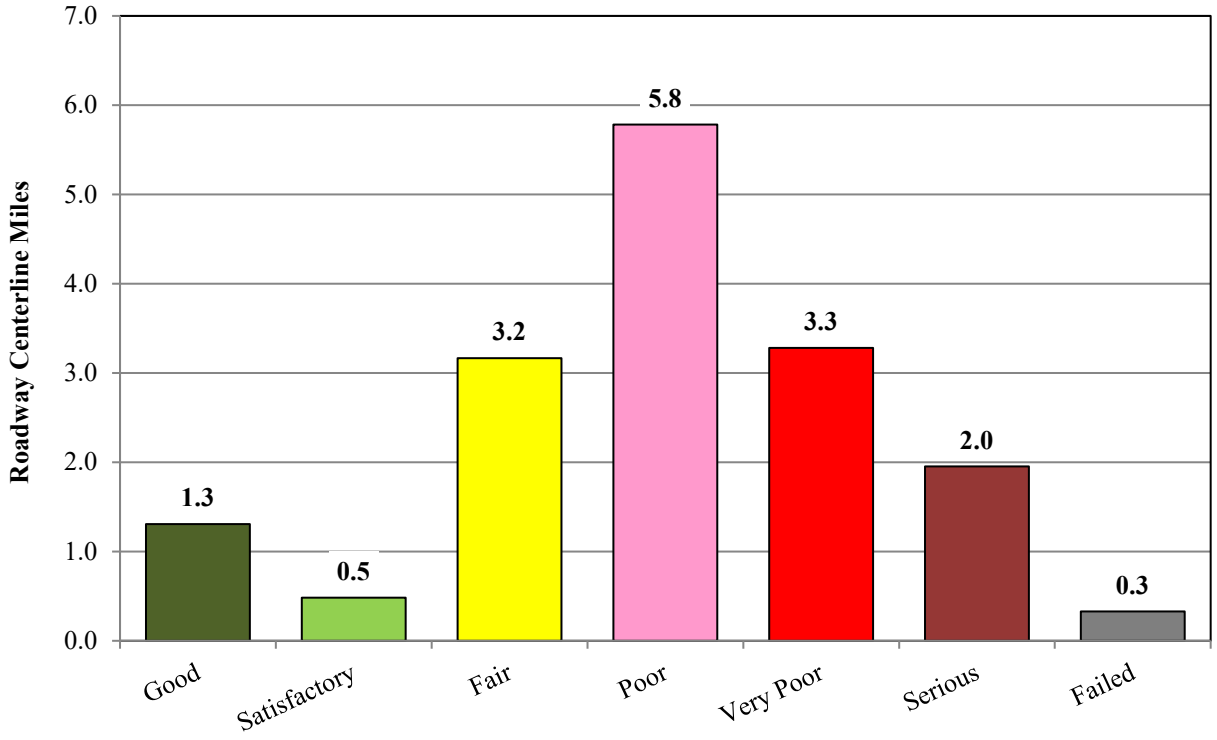


Figure 10. Village's roadway pavement condition distribution by PCI category.
(Note: Excludes gravel roadways.)

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	15.16	29.96	284,317	44	337
Tertiary, T	0.21	0.36	2,934	--*	--*
Total	**15.37**	**30.32**	**287,251**	**44**	**337**

**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	15.16	29.96	284,317	44	337
Gravel, GR	0.21	0.36	2,934	--*	--*
Total	**15.37**	**30.32**	**287,251**	**44**	**337**

**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.

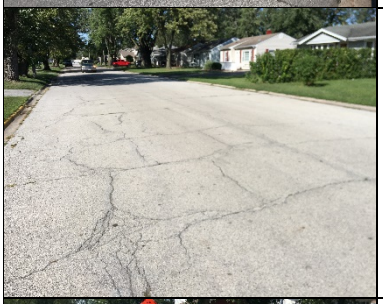
Category	IRI Value
Smooth	0-200
Marginal	201-400
Rough	>401

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 337. 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)
	Richmond Ave. *Near W. 145th St.* *(Section 40)* *Last resurfacing date unknown*	87 *(345)*	Preventive maintenance *Seal paving lane seam + seal joints between pavement and curb and gutter + surface treatment*
	Walter Zimmy Dr. *Near S. Cleveland Ave.* *(Section 10)* *Last resurfacing date unknown*	71 *(90)*	Preventive maintenance *Seal joints between pavement and curb and gutter + surface treatment*
	Troy Ave. *North of I-83* *(Section 20)* *Last resurfacing date unknown*	57 *(331)*	Major M&R *Localized patching + cold mill and overlay*
	149th St. *Near Troy Ave.* *(Section 20)* *Last resurfacing date unknown*	45 *(334)*	Major M&R *Localized structural patching + cold mill and overlay or reconstruction*
	Albany Ave. *North of I-83* *(Section 20)* *Last resurfacing date unknown*	34 *(562)*	Major M&R *Localized structural patching + cold mill and overlay or reconstruction*

	149th St. *Near Whipple St.* *(Section 40)* *Last resurfacing date unknown*	25 *(449)*	Major M&R *Localized structural patching +* *cold mill and overlay or reconstruction (full or partial)*
	Mozart Ave. *Near 150th St.* *(Section 10)* *Last resurfacing date unknown*	1 *(585)*	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 44. Furthermore, the Village's roadways were found to be in overall "marginally rough" condition, with an average IRI of 337 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 between three and five points per year was assumed based on the performance of the Village's resurfaced roads, which equates to a pavement life between resurfacings of nine and fifteen 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.

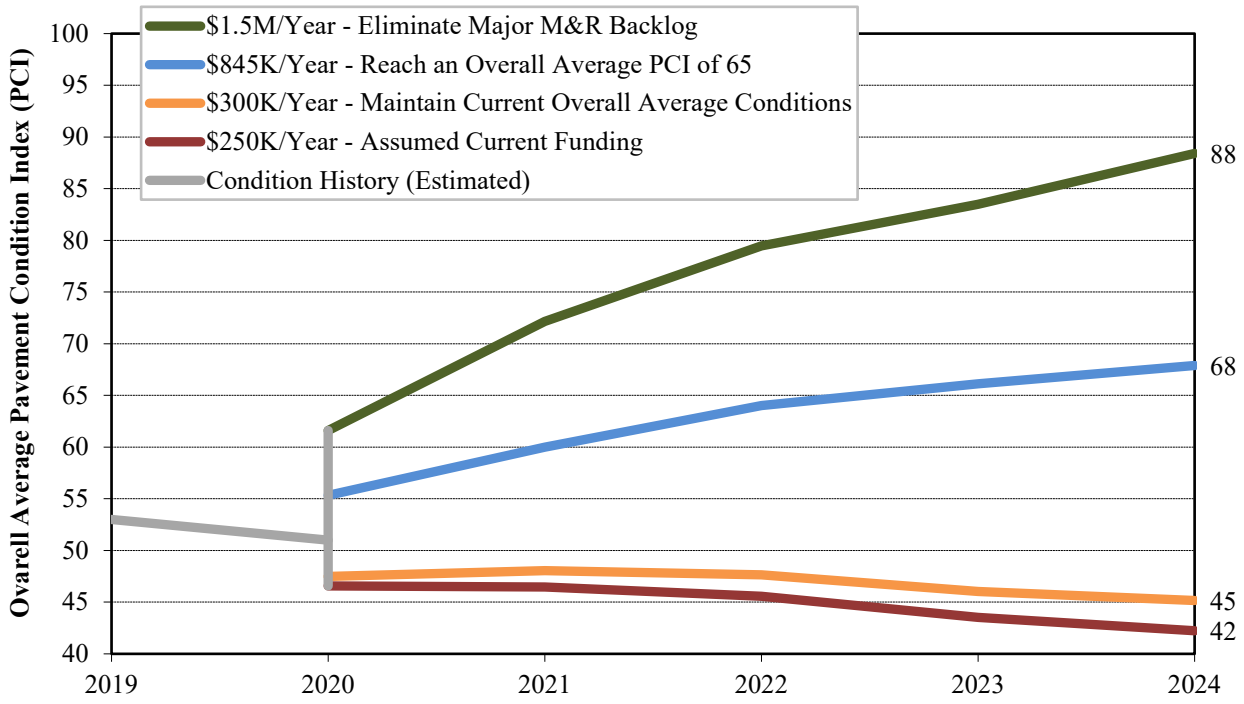


Figure 12: Impact of funding levels on overall pavement conditions by year.

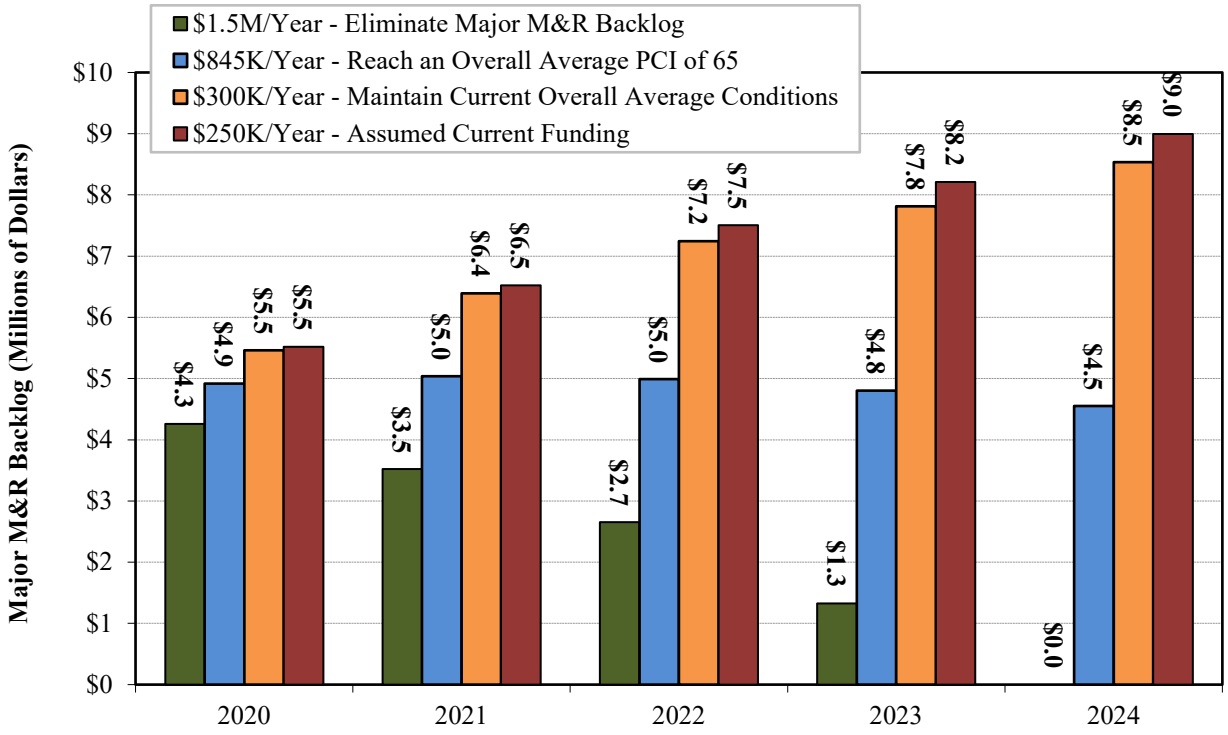


Figure 13: Impact of funding levels on major M&R backlog by year.

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)
$250K/YR (Assumed Current Funding)	$1.25M	$9.0M	$10.25M	42
Maintain Existing Overall Average Conditions ($300K/YR)	$1.5M	$8.5M	$10.0M	45
Increase Overall Average PCI to 65 ($845K/YR)	$4.2M	$4.6M	$8.8M	68
Backlog Elimination ($1.5M/YR)	$7.5M	$0M	$7.5M	88

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 $9,000, 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	7,139	FT	$7,139
Patching - AC Deep	135	SF	$1,490
Patching - AC Shallow	5	SF	$29
		Total:	**$8,658**

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

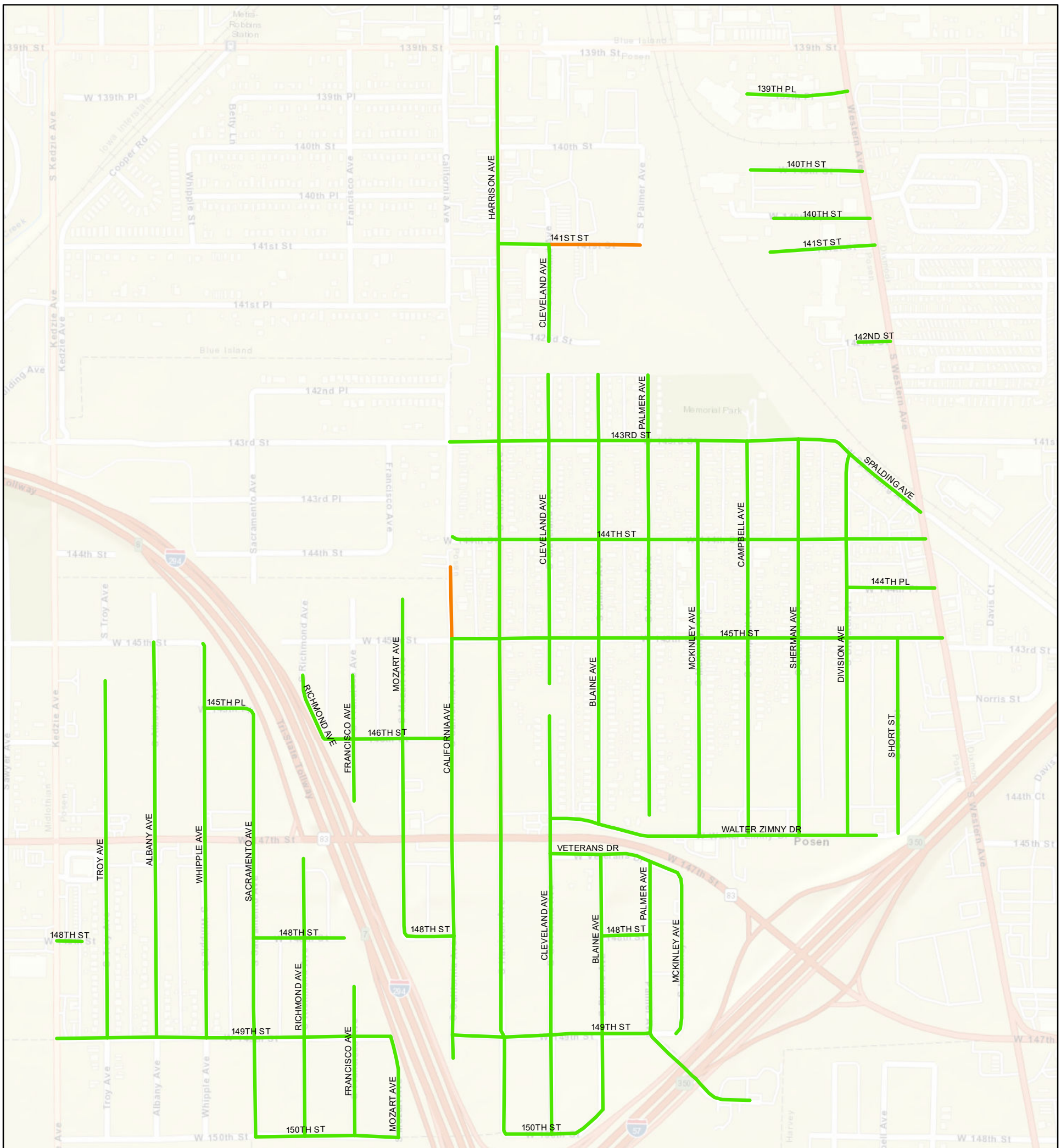
Based on the results of the pavement condition survey and forecasts of future pavement condition, the Village's current level of funding is likely inadequate to maintain the overall current condition of the Village's roadways. Managing a pavement network at an overall average PCI between 70 and 80 is 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*


139TH PL
140TH ST
140TH ST
141ST ST
141ST ST
HARRISON AVE
CLEVELAND AVE
142ND ST
143RD ST
PALMER AVE
SPALDING AVE
144TH ST
CLEVELAND AVE
CAMPBELL AVE
144TH PL
145TH ST
MCKINLEY AVE
SHERMAN AVE
DIVISION AVE
BLAINE AVE
SHORT ST
WALTER ZIMNY DR
VETERANS DR
145TH PL
RICHMOND AVE
FRANCISCO AVE
146TH ST
MOZART AVE
CALIFORNIA AVE
TROY AVE
ALBANY AVE
WHIPPLE AVE
SACRAMENTO AVE
148TH ST
148TH ST
148TH ST
148TH ST
PALMER AVE
BLAINE AVE
MCKINLEY AVE
CLEVELAND AVE
149TH ST
149TH ST
RICHMOND AVE
FRANCISCO AVE
MOZART AVE
150TH ST
150TH ST
Pavement Ranks
Secondary (S)
Tertiary (T)
0
500
1,000
Feet
Map A-1:
Pavement Ranks
Village of Posen, Illinois
Pavement Management Program
Gorrondona & Associates, Inc.
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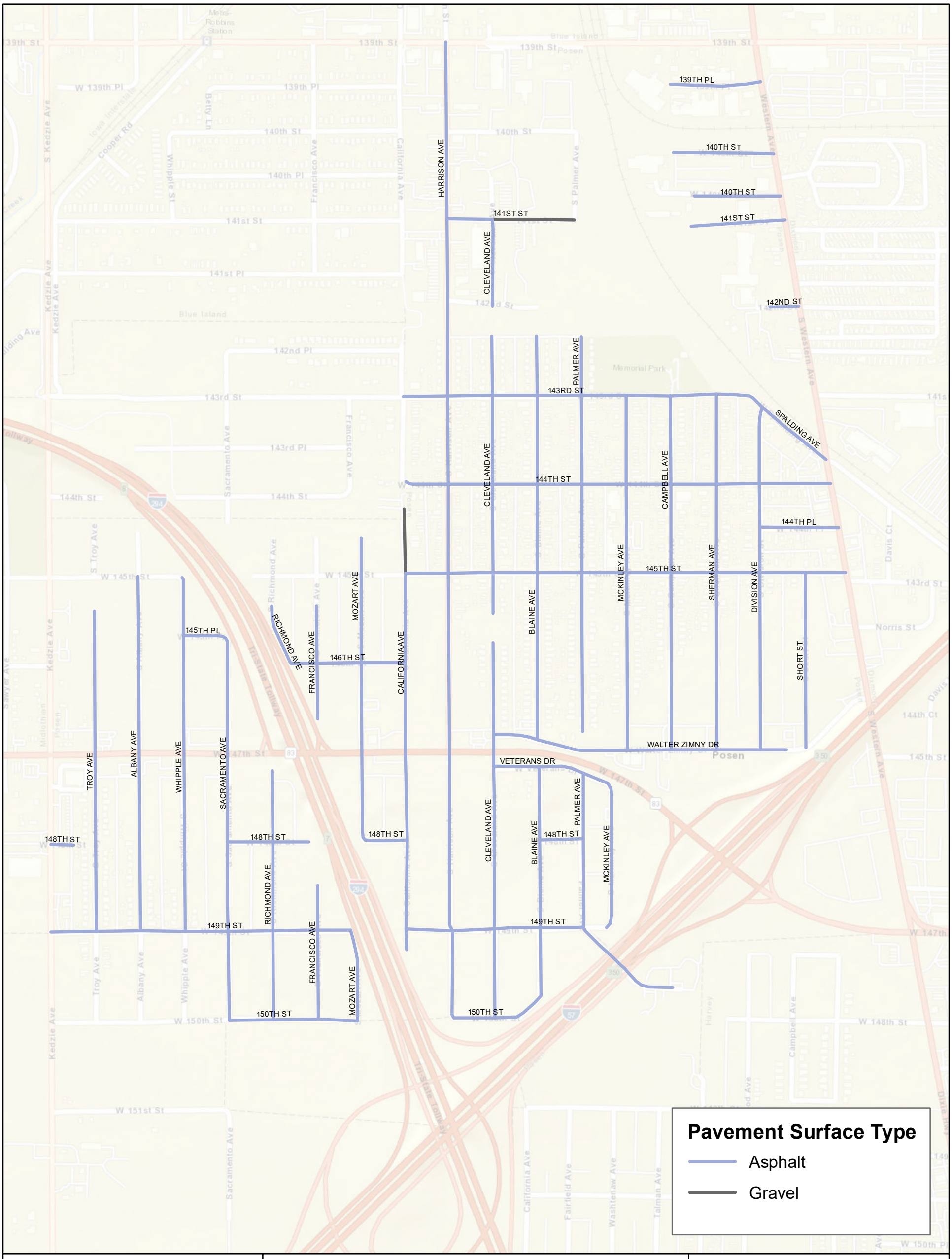
139TH PL
140TH ST
140TH ST
141ST ST
141ST ST
142ND ST
HARRISON AVE
CLEVELAND AVE
PALMER AVE
143RD ST
SPALDING AVE
144TH ST
144TH PL
CAMPBELL AVE
MCKINLEY AVE
SHERMAN AVE
DIVISION AVE
145TH ST
SHORT ST
BLAINE AVE
WALTER ZIMNY DR
VETERANS DR
145TH PL
146TH ST
RICHMOND AVE
FRANCISCO AVE
MOZART AVE
CALIFORNIA AVE
TROY AVE
ALBANY AVE
WHIPPLE AVE
SACRAMENTO AVE
148TH ST
148TH ST
148TH ST
148TH ST
149TH ST
149TH ST
150TH ST
150TH ST
Pavement Surface Type
Asphalt
Gravel
0
500
1,000
Feet
Map A-2:
Pavement Surface Types
Village of Posen, Illinois
Pavement Management Program
Gorrondona & Associates, Inc.
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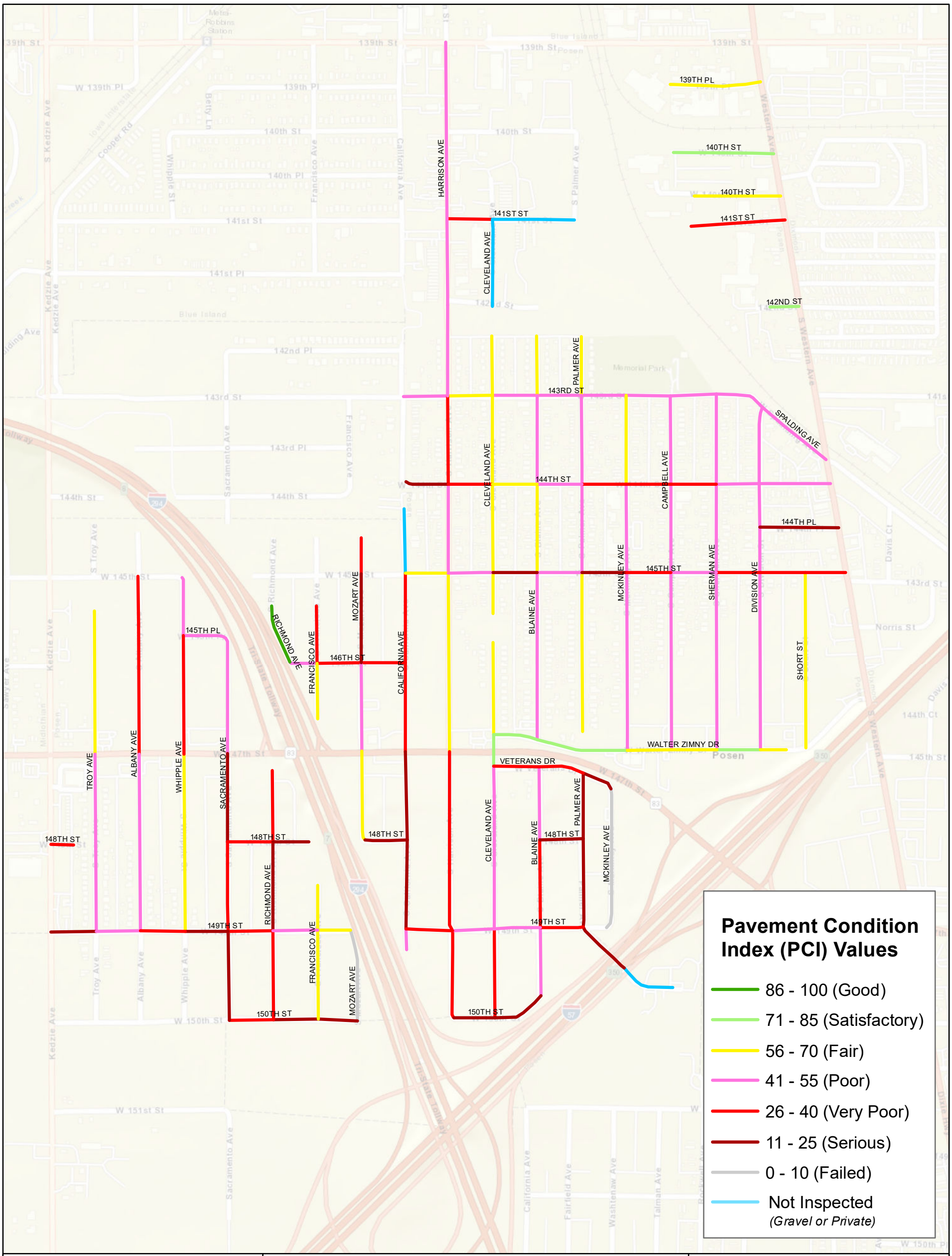

Map A-3:
Pavement Condition Index (PCI) Values

Village of Posen, Illinois

Pavement Management Program

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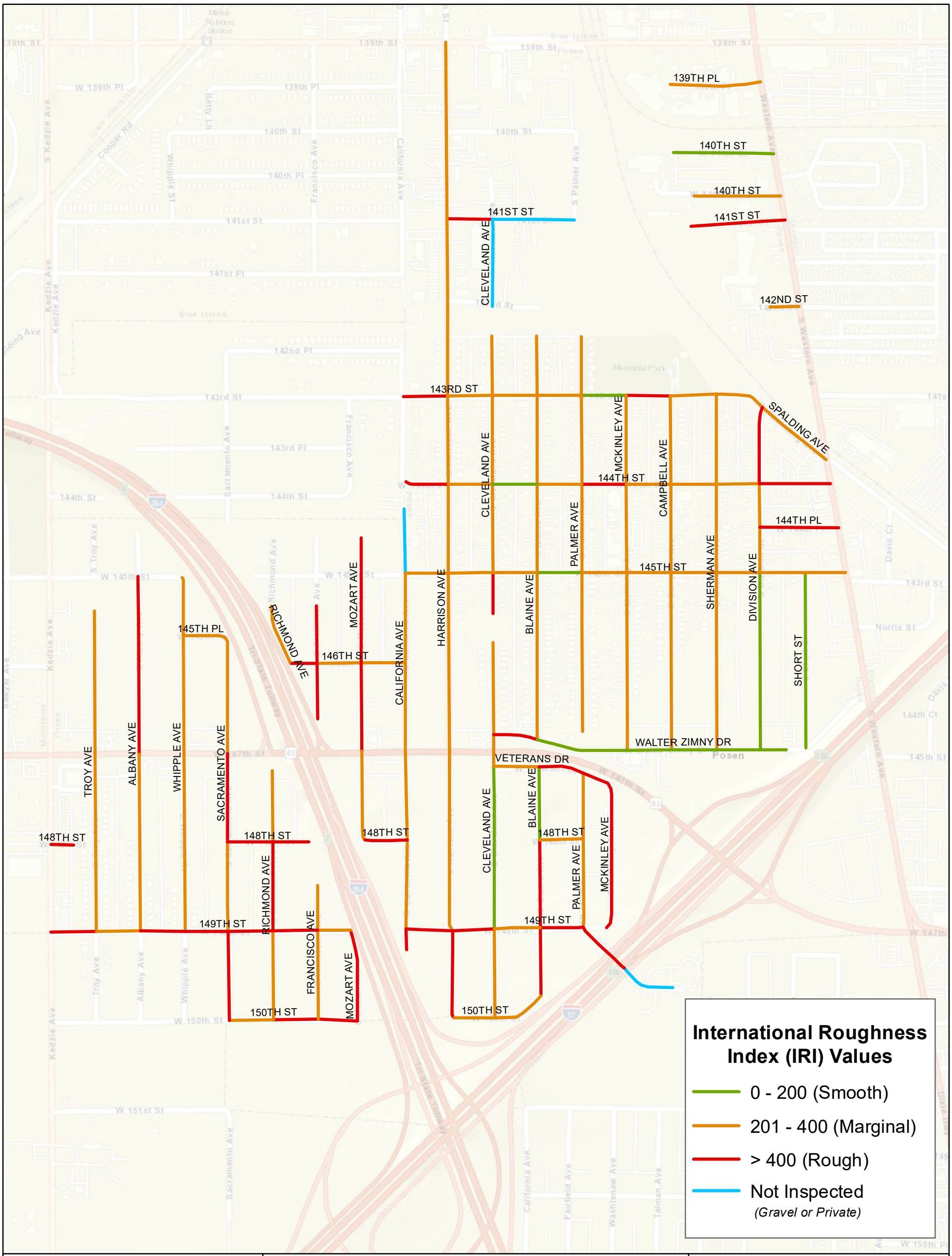

Map A-4:
International Roughness Index (IRI) Values

Village of Posen, Illinois

Pavement Management Program

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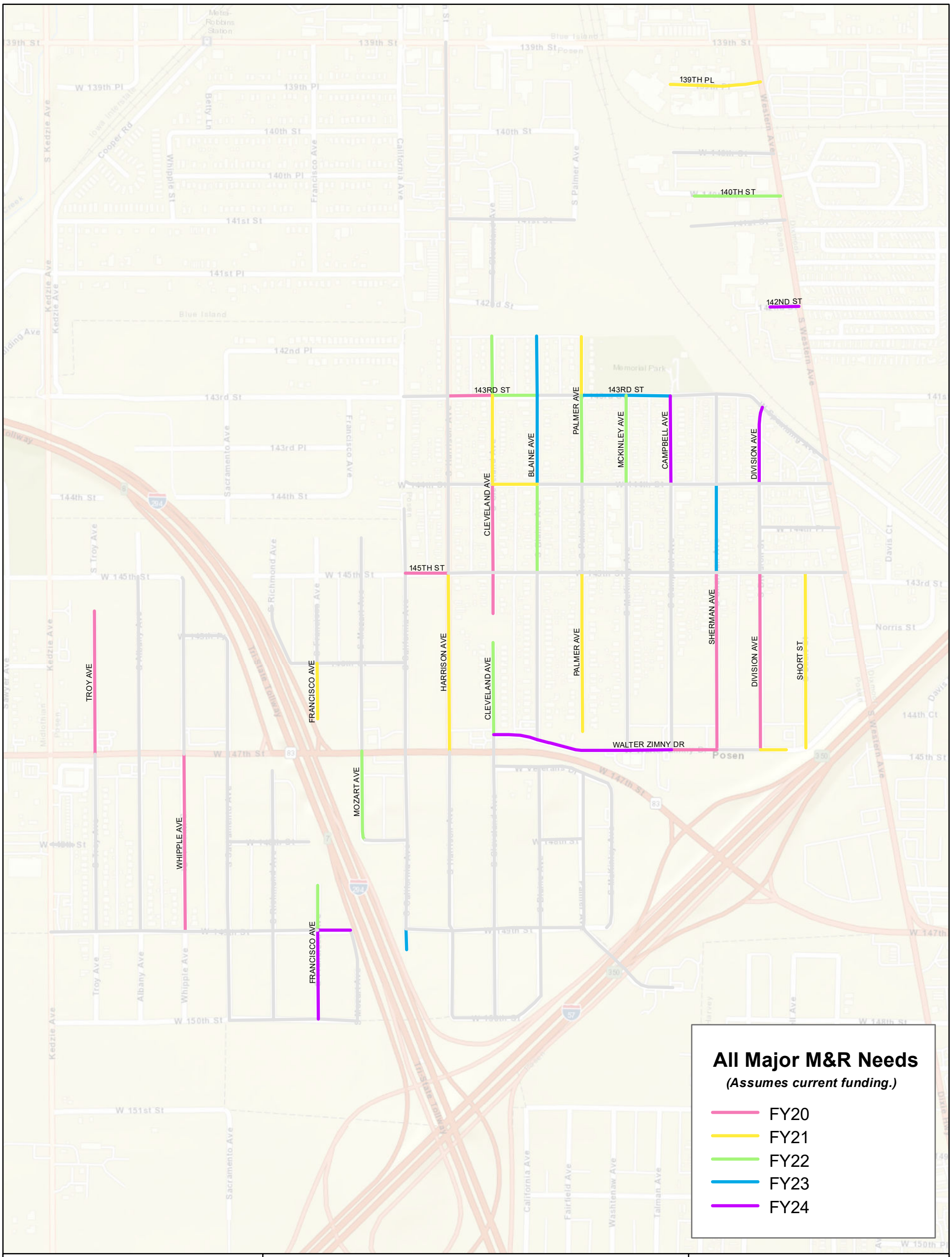
139TH PL
140TH ST
142ND ST
143RD ST
143RD ST
BLAINE AVE
PALMER AVE
MCKINLEY AVE
CAMPBELL AVE
DIVISION AVE
CLEVELAND AVE
145TH ST
HARRISON AVE
PALMER AVE
SHERMAN AVE
DIVISION AVE
SHORT ST
TROY AVE
FRANCISCO AVE
CLEVELAND AVE
WALTER ZIMNY DR
MOZART AVE
WHIPPLE AVE
FRANCISCO AVE
All Major M&R Needs
(Assumes current funding.)
FY20
FY21
FY22
FY23
FY24
0
500
Feet
1,000
Map A-5:
All Major M&R Needs
(Assumes current funding.)
Village of Posen, Illinois
Pavement Management Program
Gorrondona & Associates, Inc.
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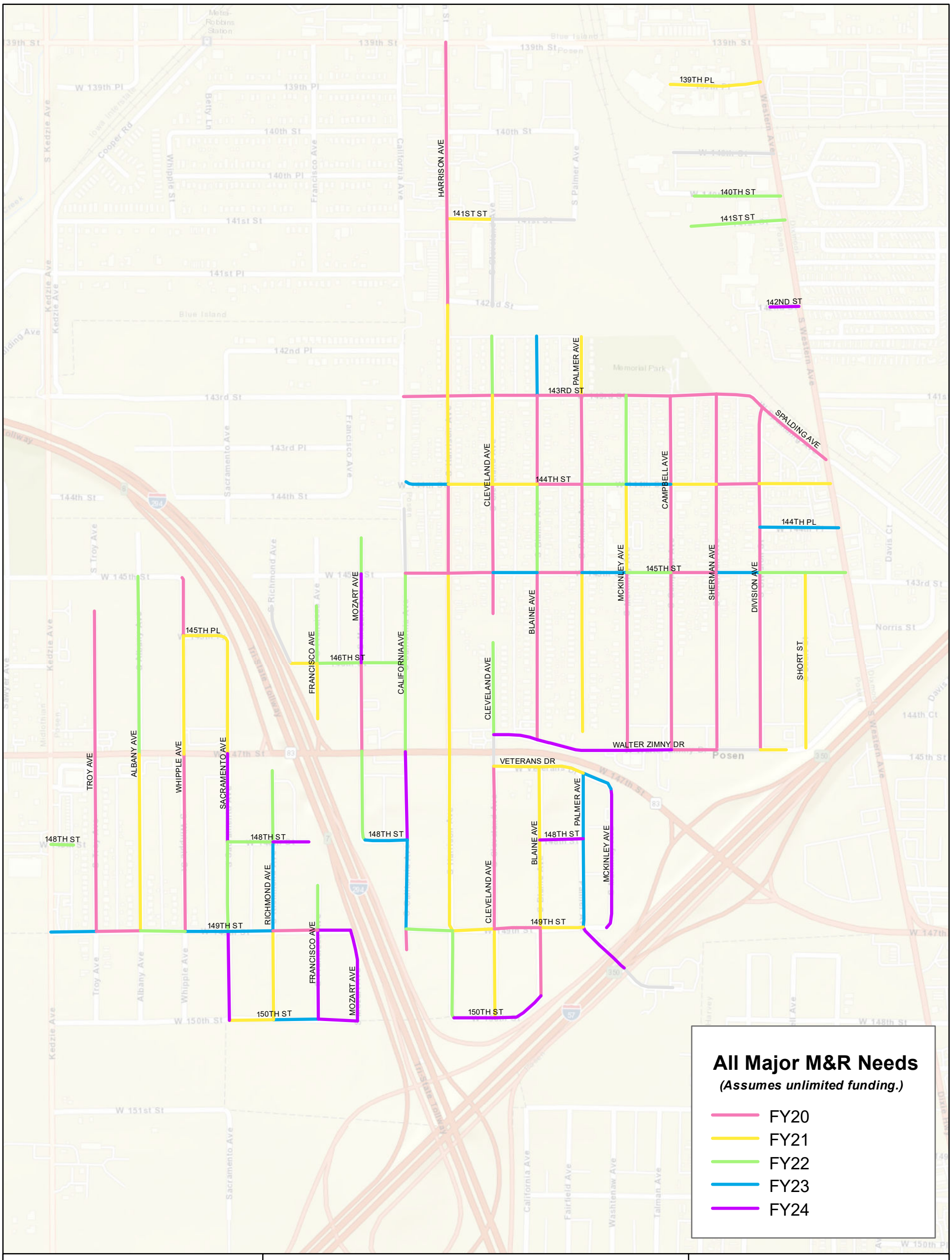

Map A-6:
All Major M&R Needs
(Assumes unlimited funding.)

Village of Posen, Illinois

Pavement Management Program

Gorrondona & Associates, Inc.

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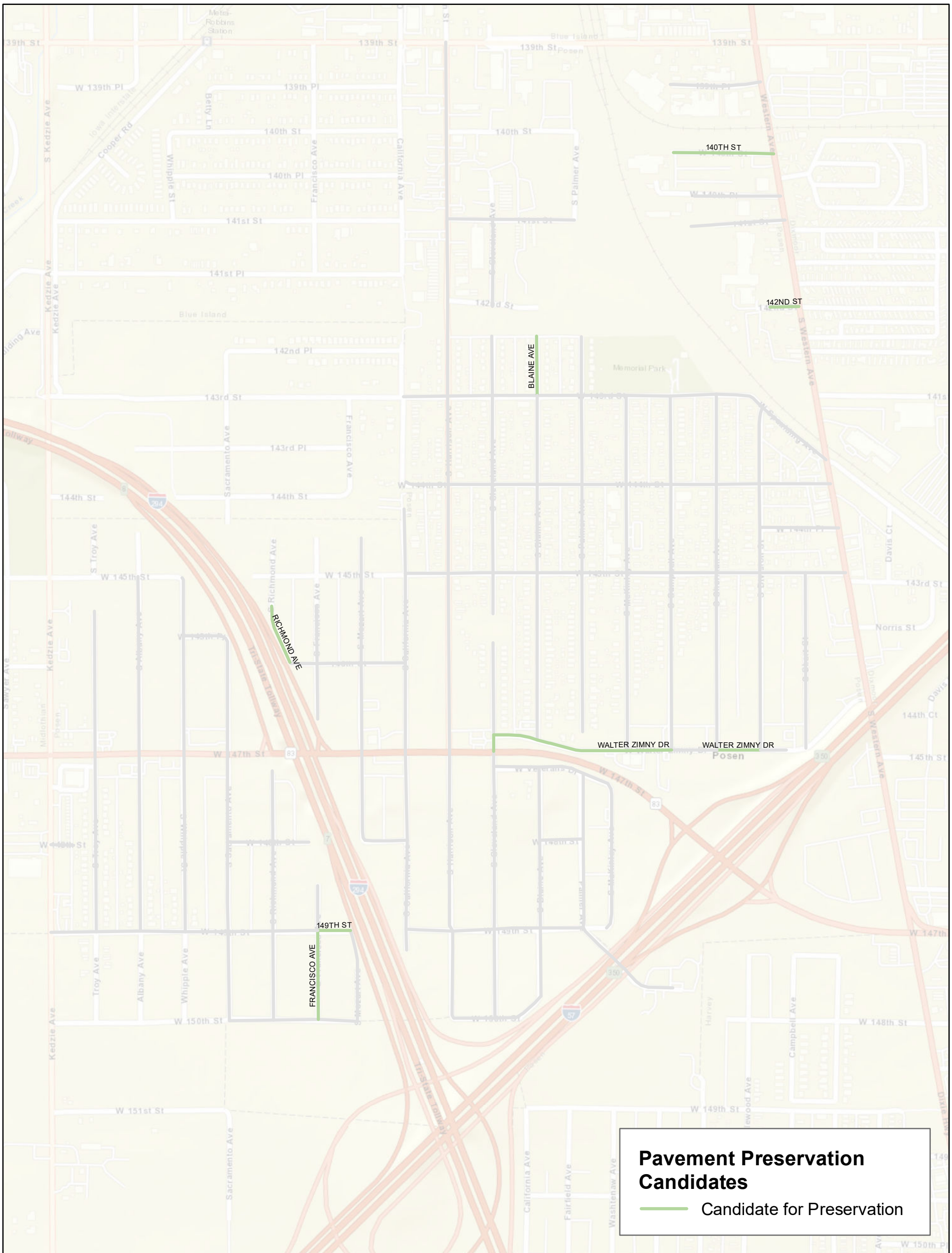

0 500 1,000 Feet

Map A-7:
Pavement Preservation Candidates

Village of Posen, Illinois

Pavement Management Program

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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
VILPO::143RD ST::20	143RD STREET	HARRISON AVENUE	CLEVELAND AVENUE	10,943	54	2020	$ 11,530
VILPO::145TH ST::10	145TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	11,916	55	2020	$ 11,781
VILPO::CLVLND AVE::60	CLEVELAND AVENUE	145TH STREET	END	10,097	54	2020	$ 10,639
VILPO::CLVLND AVE::70	CLEVELAND AVENUE	145TH STREET	144TH STREET	21,851	54	2020	$ 23,022
VILPO::DVSN AVE::10	DIVISION AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,718	53	2020	$ 48,900
VILPO::SHRMN AVE::10	SHERMAN AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,716	53	2020	$ 48,898
VILPO::TRY AVE::20	TROY AVENUE	147TH STREET	END	34,391	55	2020	$ 34,001
VILPO::WHPPL AVE::10	WHIPPLE AVENUE	149TH STREET	147TH STREET	42,432	55	2020	$ 41,950
VILPO::WLT ZMY DR::40	WALTER ZIMNY DRIVE	CAMPBELL AVENUE	SHERMAN AVENUE	13,528	55	2020	$ 13,375
VILPO::139TH PL::10	139TH PLACE	WESTERN AVENUE	END	16,979	55	2021	$ 17,370
VILPO::144TH ST::30	144TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	12,377	55	2021	$ 12,669
VILPO::CLVLND AVE::80	CLEVELAND AVENUE	144TH STREET	143RD STREET	21,927	52	2021	$ 26,846
VILPO::FRNCSC AVE::30	FRANCISCO AVENUE	146TH STREET	END	13,227	53	2021	$ 15,309
VILPO::HRRSN AVE::30	HARRISON AVENUE	147TH STREET	145TH STREET	44,181	52	2021	$ 54,092
VILPO::PLMR AVE::50	PALMER AVENUE	145TH STREET	END	39,288	55	2021	$ 40,218
VILPO::PLMR AVE::80	PALMER AVENUE	143RD STREET	END	14,448	52	2021	$ 17,689
VILPO::SHRT ST::10	SHORT STREET	WALTER ZIMNY DRIVE	145TH STREET	43,243	52	2021	$ 52,944
VILPO::WLT ZMY DR::60	WALTER ZIMNY DRIVE	DIVISION AVENUE	END	7,794	54	2021	$ 8,500
VILPO::140TH ST::30	140TH STREET	WESTERN AVENUE	END	16,153	52	2022	$ 20,448
VILPO::143RD ST::30	143RD STREET	CLEVELAND AVENUE	BLAINE AVENUE	11,035	45	2022	$ 25,904
VILPO::BLN AVE::50	BLAINE AVENUE	145TH STREET	144TH STREET	21,856	52	2022	$ 27,667
VILPO::CLVLND AVE::50	CLEVELAND AVENUE	WALTER ZIMNY DRIVE	END	21,934	53	2022	$ 26,255
VILPO::CLVLND AVE::90	CLEVELAND AVENUE	143RD STREET	END	14,654	53	2022	$ 17,541
VILPO::FRNCSC AVE::20	FRANCISCO AVENUE	149TH STREET	END	10,758	54	2022	$ 12,136
VILPO::MCKNLY AVE::40	MCKINLEY AVENUE	144TH STREET	143RD STREET	21,993	52	2022	$ 27,841
VILPO::MZRT AVE::20	MOZART AVENUE	148TH STREET	147TH STREET	21,383	53	2022	$ 25,595
VILPO::PLMR AVE::70	PALMER AVENUE	144TH STREET	143RD STREET	22,655	45	2022	$ 53,180
VILPO::143RD ST::50	143RD STREET	PALMER AVENUE	MCKINLEY AVENUE	10,974	41	2023	$ 34,812
VILPO::143RD ST::60	143RD STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	10,926	41	2023	$ 34,660
VILPO::BLN AVE::60	BLAINE AVENUE	144TH STREET	143RD STREET	21,984	41	2023	$ 69,735
VILPO::BLN AVE::70	BLAINE AVENUE	143RD STREET	END	14,141	55	2023	$ 15,508
VILPO::CLFRN AVE::10	CALIFORNIA AVENUE	149TH STREET	END	4,999	36	2023	$ 16,386
VILPO::SHRMN AVE::20	SHERMAN AVENUE	145TH STREET	144TH STREET	21,904	40	2023	$ 71,802
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	5,456	54	2024	$ 6,190
VILPO::149TH ST::70	149TH STREET	FRANCISCO AVENUE	MOZART AVENUE	7,889	51	2024	$ 10,681
VILPO::CMPBLL AVE::30	CAMPBELL AVENUE	144TH STREET	143RD STREET	21,830	36	2024	$ 73,705
VILPO::DVSN AVE::40	DIVISION AVENUE	144TH STREET	SPALDING AVENUE	19,103	35	2024	$ 64,497
VILPO::FRNCSC AVE::10	FRANCISCO AVENUE	150TH STREET	149TH STREET	21,205	51	2024	$ 28,711
VILPO::WLT ZMY DR::10	WALTER ZIMNY DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	3,944	52	2024	$ 5,051
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	27,519	52	2024	$ 35,248
VILPO::WLT ZMY DR::30	WALTER ZIMNY DRIVE	MCKINLEY AVENUE	CAMPBELL AVENUE	13,280	51	2024	$ 17,981

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
VILPO::143RD ST::10	143RD STREET	CALIFORNIA AVENUE	HARRISON AVENUE	11,033	44	2020	$ 25,987
VILPO::143RD ST::20	143RD STREET	HARRISON AVENUE	CLEVELAND AVENUE	10,943	54	2020	$ 11,530
VILPO::143RD ST::30	143RD STREET	CLEVELAND AVENUE	BLAINE AVENUE	11,035	53	2020	$ 12,343
VILPO::143RD ST::40	143RD STREET	BLAINE AVENUE	PALMER AVENUE	11,051	47	2020	$ 20,394
VILPO::143RD ST::50	143RD STREET	PALMER AVENUE	MCKINLEY AVENUE	10,974	53	2020	$ 12,275
VILPO::143RD ST::60	143RD STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	10,926	53	2020	$ 12,222
VILPO::143RD ST::70	143RD STREET	CAMPBELL AVENUE	SHERMAN AVENUE	11,389	42	2020	$ 30,700
VILPO::143RD ST::80	143RD STREET	SHERMAN AVENUE	DIVISION AVENUE	12,492	50	2020	$ 16,682
VILPO::144TH ST::40	144TH STREET	BLAINE AVENUE	PALMER AVENUE	12,354	50	2020	$ 16,497
VILPO::144TH ST::80	144TH STREET	SHERMAN AVENUE	DIVISION AVENUE	11,908	43	2020	$ 30,074
VILPO::145TH ST::10	145TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	11,916	55	2020	$ 11,781
VILPO::145TH ST::20	145TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	12,313	49	2020	$ 18,537
VILPO::145TH ST::40	145TH STREET	BLAINE AVENUE	PALMER AVENUE	12,426	42	2020	$ 33,496
VILPO::145TH ST::70	145TH STREET	CAMPBELL AVENUE	SHERMAN AVENUE	12,638	46	2020	$ 25,471
VILPO::149TH ST::100	149TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	11,043	44	2020	$ 26,011
VILPO::149TH ST::20	149TH STREET	TROY AVENUE	ALBANY AVENUE	10,595	43	2020	$ 26,758
VILPO::149TH ST::60	149TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	10,690	43	2020	$ 26,997
VILPO::BLN AVE::10	BLAINE AVENUE	149TH STREET	150TH STREET	16,309	51	2020	$ 20,361
VILPO::BLN AVE::40	BLAINE AVENUE	WALTER ZIMNY DRIVE	145TH STREET	39,970	49	2020	$ 60,172
VILPO::BLN AVE::60	BLAINE AVENUE	144TH STREET	143RD STREET	21,984	53	2020	$ 24,590
VILPO::CLFRN AVE::10	CALIFORNIA AVENUE	149TH STREET	END	4,999	48	2020	$ 8,375
VILPO::CLVLND AVE::20	CLEVELAND AVENUE	149TH STREET	VETERANS DRIVE	38,920	46	2020	$ 78,443
VILPO::CLVLND AVE::60	CLEVELAND AVENUE	145TH STREET	END	10,097	54	2020	$ 10,639
VILPO::CLVLND AVE::70	CLEVELAND AVENUE	145TH STREET	144TH STREET	21,851	54	2020	$ 23,022
VILPO::CMPBLL AVE::10	CAMPBELL AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,829	51	2020	$ 54,716
VILPO::CMPBLL AVE::20	CAMPBELL AVENUE	145TH STREET	144TH STREET	21,872	45	2020	$ 47,802
VILPO::CMPBLL AVE::30	CAMPBELL AVENUE	144TH STREET	143RD STREET	21,830	52	2020	$ 25,835
VILPO::DVSN AVE::10	DIVISION AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,718	53	2020	$ 48,900
VILPO::DVSN AVE::20	DIVISION AVENUE	145TH STREET	144TH PLACE	11,273	50	2020	$ 15,054
VILPO::DVSN AVE::30	DIVISION AVENUE	144TH PLACE	144TH STREET	10,687	46	2020	$ 21,539
VILPO::DVSN AVE::40	DIVISION AVENUE	144TH STREET	SPALDING AVENUE	19,103	51	2020	$ 23,848
VILPO::HRRSN AVE::40	HARRISON AVENUE	145TH STREET	144TH STREET	21,938	51	2020	$ 27,388
VILPO::HRRSN AVE::70	HARRISON AVENUE	142ND STREET	141ST STREET	21,307	49	2020	$ 32,076
VILPO::HRRSN AVE::80	HARRISON AVENUE	142ND STREET	141ST STREET	43,580	52	2020	$ 51,576
VILPO::MCKNLY AVE::20	MCKINLEY AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,941	48	2020	$ 73,620
VILPO::MZRT AVE::30	MOZART AVENUE	147TH STREET	146TH STREET	19,159	43	2020	$ 48,387
VILPO::PLMR AVE::60	PALMER AVENUE	145TH STREET	144TH STREET	21,861	45	2020	$ 47,778
VILPO::PLMR AVE::70	PALMER AVENUE	144TH STREET	143RD STREET	22,655	53	2020	$ 25,340
VILPO::SHRMN AVE::10	SHERMAN AVENUE	WALTER ZIMNY DRIVE	145TH STREET	43,716	53	2020	$ 48,898
VILPO::SHRMN AVE::20	SHERMAN AVENUE	145TH STREET	144TH STREET	21,904	52	2020	$ 25,923
VILPO::SHRMN AVE::30	SHERMAN AVENUE	144TH STREET	143RD STREET	22,208	42	2020	$ 59,863
VILPO::SPLDNG AVE::10	SPALDING AVENUE	DIVISION AVENUE	WESTERN AVENUE	20,414	50	2020	$ 27,262
VILPO::TRY AVE::10	TROY AVENUE	149TH STREET	147TH STREET	42,421	46	2020	$ 85,498
VILPO::TRY AVE::20	TROY AVENUE	147TH STREET	END	34,391	55	2020	$ 34,001
VILPO::WHPPL AVE::10	WHIPPLE AVENUE	149TH STREET	147TH STREET	42,432	55	2020	$ 41,950
VILPO::WHPPL AVE::30	WHIPPLE AVENUE	145TH PLACE	145TH STREET	13,960	40	2020	$ 41,879
VILPO::WLT ZMY DR::40	WALTER ZIMNY DRIVE	CAMPBELL AVENUE	SHERMAN AVENUE	13,528	55	2020	$ 13,375
VILPO::139TH PL::10	139TH PLACE	WESTERN AVENUE	END	16,979	55	2021	$ 17,370
VILPO::141ST ST::10	141ST STREET	HARRISON AVENUE	CLEVELAND AVENUE	8,548	28	2021	$ 29,439
VILPO::144TH ST::20	144TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	12,298	29	2021	$ 40,449
VILPO::144TH ST::30	144TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	12,377	55	2021	$ 12,669
VILPO::144TH ST::70	144TH STREET	CAMPBELL AVENUE	SHERMAN AVENUE	12,014	32	2021	$ 37,120
VILPO::144TH ST::90	144TH STREET	DIVISION AVENUE	WESTERN AVENUE	19,663	35	2021	$ 60,755
VILPO::145TH PL::10	145TH PLACE	WHIPPLE AVENUE	SACRAMENTO AVENUE	10,180	36	2021	$ 31,455
VILPO::146TH ST::10	146TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	6,590	36	2021	$ 20,363
VILPO::149TH ST::110	149TH STREET	BLAINE AVENUE	PALMER AVENUE	10,322	32	2021	$ 31,894
VILPO::149TH ST::90	149TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	9,982	36	2021	$ 30,844

Pavement ID	Road Name	From	To	Area	PCI	Year	Cost
VILPO::150TH ST::10	150TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	5,613	30	2021	$ 17,594
VILPO::BLN AVE::20	BLAINE AVENUE	149TH STREET	148TH STREET	20,931	34	2021	$ 64,673
VILPO::BLN AVE::30	BLAINE AVENUE	148TH STREET	VETERANS DRIVE	17,626	36	2021	$ 54,462
VILPO::CLVLND AVE::10	CLEVELAND AVENUE	149TH STREET	150TH STREET	21,326	30	2021	$ 66,850
VILPO::CLVLND AVE::80	CLEVELAND AVENUE	144TH STREET	143RD STREET	21,927	52	2021	$ 26,846
VILPO::FRNCSC AVE::30	FRANCISCO AVENUE	146TH STREET	END	13,227	53	2021	$ 15,309
VILPO::HRRSN AVE::20	HARRISON AVENUE	149TH STREET	147TH STREET	43,006	30	2021	$ 134,808
VILPO::HRRSN AVE::30	HARRISON AVENUE	147TH STREET	145TH STREET	44,181	52	2021	$ 54,092
VILPO::HRRSN AVE::50	HARRISON AVENUE	144TH STREET	143RD STREET	21,755	30	2021	$ 68,194
VILPO::HRRSN AVE::60	HARRISON AVENUE	143RD STREET	142ND STREET	22,533	37	2021	$ 69,622
VILPO::LBNY AVE::10	ALBANY AVENUE	149TH STREET	147TH STREET	42,276	37	2021	$ 130,625
VILPO::MCKNLY AVE::30	MCKINLEY AVENUE	145TH STREET	144TH STREET	21,867	37	2021	$ 67,565
VILPO::PLMR AVE::50	PALMER AVENUE	145TH STREET	END	39,288	55	2021	$ 40,218
VILPO::PLMR AVE::80	PALMER AVENUE	143RD STREET	END	14,448	52	2021	$ 17,689
VILPO::RCHMND AVE::10	RICHMOND AVENUE	150TH STREET	149TH STREET	21,276	31	2021	$ 65,741
VILPO::SCRMNT AVE::40	SACRAMENTO AVENUE	147TH STREET	145TH PLACE	27,811	35	2021	$ 85,932
VILPO::SHRT ST::10	SHORT STREET	WALTER ZIMNY DRIVE	145TH STREET	43,243	52	2021	$ 52,944
VILPO::VTRNS DR::10	VETERANS DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	10,951	33	2021	$ 33,837
VILPO::VTRNS DR::20	VETERANS DRIVE	BLAINE AVENUE	PALMER AVENUE	10,738	29	2021	$ 35,320
VILPO::WHPPL AVE::20	WHIPPLE AVENUE	147TH STREET	145TH PLACE	28,486	31	2021	$ 88,016
VILPO::WLT ZMY DR::60	WALTER ZIMNY DRIVE	DIVISION AVENUE	END	7,794	54	2021	$ 8,500
VILPO::140TH ST::30	140TH STREET	WESTERN AVENUE	END	16,153	52	2022	$ 20,448
VILPO::141ST ST::40	141ST STREET	WESTERN AVENUE	END	17,603	22	2022	$ 79,474
VILPO::144TH ST::50	144TH STREET	PALMER AVENUE	MCKINLEY AVENUE	12,314	17	2022	$ 67,599
VILPO::145TH ST::100	145TH STREET	SHORT STREET	WESTERN AVENUE	11,229	18	2022	$ 59,255
VILPO::145TH ST::60	145TH STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	12,293	17	2022	$ 67,480
VILPO::145TH ST::90	145TH STREET	DIVISION AVENUE	SHORT STREET	12,620	24	2022	$ 52,961
VILPO::146TH ST::20	146TH STREET	FRANCISCO AVENUE	MOZART AVENUE	10,588	24	2022	$ 44,433
VILPO::146TH ST::30	146TH STREET	MOZART AVENUE	CALIFORNIA AVENUE	10,611	18	2022	$ 55,996
VILPO::148TH ST::10	148TH STREET	KEDZIE AVENUE	END	5,719	19	2022	$ 28,966
VILPO::148TH ST::20	148TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	10,822	23	2022	$ 47,135
VILPO::149TH ST::30	149TH STREET	ALBANY AVENUE	WHIPPLE AVENUE	10,764	20	2022	$ 52,235
VILPO::149TH ST::80	149TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	11,200	21	2022	$ 52,349
VILPO::BLN AVE::50	BLAINE AVENUE	145TH STREET	144TH STREET	21,856	52	2022	$ 27,667
VILPO::CLFRN AVE::40	CALIFORNIA AVENUE	147TH STREET	146TH STREET	22,021	24	2022	$ 92,410
VILPO::CLFRN AVE::50	CALIFORNIA AVENUE	146TH STREET	145TH STREET	22,041	19	2022	$ 111,637
VILPO::CLVLND AVE::50	CLEVELAND AVENUE	WALTER ZIMNY DRIVE	END	21,934	53	2022	$ 26,255
VILPO::CLVLND AVE::90	CLEVELAND AVENUE	143RD STREET	END	14,654	53	2022	$ 17,541
VILPO::FRNCSC AVE::20	FRANCISCO AVENUE	149TH STREET	END	10,758	54	2022	$ 12,136
VILPO::FRNCSC AVE::40	FRANCISCO AVENUE	146TH STREET	END	13,821	18	2022	$ 72,934
VILPO::HRRSN AVE::10	HARRISON AVENUE	149TH STREET	150TH STREET	18,454	23	2022	$ 80,378
VILPO::LBNY AVE::20	ALBANY AVENUE	147TH STREET	145TH STREET	42,699	24	2022	$ 179,185
VILPO::MCKNLY AVE::40	MCKINLEY AVENUE	144TH STREET	143RD STREET	21,993	52	2022	$ 27,841
VILPO::MZRT AVE::20	MOZART AVENUE	148TH STREET	147TH STREET	21,383	53	2022	$ 25,595
VILPO::MZRT AVE::50	MOZART AVENUE	145TH STREET	END	6,405	24	2022	$ 26,879
VILPO::RCHMND AVE::30	RICHMOND AVENUE	148TH STREET	END	17,060	18	2022	$ 90,029
VILPO::SCRMNT AVE::20	SACRAMENTO AVENUE	149TH STREET	148TH STREET	21,428	24	2022	$ 89,921
VILPO::144TH PL::10	144TH PLACE	DIVISION AVENUE	WESTERN AVENUE	18,896	7	2023	$ 134,219
VILPO::144TH ST::10	144TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	11,141	7	2023	$ 79,138
VILPO::144TH ST::60	144TH STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	12,271	13	2023	$ 80,269
VILPO::145TH ST::30	145TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	12,238	6	2023	$ 86,929
VILPO::145TH ST::50	145TH STREET	PALMER AVENUE	MCKINLEY AVENUE	12,358	11	2023	$ 86,240
VILPO::145TH ST::80	145TH STREET	SHERMAN AVENUE	DIVISION AVENUE	11,955	13	2023	$ 78,203
VILPO::148TH ST::40	148TH STREET	CALIFORNIA AVENUE	MOZART AVENUE	10,154	7	2023	$ 72,126
VILPO::149TH ST::10	149TH STREET	KEDZIE AVENUE	TROY AVENUE	10,822	2	2023	$ 76,873
VILPO::149TH ST::40	149TH STREET	WHIPPLE AVENUE	SACRAMENTO AVENUE	10,187	11	2023	$ 71,092
VILPO::149TH ST::50	149TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	10,822	12	2023	$ 73,161

Pavement ID	Road Name	From	To	Area	PCI	Year	Cost
VILPO::150TH ST::20	150TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	5,697	9	2023	$ 40,470
VILPO::BLN AVE::70	BLAINE AVENUE	143RD STREET	END	14,141	55	2023	$ 15,508
VILPO::CLFRN AVE::20	CALIFORNIA AVENUE	149TH STREET	148TH STREET	21,375	11	2023	$ 149,167
VILPO::PLMR AVE::30	PALMER AVENUE	149TH STREET	148TH STREET	21,177	8	2023	$ 150,422
VILPO::PLMR AVE::40	PALMER AVENUE	148TH STREET	VETERANS DRIVE	15,784	7	2023	$ 112,118
VILPO::RCHMND AVE::20	RICHMOND AVENUE	149TH STREET	148TH STREET	21,321	5	2023	$ 151,450
VILPO::VTRNS DR::30	VETERANS DRIVE	PALMER AVENUE	MCKINLEY AVENUE	7,304	0	2023	$ 51,880
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	5,456	54	2024	$ 6,190
VILPO::148TH ST::30	148TH STREET	RICHMOND AVENUE	END	8,626	0	2024	$ 63,110
VILPO::148TH ST::50	148TH STREET	BLAINE AVENUE	PALMER AVENUE	10,446	0	2024	$ 76,425
VILPO::149TH ST::70	149TH STREET	FRANCISCO AVENUE	MOZART AVENUE	7,889	51	2024	$ 10,681
VILPO::150TH ST::30	150TH STREET	FRANCISCO AVENUE	MOZART AVENUE	8,748	0	2024	$ 64,003
VILPO::150TH ST::40	150TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	5,189	0	2024	$ 37,966
VILPO::150TH ST::50	150TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	8,155	0	2024	$ 59,664
VILPO::CLFRN AVE::30	CALIFORNIA AVENUE	148TH STREET	147TH STREET	21,086	1	2024	$ 154,269
VILPO::FRNCSC AVE::10	FRANCISCO AVENUE	150TH STREET	149TH STREET	21,205	51	2024	$ 28,711
VILPO::MCKNLY AVE::10	MCKINLEY AVENUE	VETERANS DRIVE	END	30,481	0	2024	$ 223,010
VILPO::MZRT AVE::10	MOZART AVENUE	150TH STREET	END	20,576	0	2024	$ 150,539
VILPO::MZRT AVE::40	MOZART AVENUE	146TH STREET	145TH STREET	21,405	0	2024	$ 156,602
VILPO::PLMR AVE::20	PALMER AVENUE	149TH STREET	PALMER AVENUE	9,521	0	2024	$ 69,655
VILPO::SCRMNT AVE::10	SACRAMENTO AVENUE	150TH STREET	149TH STREET	21,418	0	2024	$ 156,703
VILPO::SCRMNT AVE::30	SACRAMENTO AVENUE	148TH STREET	147TH STREET	21,136	0	2024	$ 154,640
VILPO::WLT ZMY DR::10	WALTER ZIMNY DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	3,944	52	2024	$ 5,051
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	27,519	52	2024	$ 35,248
VILPO::WLT ZMY DR::30	WALTER ZIMNY DRIVE	MCKINLEY AVENUE	CAMPBELL AVENUE	13,280	51	2024	$ 17,981

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
VILPO::140TH ST::20	140TH STREET	WESTERN AVENUE	END	18,817	L & T CR	3.1%	Crack Sealing - AC	$578
VILPO::140TH ST::20	140TH STREET	WESTERN AVENUE	END	18,817	L & T CR	0.3%	Crack Sealing - AC	$54
VILPO::149TH ST::70	149TH STREET	FRANCISCO AVENUE	MOZART AVENUE	7,889	L & T CR	2.1%	Crack Sealing - AC	$162
VILPO::149TH ST::70	149TH STREET	FRANCISCO AVENUE	MOZART AVENUE	7,889	L & T CR	1.2%	Crack Sealing - AC	$98
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	5,456	L & T CR	1.0%	Crack Sealing - AC	$55
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	5,456	L & T CR	2.0%	Crack Sealing - AC	$109
VILPO::BLN AVE::70	BLAINE AVENUE	143RD STREET	END	14,141	L & T CR	0.5%	Crack Sealing - AC	$64
VILPO::BLN AVE::70	BLAINE AVENUE	143RD STREET	END	14,141	L & T CR	7.6%	Crack Sealing - AC	$1,071
VILPO::CLVLND AVE::40	CLEVELAND AVENUE	147TH STREET	WALTER ZIMNY DRIVE	3,935	L & T CR	0.5%	Crack Sealing - AC	$20
VILPO::CLVLND AVE::40	CLEVELAND AVENUE	147TH STREET	WALTER ZIMNY DRIVE	3,935	L & T CR	0.5%	Crack Sealing - AC	$20
VILPO::RCHMND AVE::40	RICHMOND AVENUE	146TH STREET	END	7,177	L & T CR	0.2%	Crack Sealing - AC	$16
VILPO::WLT ZMY DR::10	WALTER ZIMNY DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	3,944	L & T CR	5.2%	Crack Sealing - AC	$203
VILPO::WLT ZMY DR::10	WALTER ZIMNY DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	3,944	L & T CR	0.7%	Crack Sealing - AC	$27
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	27,519	L & T CR	2.7%	Crack Sealing - AC	$729
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	27,519	L & T CR	3.5%	Crack Sealing - AC	$969
VILPO::WLT ZMY DR::30	WALTER ZIMNY DRIVE	MCKINLEY AVENUE	CAMPBELL AVENUE	13,280	L & T CR	3.4%	Crack Sealing - AC	$446
VILPO::WLT ZMY DR::30	WALTER ZIMNY DRIVE	MCKINLEY AVENUE	CAMPBELL AVENUE	13,280	L & T CR	5.2%	Crack Sealing - AC	$687
VILPO::WLT ZMY DR::50	WALTER ZIMNY DRIVE	SHERMAN AVENUE	DIVISION AVENUE	13,025	L & T CR	0.9%	Crack Sealing - AC	$121
VILPO::WLT ZMY DR::50	WALTER ZIMNY DRIVE	SHERMAN AVENUE	DIVISION AVENUE	13,025	L & T CR	3.1%	Crack Sealing - AC	$403
VILPO::FRNCSC AVE::10	FRANCISCO AVENUE	150TH STREET	149TH STREET	21,205	L & T CR	1.4%	Crack Sealing - AC	$292
VILPO::FRNCSC AVE::10	FRANCISCO AVENUE	150TH STREET	149TH STREET	21,205	L & T CR	4.8%	Crack Sealing - AC	$1,012
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	5,456	ALLIGATOR CR	0.3%	Patching - AC Deep	$424
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	27,519	ALLIGATOR CR	0.2%	Patching - AC Deep	$1,066
VILPO::RCHMND AVE::40	RICHMOND AVENUE	146TH STREET	END	7,177	RUTTING	0.1%	Patching - AC Shallow	$29

APPENDIX F – PAVEMENT INVENTORY AND CONDITION TABULAR DATA

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
VILPO::139TH PL::10	139TH PLACE	WESTERN AVENUE	END	Asphalt	S	679	25	16,979	61	300
VILPO::140TH ST::20	140TH STREET	WESTERN AVENUE	END	Asphalt	S	753	25	18,817	82	168
VILPO::140TH ST::30	140TH STREET	WESTERN AVENUE	END	Asphalt	S	646	25	16,153	62	281
VILPO::141ST ST::10	141ST STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	342	25	8,548	34	711
VILPO::141ST ST::20	141ST STREET	CLEVELAND AVENUE	BLAINE AVENUE	Gravel	T	321	25	8,013	Gravel	Gravel
VILPO::141ST ST::30	141ST STREET	BLAINE AVENUE	PALMER AVENUE	Gravel	T	293	10	2,931	Gravel	Gravel
VILPO::141ST ST::40	141ST STREET	WESTERN AVENUE	END	Asphalt	S	704	25	17,603	32	467
VILPO::142ND ST::40	142ND STREET	WESTERN AVENUE	END	Asphalt	S	218	25	5,456	73	256
VILPO::143RD ST::10	143RD STREET	CALIFORNIA AVENUE	HARRISON AVENUE	Asphalt	S	334	33	11,033	46	425
VILPO::143RD ST::20	143RD STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	332	33	10,943	56	335
VILPO::143RD ST::30	143RD STREET	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	334	33	11,035	55	209
VILPO::143RD ST::40	143RD STREET	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	335	33	11,051	49	216
VILPO::143RD ST::50	143RD STREET	PALMER AVENUE	MCKINLEY AVENUE	Asphalt	S	333	33	10,974	55	198
VILPO::143RD ST::60	143RD STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	Asphalt	S	331	33	10,926	55	454
VILPO::143RD ST::70	143RD STREET	CAMPBELL AVENUE	SHERMAN AVENUE	Asphalt	S	345	33	11,389	44	208
VILPO::143RD ST::80	143RD STREET	SHERMAN AVENUE	DIVISION AVENUE	Asphalt	S	379	33	12,492	52	284
VILPO::144TH PL::10	144TH PLACE	DIVISION AVENUE	WESTERN AVENUE	Asphalt	S	590	32	18,896	21	423
VILPO::144TH ST::10	144TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	Asphalt	S	318	35	11,141	21	572
VILPO::144TH ST::20	144TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	332	37	12,298	35	203
VILPO::144TH ST::30	144TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	335	37	12,377	61	186
VILPO::144TH ST::40	144TH STREET	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	334	37	12,354	52	392
VILPO::144TH ST::50	144TH STREET	PALMER AVENUE	MCKINLEY AVENUE	Asphalt	S	333	37	12,314	27	405
VILPO::144TH ST::60	144TH STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	Asphalt	S	332	37	12,271	27	307
VILPO::144TH ST::70	144TH STREET	CAMPBELL AVENUE	SHERMAN AVENUE	Asphalt	S	343	35	12,014	38	308
VILPO::144TH ST::80	144TH STREET	SHERMAN AVENUE	DIVISION AVENUE	Asphalt	S	322	37	11,908	45	289
VILPO::144TH ST::90	144TH STREET	DIVISION AVENUE	WESTERN AVENUE	Asphalt	S	531	37	19,663	41	413
VILPO::145TH PL::10	145TH PLACE	WHIPPLE AVENUE	SACRAMENTO AVENUE	Asphalt	S	318	32	10,180	42	369
VILPO::145TH ST::10	145TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	Asphalt	S	322	37	11,916	57	327
VILPO::145TH ST::100	145TH STREET	SHORT STREET	WESTERN AVENUE	Asphalt	S	303	37	11,229	28	323
VILPO::145TH ST::20	145TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	333	37	12,313	51	377
VILPO::145TH ST::30	145TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	331	37	12,238	20	207
VILPO::145TH ST::40	145TH STREET	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	336	37	12,426	44	179
VILPO::145TH ST::50	145TH STREET	PALMER AVENUE	MCKINLEY AVENUE	Asphalt	S	334	37	12,358	25	275
VILPO::145TH ST::60	145TH STREET	MCKINLEY AVENUE	CAMPBELL AVENUE	Asphalt	S	332	37	12,293	27	299
VILPO::145TH ST::70	145TH STREET	CAMPBELL AVENUE	SHERMAN AVENUE	Asphalt	S	342	37	12,638	48	283
VILPO::145TH ST::80	145TH STREET	SHERMAN AVENUE	DIVISION AVENUE	Asphalt	S	323	37	11,955	27	256
VILPO::145TH ST::90	145TH STREET	DIVISION AVENUE	SHORT STREET	Asphalt	S	341	37	12,620	34	301
VILPO::146TH ST::10	146TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	Asphalt	S	206	32	6,590	42	923
VILPO::146TH ST::20	146TH STREET	FRANCISCO AVENUE	MOZART AVENUE	Asphalt	S	331	32	10,588	34	305
VILPO::146TH ST::30	146TH STREET	MOZART AVENUE	CALIFORNIA AVENUE	Asphalt	S	332	32	10,611	28	398
VILPO::148TH ST::10	148TH STREET	KEDZIE AVENUE	END	Asphalt	S	173	33	5,719	29	696
VILPO::148TH ST::20	148TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	Asphalt	S	338	32	10,822	33	437
VILPO::148TH ST::30	148TH STREET	RICHMOND AVENUE	END	Asphalt	S	270	32	8,626	16	477
VILPO::148TH ST::40	148TH STREET	CALIFORNIA AVENUE	MOZART AVENUE	Asphalt	S	317	32	10,154	21	409

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
VILPO::148TH ST::50	148TH STREET	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	326	32	10,446	13	367
VILPO::149TH ST::10	149TH STREET	KEDZIE AVENUE	TROY AVENUE	Asphalt	S	338	32	10,822	16	506
VILPO::149TH ST::100	149TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	345	32	11,043	46	359
VILPO::149TH ST::110	149TH STREET	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	323	32	10,322	38	442
VILPO::149TH ST::20	149TH STREET	TROY AVENUE	ALBANY AVENUE	Asphalt	S	331	32	10,595	45	335
VILPO::149TH ST::30	149TH STREET	ALBANY AVENUE	WHIPPLE AVENUE	Asphalt	S	336	32	10,764	30	423
VILPO::149TH ST::40	149TH STREET	WHIPPLE AVENUE	SACRAMENTO AVENUE	Asphalt	S	318	32	10,187	25	449
VILPO::149TH ST::50	149TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	Asphalt	S	338	32	10,822	26	522
VILPO::149TH ST::60	149TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	Asphalt	S	334	32	10,690	45	452
VILPO::149TH ST::70	149TH STREET	FRANCISCO AVENUE	MOZART AVENUE	Asphalt	S	247	32	7,889	70	328
VILPO::149TH ST::80	149TH STREET	CALIFORNIA AVENUE	HARRISON AVENUE	Asphalt	S	350	32	11,200	31	405
VILPO::149TH ST::90	149TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	312	32	9,982	42	527
VILPO::150TH ST::10	150TH STREET	SACRAMENTO AVENUE	RICHMOND AVENUE	Asphalt	S	330	17	5,613	36	395
VILPO::150TH ST::20	150TH STREET	RICHMOND AVENUE	FRANCISCO AVENUE	Asphalt	S	335	17	5,697	23	607
VILPO::150TH ST::30	150TH STREET	FRANCISCO AVENUE	MOZART AVENUE	Asphalt	S	292	30	8,748	13	480
VILPO::150TH ST::40	150TH STREET	HARRISON AVENUE	CLEVELAND AVENUE	Asphalt	S	305	17	5,189	12	336
VILPO::150TH ST::50	150TH STREET	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	408	20	8,155	16	383
VILPO::BLN AVE::10	BLAINE AVENUE	149TH STREET	150TH STREET	Asphalt	S	510	32	16,309	53	400
VILPO::BLN AVE::20	BLAINE AVENUE	149TH STREET	148TH STREET	Asphalt	S	654	32	20,931	40	431
VILPO::BLN AVE::30	BLAINE AVENUE	148TH STREET	VETERANS DRIVE	Asphalt	S	551	32	17,626	42	172
VILPO::BLN AVE::40	BLAINE AVENUE	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,249	32	39,970	51	243
VILPO::BLN AVE::50	BLAINE AVENUE	145TH STREET	144TH STREET	Asphalt	S	662	33	21,856	62	255
VILPO::BLN AVE::60	BLAINE AVENUE	144TH STREET	143RD STREET	Asphalt	S	666	33	21,984	55	313
VILPO::BLN AVE::70	BLAINE AVENUE	143RD STREET	END	Asphalt	S	442	32	14,141	69	314
VILPO::CLFRN AVE::10	CALIFORNIA AVENUE	149TH STREET	END	Asphalt	S	156	32	4,999	50	498
VILPO::CLFRN AVE::20	CALIFORNIA AVENUE	149TH STREET	148TH STREET	Asphalt	S	668	32	21,375	25	390
VILPO::CLFRN AVE::30	CALIFORNIA AVENUE	148TH STREET	147TH STREET	Asphalt	S	659	32	21,086	19	325
VILPO::CLFRN AVE::40	CALIFORNIA AVENUE	147TH STREET	146TH STREET	Asphalt	S	667	33	22,021	34	393
VILPO::CLFRN AVE::50	CALIFORNIA AVENUE	146TH STREET	145TH STREET	Asphalt	S	668	33	22,041	29	349
VILPO::CLFRN AVE::60	CALIFORNIA AVENUE	145TH STREET	END	Gravel	T	483	32	15,457	Gravel	Gravel
VILPO::CLVLND AVE::10	CLEVELAND AVENUE	149TH STREET	150TH STREET	Asphalt	S	666	32	21,326	36	249
VILPO::CLVLND AVE::100	CLEVELAND AVENUE	141ST STREET	END	Asphalt	S	655	25	16,377	Private	Does not exist.
VILPO::CLVLND AVE::20	CLEVELAND AVENUE	149TH STREET	VETERANS DRIVE	Asphalt	S	1,216	32	38,920	48	197
VILPO::CLVLND AVE::30	CLEVELAND AVENUE	VETERANS DRIVE	147TH STREET	Asphalt	S	115	32	3,675	80	359
VILPO::CLVLND AVE::40	CLEVELAND AVENUE	147TH STREET	WALTER ZIMNY DRIVE	Asphalt	S	123	32	3,935	83	361
VILPO::CLVLND AVE::50	CLEVELAND AVENUE	WALTER ZIMNY DRIVE	END	Asphalt	S	685	32	21,934	63	253
VILPO::CLVLND AVE::60	CLEVELAND AVENUE	145TH STREET	END	Asphalt	S	306	33	10,097	56	419
VILPO::CLVLND AVE::70	CLEVELAND AVENUE	145TH STREET	144TH STREET	Asphalt	S	662	33	21,851	56	299
VILPO::CLVLND AVE::80	CLEVELAND AVENUE	144TH STREET	143RD STREET	Asphalt	S	664	33	21,927	58	310
VILPO::CLVLND AVE::90	CLEVELAND AVENUE	143RD STREET	END	Asphalt	S	444	33	14,654	63	274
VILPO::CMPBLL AVE::10	CAMPBELL AVENUE	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,328	33	43,829	53	226
VILPO::CMPBLL AVE::20	CAMPBELL AVENUE	145TH STREET	144TH STREET	Asphalt	S	663	33	21,872	47	380
VILPO::CMPBLL AVE::30	CAMPBELL AVENUE	144TH STREET	143RD STREET	Asphalt	S	662	33	21,830	54	311
VILPO::DVSN AVE::10	DIVISION AVENUE	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,325	33	43,718	55	178

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
VILPO::DVSN AVE::20	DIVISION AVENUE	145TH STREET	144TH PLACE	Asphalt	S	342	33	11,273	52	263
VILPO::DVSN AVE::30	DIVISION AVENUE	144TH PLACE	144TH STREET	Asphalt	S	324	33	10,687	48	241
VILPO::DVSN AVE::40	DIVISION AVENUE	144TH STREET	SPALDING AVENUE	Asphalt	S	579	33	19,103	53	418
VILPO::FRNCSC AVE::10	FRANCISCO AVENUE	150TH STREET	149TH STREET	Asphalt	S	663	32	21,205	70	252
VILPO::FRNCSC AVE::20	FRANCISCO AVENUE	149TH STREET	END	Asphalt	S	336	32	10,758	64	269
VILPO::FRNCSC AVE::30	FRANCISCO AVENUE	146TH STREET	END	Asphalt	S	413	32	13,227	59	510
VILPO::FRNCSC AVE::40	FRANCISCO AVENUE	146TH STREET	END	Asphalt	S	432	32	13,821	28	516
VILPO::HRRSN AVE::10	HARRISON AVENUE	149TH STREET	150TH STREET	Asphalt	S	659	28	18,454	33	537
VILPO::HRRSN AVE::20	HARRISON AVENUE	149TH STREET	147TH STREET	Asphalt	S	1,344	32	43,006	36	385
VILPO::HRRSN AVE::30	HARRISON AVENUE	147TH STREET	145TH STREET	Asphalt	S	1,339	33	44,181	58	290
VILPO::HRRSN AVE::40	HARRISON AVENUE	145TH STREET	144TH STREET	Asphalt	S	665	33	21,938	53	285
VILPO::HRRSN AVE::50	HARRISON AVENUE	144TH STREET	143RD STREET	Asphalt	S	659	33	21,755	36	329
VILPO::HRRSN AVE::60	HARRISON AVENUE	143RD STREET	142ND STREET	Asphalt	S	683	33	22,533	43	300
VILPO::HRRSN AVE::70	HARRISON AVENUE	142ND STREET	141ST STREET	Asphalt	S	646	33	21,307	51	257
VILPO::HRRSN AVE::80	HARRISON AVENUE	142ND STREET	141ST STREET	Asphalt	S	1,321	33	43,580	54	255
VILPO::LBNY AVE::10	ALBANY AVENUE	149TH STREET	147TH STREET	Asphalt	S	1,321	32	42,276	43	370
VILPO::LBNY AVE::20	ALBANY AVENUE	147TH STREET	145TH STREET	Asphalt	S	1,334	32	42,699	34	562
VILPO::MCKNLY AVE::10	MCKINLEY AVENUE	VETERANS DRIVE	END	Asphalt	S	1,051	29	30,481	10	619
VILPO::MCKNLY AVE::20	MCKINLEY AVENUE	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,332	33	43,941	50	329
VILPO::MCKNLY AVE::30	MCKINLEY AVENUE	145TH STREET	144TH STREET	Asphalt	S	663	33	21,867	43	361
VILPO::MCKNLY AVE::40	MCKINLEY AVENUE	144TH STREET	143RD STREET	Asphalt	S	666	33	21,993	62	270
VILPO::MZRT AVE::10	MOZART AVENUE	150TH STREET	END	Asphalt	S	686	30	20,576	1	585
VILPO::MZRT AVE::20	MOZART AVENUE	148TH STREET	147TH STREET	Asphalt	S	668	32	21,383	63	348
VILPO::MZRT AVE::30	MOZART AVENUE	147TH STREET	146TH STREET	Asphalt	S	661	29	19,159	45	572
VILPO::MZRT AVE::40	MOZART AVENUE	146TH STREET	145TH STREET	Asphalt	S	669	32	21,405	17	659
VILPO::MZRT AVE::50	MOZART AVENUE	145TH STREET	END	Asphalt	S	267	24	6,405	34	486
VILPO::PLMR AVE::10	PALMER AVENUE	PALMER AVENUE	END	Asphalt	S	420	22	9,242	Private	Does not exist.
VILPO::PLMR AVE::20	PALMER AVENUE	149TH STREET	PALMER AVENUE	Asphalt	S	433	22	9,521	11	540
VILPO::PLMR AVE::30	PALMER AVENUE	149TH STREET	148TH STREET	Asphalt	S	662	32	21,177	22	304
VILPO::PLMR AVE::40	PALMER AVENUE	148TH STREET	VETERANS DRIVE	Asphalt	S	493	32	15,784	21	261
VILPO::PLMR AVE::50	PALMER AVENUE	145TH STREET	END	Asphalt	S	1,191	33	39,288	61	257
VILPO::PLMR AVE::60	PALMER AVENUE	145TH STREET	144TH STREET	Asphalt	S	662	33	21,861	47	289
VILPO::PLMR AVE::70	PALMER AVENUE	144TH STREET	143RD STREET	Asphalt	S	666	34	22,655	55	331
VILPO::PLMR AVE::80	PALMER AVENUE	143RD STREET	END	Asphalt	S	438	33	14,448	58	243
VILPO::RCHMND AVE::10	RICHMOND AVENUE	150TH STREET	149TH STREET	Asphalt	S	665	32	21,276	37	399
VILPO::RCHMND AVE::20	RICHMOND AVENUE	149TH STREET	148TH STREET	Asphalt	S	666	32	21,321	19	436
VILPO::RCHMND AVE::30	RICHMOND AVENUE	148TH STREET	END	Asphalt	S	533	32	17,060	28	325
VILPO::RCHMND AVE::40	RICHMOND AVENUE	146TH STREET	END	Asphalt	S	449	16	7,177	87	345
VILPO::SCRMNT AVE::10	SACRAMENTO AVENUE	150TH STREET	149TH STREET	Asphalt	S	669	32	21,418	12	687
VILPO::SCRMNT AVE::20	SACRAMENTO AVENUE	149TH STREET	148TH STREET	Asphalt	S	670	32	21,428	34	372
VILPO::SCRMNT AVE::30	SACRAMENTO AVENUE	148TH STREET	147TH STREET	Asphalt	S	661	32	21,136	16	414
VILPO::SCRMNT AVE::40	SACRAMENTO AVENUE	147TH STREET	145TH PLACE	Asphalt	S	869	32	27,811	41	277
VILPO::SHRMN AVE::10	SHERMAN AVENUE	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,325	33	43,716	55	241
VILPO::SHRMN AVE::20	SHERMAN AVENUE	145TH STREET	144TH STREET	Asphalt	S	664	33	21,904	54	339

Pavement ID	Road Name	From	To	Surface	Rank	Length (FT)	Width (FT)	Area (SF)	PCI	IRI
VILPO::SHRMN AVE::30	SHERMAN AVENUE	144TH STREET	143RD STREET	Asphalt	S	673	33	22,208	44	275
VILPO::SHRT ST::10	SHORT STREET	WALTER ZIMNY DRIVE	145TH STREET	Asphalt	S	1,310	33	43,243	58	193
VILPO::SPLDNG AVE::10	SPALDING AVENUE	DIVISION AVENUE	WESTERN AVENUE	Asphalt	S	619	33	20,414	52	299
VILPO::TRY AVE::10	TROY AVENUE	149TH STREET	147TH STREET	Asphalt	S	1,326	32	42,421	48	285
VILPO::TRY AVE::20	TROY AVENUE	147TH STREET	END	Asphalt	S	1,075	32	34,391	57	331
VILPO::VTRNS DR::10	VETERANS DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	342	32	10,951	39	264
VILPO::VTRNS DR::20	VETERANS DRIVE	BLAINE AVENUE	PALMER AVENUE	Asphalt	S	336	32	10,738	35	450
VILPO::VTRNS DR::30	VETERANS DRIVE	PALMER AVENUE	MCKINLEY AVENUE	Asphalt	S	252	29	7,304	13	684
VILPO::WHPPL AVE::10	WHIPPLE AVENUE	149TH STREET	147TH STREET	Asphalt	S	1,326	32	42,432	57	338
VILPO::WHPPL AVE::20	WHIPPLE AVENUE	147TH STREET	145TH PLACE	Asphalt	S	890	32	28,486	37	302
VILPO::WHPPL AVE::30	WHIPPLE AVENUE	145TH PLACE	145TH STREET	Asphalt	S	436	32	13,960	42	307
VILPO::WLT ZMY DR::10	WALTER ZIMNY DRIVE	CLEVELAND AVENUE	BLAINE AVENUE	Asphalt	S	329	12	3,944	71	90
VILPO::WLT ZMY DR::20	WALTER ZIMNY DRIVE	BLAINE AVENUE	MCKINLEY AVENUE	Asphalt	S	688	40	27,519	71	120
VILPO::WLT ZMY DR::30	WALTER ZIMNY DRIVE	MCKINLEY AVENUE	CAMPBELL AVENUE	Asphalt	S	332	40	13,280	70	108
VILPO::WLT ZMY DR::40	WALTER ZIMNY DRIVE	CAMPBELL AVENUE	SHERMAN AVENUE	Asphalt	S	338	40	13,528	57	114
VILPO::WLT ZMY DR::50	WALTER ZIMNY DRIVE	SHERMAN AVENUE	DIVISION AVENUE	Asphalt	S	326	40	13,025	75	123
VILPO::WLT ZMY DR::60	WALTER ZIMNY DRIVE	DIVISION AVENUE	END	Asphalt	S	195	40	7,794	60	165