# Implementation of Transportation Asset Management in Grandview, Missouri

**Final Report**
**February 2017**

**Sponsored by**
City of Grandview, Missouri
Midwest Transportation Center
U.S. Department of Transportation
Office of the Assistant Secretary for
Research and Technology

MIDWEST TRANSPORTATION CENTER MTC

IOWA STATE UNIVERSITY
Institute for Transportation

## About MTC

The Midwest Transportation Center (MTC) is a regional University Transportation Center (UTC) sponsored by the U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology (USDOT/OST-R). The mission of the UTC program is to advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research, and technology transfer at university-based centers of excellence. Iowa State University, through its Institute for Transportation (InTrans), is the MTC lead institution.

## About InTrans

The mission of the Institute for Transportation (InTrans) at Iowa State University is to develop and implement innovative methods, materials, and technologies for improving transportation efficiency, safety, reliability, and sustainability while improving the learning environment of students, faculty, and staff in transportation-related fields.

**Technical Report Documentation Page**

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|

**4. Title and Subtitle**

Implementation of Transportation Asset Management in Grandview, Missouri

**5. Report Date**

February 2017

**6. Performing Organization Code**


**7. Author(s)**

Henry Brown, Carlos Sun, Chris Fitzpatrick, and Ahmed Abdaljabbar


**8. Performing Organization Report No.**


**9. Performing Organization Name and Address**

Transportation Infrastructure Center
Department of Civil and Environmental Engineering
University of Missouri-Columbia
E2509 Lafferre Hall
Columbia, MO 65211


**10. Work Unit No. (TRAIS)**

**11. Contract or Grant No.**

Part of DTRT13-G-UTC37


**12. Sponsoring Organization Name and Address**

Midwest Transportation Center
2711 S. Loop Drive, Suite 4700
Ames, IA 50010-8664

City of Grandview, Missouri
1200 Main Street
Grandview, MO 64030

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology
1200 New Jersey Avenue, SE
Washington, DC 20590


**13. Type of Report and Period Covered**

Final Report

**14. Sponsoring Agency Code**

**15. Supplementary Notes**

Visit www.intrans.iastate.edu for color pdfs of this and other research reports.


**16. Abstract**

The successful implementation of transportation asset management (TAM) by local governments facilitates the optimization of limited resources. The use of a data-driven TAM program helps to identify and prioritize needs, identify and dedicate resources for the preservation of infrastructure, and provide policy decision makers with the data to support good decisions.

In this project, a TAM program was implemented for the City of Grandview, Missouri. The implementation process included an examination of the current TAM practices, review of TAM software systems, deployment of a TAM system, analysis of existing pavement and service request data, inventory of existing pavement condition, formulation of a pavement preservation plan, and development of a framework for ensuring that the implemented TAM is sustainable.

Pavement preservation plans were developed for both the near term (2016 through 2020) and long term (2021 through 2040). A decision tree methodology was developed and utilized to select specific pavement treatments for the next five years. The long-term analysis assessed the possible impacts of a vote in 2021 to increase the sales tax to fund transportation projects. Recommendations for sustaining the TAM system were provided.

The flexible framework developed in this research can be used by other communities to help local governments maximize limited resources.



**17. Key Words**

infrastructure decision tree—local pavement management—local pavement preservation—pavement maintenance—transportation asset management


**18. Distribution Statement**

No restrictions.

| 19. Security Classification (of this report) | 20. Security Classification (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified. | Unclassified. | 157 | NA |

# IMPLEMENTATION OF TRANSPORTATION ASSET MANAGEMENT IN GRANDVIEW, MISSOURI

**Final Report**
**February 2017**


**Principal Investigator**
Henry Brown, Research Engineer
Transportation Infrastructure Center
University of Missouri-Columbia

**Co-Principal Investigator**
Carlos Sun, Associate Director
Transportation Infrastructure Center
University of Missouri-Columbia

**Research Assistants**
Chris Fitzpatrick and Ahmed Abdaljabbar

**Authors**
Henry Brown, Carlos Sun, Chris Fitzpatrick, and Ahmed Abdaljabbar



Sponsored by
City of Grandview, Missouri,
Midwest Transportation Center, and
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

A report from
**Institute for Transportation**
**Iowa State University**
2711 South Loop Drive, Suite 4700
Ames, IA 50010-8664
Phone: 515-294-8103 / Fax: 515-294-0467
www.intrans.iastate.edu

# TABLE OF CONTENTS

## LIST OF FIGURES

# LIST OF TABLES

**ACKNOWLEDGMENTS**

This project was funded by the City of Grandview, Missouri, the Midwest Transportation Center, and the U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology.

The authors acknowledge the assistance provided by Grandview's public works director, Dennis Randolph. The authors would like to thank the following members of the project technical advisory committee for sharing their experiences and providing input: Jeff Fisher (Belton, Missouri), David Frazier (Belton, Missouri), Mike Geisel (Chesterfield, Missouri), Dan Haid (Boone County, Missouri), Jenni Jones (Missouri Department of Transportation), and Richard Stone (Columbia, Missouri). The authors also thank Dena Mezger (Lee's Summit, Missouri), Chris Steuve (Greene County, Missouri), Mike Ross (Overland Park, Kansas), Joanna Johnson (Kalamazoo County, Michigan), Brian Gutowski (Emmet County, Michigan), Ben Clark (Lenexa, Kansas), Brian Sanada (Michigan Department of Transportation), and Wayne Schoonover (Mason County, Michigan) for sharing their agency's experiences with TAM. The authors appreciate the assistance with implementing Roadsoft provided by Tim Colling, Mary Crane, and Andrew Rollenhagen from the Michigan Technological University Center for Technology and Training. The authors would also like to thank University of Missouri research assistant Ryan Rands for helping with data entry.

## EXECUTIVE SUMMARY

Local governments face many challenges in keeping their existing pavements, bridges, signs, drainage structures, and other infrastructure in a state of good repair. One such challenge is the limited availability of funding for maintenance projects to help preserve and improve existing facilities. Agencies must evaluate many candidate projects to determine the projects that will most efficiently provide improvements to their infrastructure. In performing the evaluation of various alternatives, agencies must take into consideration many factors, including environmental regulations.

The successful implementation of transportation asset management (TAM) by local governments facilitates the evaluation of alternatives through the use of a data-driven methodology that identifies and prioritizes needs, identifies and dedicates resources for the preservation of infrastructure, and provides policy decision makers with the facts and data to support good decisions. The successful implementation of TAM requires the utilization of a “mix of fixes” approach that emphasizes maintenance over rehabilitation. TAM empowers public agencies to invest their limited budgets in such a way as to provide the greatest return on investment.

In this project, TAM was implemented for the City of Grandview, Missouri. The research team’s goal was to help Grandview make data-driven decisions to maximize infrastructure performance and to provide Grandview with an innovative framework for the implementation of TAM within the city’s network that can be sustained in the following years. The focus of Grandview’s program is on pavements, but the framework developed could be applied to other assets as well.

The research team and Grandview Public Works Director Dennis Randolph developed the following goals for Grandview’s TAM practice:

- For years 1–5: Maintain pavements in their current condition while experiencing a 2% annual decrease in buying power
- For years 1–5: Provide a list of treatments for individual segments that are maintained by the city
- For years 5+: Begin improving the average pavement condition by 3% to 5% annually
- Reduce pothole service requests at least 10%

To meet these goals, the research team performed the following tasks:

- Assessed the current state of the practice for TAM
- Reviewed TAM software systems
- Implemented a TAM system
- Conducted analyses of existing pavement and service request data
- Conducted an inventory of pavement condition
- Formulated a pavement preservation plan
- Developed a framework for ensuring that the implemented TAM is sustainable

To assess the current state of the practice for TAM, a literature review was conducted, and discussions were held with 11 local communities in Missouri and other states to learn about best practices for TAM. This review indicated that local communities have various approaches to TAM and use a variety of tools. There is no “one-size-fits all” method for TAM because each community has different needs.

The research team evaluated historical data provided by the city, including pavement treatments, pavement ratings, and service requests. The city uses four types of treatments: crack seal, seal coat, overlay, and reconstruction. The current majority of Grandview’s maintenance activity is overlay. A review of Pavement Surface Evaluation and Rating (PASER) values from 2010 and 2014 indicated that the number of lane-miles of pavement in fair condition has decreased while the number of lane-miles of pavement in good condition has increased. Service request cards and pavement ratings were received from the city and evaluated to establish trends in pavement assets for the years 2003 through the present. This study evaluated yearly and monthly breakdowns of pavement ratings and requests cards for new curbs, sidewalks, potholes, and sidewalk and curb removals/replacements. Potholes and removals/replacements of sidewalks were the most common service requests, totaling approximately 80% of all pavement service requests received by the city. The review of the service request data indicated that the number of pothole service requests in the city has generally increased and that the pothole service requests are distributed uniformly throughout the city.

The research team evaluated several TAM software packages to help the city find the package that best fit its needs. A spreadsheet was developed to assist in the evaluation of different software packages using a variety of criteria. Grandview staff selected Roadsoft as the system that best fit the city’s needs. Roadsoft uses the PASER system for pavements, which involves a visual rating of pavements on a scale of 1 to 10.

A pavement inventory of all streets in Grandview’s jurisdiction was conducted. The inventory was conducted using a spreadsheet and the Roadsoft Laptop Data Collector (LDC), which interfaces with the Roadsoft system. Data attributes collected for each segment included lane width, number of lanes, pavement surface type, shoulder width, shoulder type, type of curb (straight back, rolling, or none), starting point and ending point of each PASER value recorded, functional class, and PASER value for the segment. A representative from the city accompanied the research team for part of the inventory to ensure consistency in the PASER values.

Once the inventory was conducted and Roadsoft was configured, a pavement preservation plan was developed. Analyses were performed for two time periods: 2016 through 2020 and 2021 through 2040. The analysis for the first time period was based on the current budget funding levels and included recommendations for specific projects for the next five years. The analysis for 2021 through 2040 recommended allocations of funding among different treatment types but did not recommend specific projects due to the longer time horizon. The analysis for this time period included an evaluation of four different scenarios based on two discount rates and two funding levels.

For 2016 through 2020, the research team investigated seven different scenarios, including a No Treatment scenario. The recommended scenario is the Targeting Infrastructure to Gain Efficiency in Roads (TIGER) Tree scenario, which is based on the funding allocations determined by the Roadsoft optimization method as well as some reconstruction projects added between 2018 and 2020. This scenario includes recommendations for specific projects as determined using a decision tree methodology and spreadsheet tool that the research team developed. The decision tree uses a data-driven approach to evaluate factors, such as PASER value, service requests, functional class, remaining service life (RSL), and treatment type, to determine the allocation of funding to specific segments and treatments. Under the TIGER Tree scenario, the average PASER value for the network is projected to increase by 9.3%.

An analysis for 2021 through 2040 was also performed. This analysis was based on the projected Grandview network in the year 2021, which consists of all treatments recommended under the TIGER Tree scenario for 2016 through 2020 as well as Frontage Road improvements. The Roadsoft optimization method was performed for four different scenarios based on two funding levels and two discount rates. The two funding levels were based on the outcome of a vote to increase the local sales tax in the year 2021. The results from this analysis show that approval of the sales tax increase would have a significant impact on improving the overall condition of Grandview's network. The discount rate would also affect the results considerably.

As part of the process of implementing TAM in Grandview, recommendations for ensuring the sustainability of the TAM system were developed. The research team recommended that the city update the PASER values for one-third of its jurisdiction each year. Once the decision tree tool is utilized, the selected future treatments should be added to Roadsoft to update the network for the upcoming years. The pavement preservation plan should also be updated annually. The inventory data can be imported/exported easily from Roadsoft to GIS or .csv formats. These recommendations for sustaining the TAM system will help to ensure that the long-term benefits of the TAM system in Grandview are realized.

The framework developed in this project can be utilized by other communities in Missouri and other states. This decision-based model benefits communities by accounting for all pavement assets and providing recommended solutions for the rehabilitation of these pavements in the most cost-effective way to help a community get "the biggest bang for the buck." The decision-based model takes into account various attributes (pavement rating, RSL, roadway classification, annual average daily traffic [AADT], community budget, etc.). The implementation of TAM will help local communities develop a pavement maintenance program that helps maximize limited resources through a "mix of fixes" approach that emphasizes keeping good roads in good condition.

**ACRONYMS**

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| AASHTO | American Association of State Highway and Transportation Officials |
| APR | Average PASER Rating |
| CS | Crack Seal |
| DOT | Department of Transportation |
| FHWA | Federal Highway Administration |
| GIS | Geographic Information Services |
| MR&R | Maintenance, Rehabilitation, and Reconstruction |
| NFC | National Function Classification |
| NPV | Net Present Value |
| OL | Overlay |
| PASER | Pavement Surface Evaluation Rating |
| PV | PASER Value |
| RC | Reconstruction |
| RSL | Remaining Service Life |
| SL | Seal Coat |
| SR | Service Request |
| TAC | Technical Advisory Committee |
| TAM | Transportation Asset Management |
| TAMP | Transportation Asset Management Plan |
| TIGER | Targeting Infrastructure to Gain Efficiency in Roads |
| TT | Treatment Type |

# CHAPTER 1. INTRODUCTION

Local governments are faced with challenges in determining how to allocate their limited funding to maintain their existing pavements, bridges, signs, drainage structures, and other infrastructure. One tool that can help local agencies meet this challenge is transportation asset management (TAM). TAM helps communities maximize the use of their limited resources by providing tools for data-driven decision making and implementing a "mix of fixes" approach that emphasizes maintenance over rehabilitation. This project sought to help the City of Grandview, Missouri implement a TAM system. The project was focused on pavement management, but the same TAM principles could also be applied to other infrastructure.

This report describes the development of a process for implementing TAM in Grandview, Missouri. Chapter 2 provides an overview of the city and its TAM goals. The report provides an overview of TAM in Chapter 3. Chapter 4 describes ways to evaluate the current condition of the pavements in an agency's jurisdiction. Chapter 5 includes case studies involving the implementation of TAM programs by state and local transportation agencies. The process of evaluating TAM software systems to select the best system for Grandview is discussed in Chapter 6. Chapter 7 describes the asset inventory and analysis undertaken for the city. Recommendations for ensuring the sustainability of the TAM system are discussed in Chapter 8, and conclusions are presented in Chapter 9.

From this report, readers will have a better understanding of the process for implementing TAM at the local agency level and the benefits of TAM. TAM stands in sharp contrast to "worst-first" prioritization, which is the least practicable infrastructure maintenance repair and rehabilitation strategy because it underutilizes an agency's pavement system and budget.

## CHAPTER 2. PROJECT OVERVIEW

### 2.1 Grandview, Missouri Overview

Grandview, Missouri, is located southeast of Kansas City, Missouri in Jackson County, as shown in Figure 2.1. According to the U.S. Census Bureau (2010), the city has an area of 14.79 $mi^2$ (38.31 $km^2$) and a total population of 24,475.

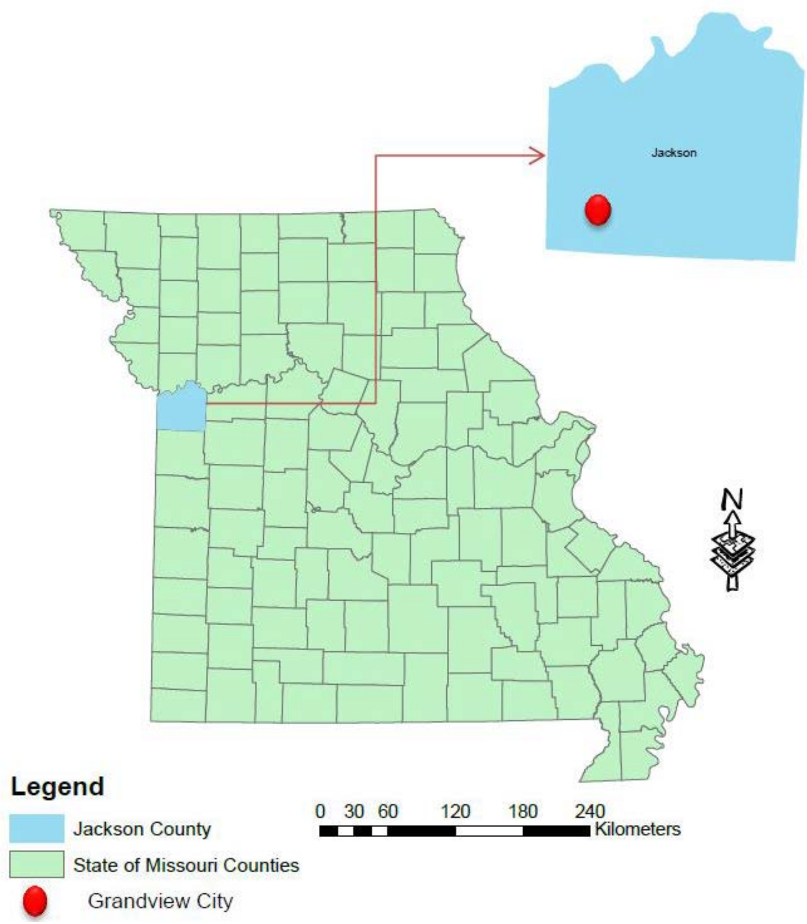





**Figure 2.1. City of Grandview in Jackson County, Missouri**

The majority of city streets are comprised of asphalt and asphalt composite pavements. The asphalt and asphalt composite pavements make up approximately 95% and 5% of Grandview's 285 lane-mile network, respectively. Currently, Grandview does not have a formal TAM system that monitors, evaluates, and maintains its existing pavement infrastructure. The goal of this project was to help Grandview implement a TAM system that can be sustained for the long term. The research team from the University of Missouri worked with the city's public works director, Dennis Randolph, to implement a TAM system for Grandview. The focus of the project was on pavement assets, although the framework developed could also be applied to other assets such as signs, bridges, and pavement markings.

## 2.2 Grandview, Missouri TAM Goals

In early 2015, the research team met with Randolph to discuss the TAM goals for Grandview. The objective of this meeting was to establish a list of goals to help the city optimize its infrastructure condition with limited resources. The goals were determined to be the following:

- For years 1-5: Maintain pavements in their current condition while experiencing a 2% annual decrease in buying power
- For years 1-5: Provide a list of treatments for individual segments that are maintained by the city
- For years 5+: Begin improving the average pavement condition by 3% to 5% annually
- Reduce pothole service requests by 10% or more

To meet these goals, the research team adhered to the TAM principles of using a "mix of fixes" approach to keep the good roads in good condition. The research team assessed the current state of the practice for TAM, reviewed TAM software systems, configured a TAM system for use by the city, conducted analyses of existing pavement and service request data, conducted an inventory of pavement condition, formulated a pavement preservation plan, and developed a framework for ensuring that the TAM is sustainable.

## 2.3 Technical Advisory Committee

A technical advisory committee (TAC) was formed to help provide guidance and direction to the project. The TAC included representatives from various agencies such as the Missouri Department of Transportation (MoDOT), the City of Belton, the City of Chesterfield, Boone County, and the City of Columbia. A project kickoff meeting was held with the research team, representatives from the city, and the TAC on March 9, 2015. Members of the TAC emphasized the importance of laying the groundwork at the beginning of the development of the TAM program; careful consideration should be given to the goals and data needs of the program in the early stages of program development. The importance of starting with a simple program that can be built upon in the future was also discussed. Members of the TAC also discussed the TAM efforts in their agencies, as described in Chapter 5 of this report.

# CHAPTER 3. OVERVIEW OF TAM

As part of the process for developing a TAM framework for local governments, a literature review was undertaken to gain an understanding of current successful TAM processes used throughout the United States. An assessment of existing practices can help a community understand how to implement successful TAM practices to meet its own goals.

## 3.1 What is TAM?

TAM has been defined in different ways. Here are some examples of definitions:

- The Federal Highway Administration (FHWA) (1999) defines it as "a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision making."
- American Association of State Highway and Transportation Officials (AASHTO) defines it as a "strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively throughout their life-cycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well defined objectives." (FHWA 2007)
- Some researchers define TAM as a calculated and methodical process of operating, maintaining, upgrading, and expanding physical assets effectively and efficiently throughout the service life of the infrastructure (Hawkins and Smadi 2013).

Each of these definitions has the following similar traits. It is systematic or methodical in its approach. It applies both business and engineering principles to allocate resources, and it takes into consideration the entire lifecycle of the infrastructure. Finally, it focuses on implementing data-driven decisions.

The objectives of TAM include the following (Hawkins and Smadi 2013):

- Policy-driven planning
- Resource allocation
- Performance-based assessment
- Performance tracking
- Decision making tools
- Data verification
- Data-driven decisions
- Analysis
- Accountability

In pursuit of these objectives, agencies may use different practices depending on their needs (OPUS International Consultants Inc. 2011). Common themes of TAM for operating and maintaining infrastructure include the development of policy-driven plans that are based on performance goals and measured results. TAM is performance-based and strives to implement policy in a way that facilitates data-driven decisions. Data-driven decisions require quality information from the analysis of asset conditions and historical cost data. The data are applied to select cost-effective maintenance alternatives for the entire system using a "mix of fixes" and to continuously analyze and monitor a pavement throughout its life. TAM is a living system for local communities, in that the system builds on existing processes and tools to form a dynamic improvement guide to better the communities' overall network of assets.

## 3.2 History of TAM

TAM is not a completely new practice in transportation. TAM began in New Zealand, Europe, and Australia during the early 1990s. During that time, agencies in the United States were still focusing their TAM efforts on pavements and bridges at the individual asset level instead of using a comprehensive, integrated, and long-term TAM approach (Hawkins and Smadi 2013). In 1998, AASHTO developed a taskforce to encourage state departments of transportation (DOTs) to implement TAM. In 1999, the FHWA developed a program that supported TAM efforts by the American Association of State Highway and Transportation Officials (AASHTO) and state DOTs. The program emphasized that TAM needs to be flexible in addressing each transportation agency's needs and that TAM needs to involve communication and education. In 2002, the National Cooperative Highway Research Program (NCHRP) developed the first guide for TAM (Cambridge Systematics et al. 2002). This guide provided state DOTs with a self-assessment tool to help them assess their progress towards TAM implementation and explore their weaknesses and strengths. The 6th National Conference on Transportation Asset Management included an introduction to tradeoff analysis between capital investment and asset preservation as a TAM role (Hawkins and Smadi 2013). The 7th National Conference on Transportation Asset Management in 2007 brought the idea of incorporating analysis for economics, risks, and performance into TAM decision making procedures and included a track on transit TAM (Hawkins and Smadi 2013). Since 2003, the FHWA has produced case studies of effective TAM practices that are being implemented by state DOTs. These case studies focus on economic analysis, implementation practices, and the life-cycle costs of assets.

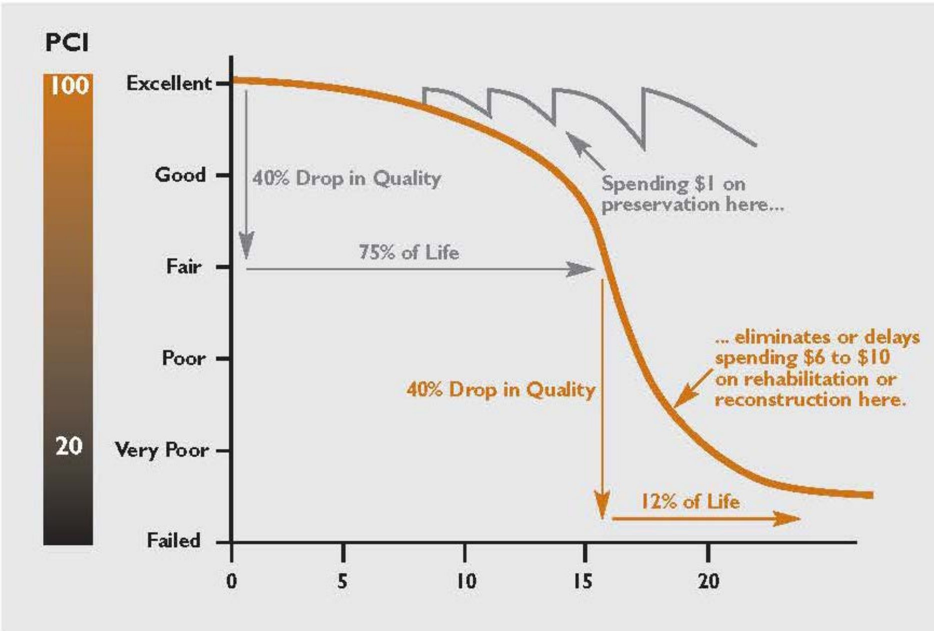
## 3.3 Benefits of TAM

The continuing decline in transportation financing has led transportation agencies to search for alternative and innovative ways to maintain and improve their current infrastructure. The use of TAM is an innovative solution to help agencies maximize the condition of their infrastructure with limited resources. TAM principles can be applied to many different types of infrastructure, such as pavements, signs, pavement markings, bridges, guardrails, and culverts. The use of TAM for pavements can help transportation agencies prioritize projects and develop budgets for pavement maintenance, rehabilitation, and replacement (MR&R). Pavement TAM uses a systematic approach based on data-driven decision making. It helps agencies save money in the long run by keeping good roads in good condition. There are several major short- and long-term benefits of implementing TAM for different state DOT's and other agencies. These benefits have been outlined in literature such as Haas and Hensing (2005), Kraus (2004), and Mizusawa and McNeil (2009).

One of the major benefits of TAM programs is that they help in the decision making process for allocating and planning for short- and long-term activities (Haas and Hensing 2005). In today's environment, providing justification for any kind of decision relating to public infrastructure has become very important to ensure that agencies are committed to showing their accountability and responsibility. In Missouri, according to Governmental Accounting Standards Board (GASB) Statement 34, the provision of an asset and financial report is mandated. MoDOT's functional managers realize the possible positive effects of investments on their roadways and bridges (Kraus 2004). Another related benefit of TAM in decision making is that it helps agencies understand the relationships among multiple investment options (Mizusawa and McNeil 2009). TAM systems enable the effects or impacts of diverse funding levels on infrastructure conditions to be specified over the long term (Kraus 2004).

As a long-term objective, TAM is intended to eventually improve the MR&R of infrastructure (Mizusawa and McNeil 2009). In other words, "more timely decisions and other efficiency improvements [are] combined to reduce the costs of acquisition, maintenance, upgrade, and replacement of assets" (Haas and Hensing 2005). These enhancements in infrastructure condition will also provide a better driving environment for different transportation system users through reducing user and vehicle operating costs (Mizusawa and McNeil 2009).

One way to visualize the benefits of a TAM system is through a pavement deterioration curve, such as the one shown in Figure 3.1.




Galehouse et al. 2003, *TR News*

**Figure 3.1. Pavement preservation concept**

In Figure 3.1, pavement condition, as represented by the pavement condition index (PCI), is plotted against time. As can be seen in the graph, pavement condition rapidly deteriorates after the pavement has reached 75% of its life. Once the pavement reaches this condition, the costs for rehabilitation or reconstruction are significantly higher than the costs that would be incurred through the application of preventive maintenance earlier in the pavement life-cycle.

Galehouse et al. (2003) presented a numerical cost comparison between a traditional project life-cycle and a preservation-oriented life-cycle. The results are shown in Tables 3.1 and 3.2.

**Table 3.1. User and reconstruction costs for traditional alternative**

| Activity | DI (Before) | DI (After) | Age | Life Extended | RSL (years) | Cost (per lane-mile) | Type of Cost |
|---|---|---|---|---|---|---|---|
| New Construction | | 0 | 0 | | 25 | $508,000 | Construction |
| | | | | | | $21,000 | User |
| Major Construction | 51 | 0 | 25 | | 25 | $490,000 | Construction |
| | | | | | | $19,000 | User |
| Totals | | | | | | $998,000 | Construction |
| | | | | | | $40,000 | User |

DI = distress index, a measure of pavement condition
Scale values: 0 = no distress, 50 = reconstruction required
RSL = remaining service life, the remaining time over which a pavement can be preserved

Source: Galehouse et al. 2003

**Table 3.2. User and reconstruction costs for preservation**

| Activity | DI (Before) | DI (After) | Age | Life Extended | RSL (years) | Cost (per lane-mile) | Type of Cost |
|---|---|---|---|---|---|---|---|
| New Construction | | 0 | 0 | | 25 | $508,000 | Construction |
| | | | | | | $21,000 | User |
| First Preservation | 11 | 6 | 5 | 2 | 22 | $15,000 | Construction |
| | | | | | | $350 | User |
| Second Preservation | 21 | 0 | 10 | 8 | 25 | $39,000 | Construction |
| | | | | | | $350 | User |
| Third Preservation | 16 | 8 | 14 | 1 | 22 | $15,000 | Construction |
| | | | | | | $350 | User |
| Fourth Preservation | 33 | 0 | 20 | 5 | 21 | $55,000 | Construction |
| | | | | | | $700 | User |
| Fifth Preservation | 14 | 7 | 25 | 2 | 18 | $15,000 | Construction |
| | | | | | | $350 | User |
| Totals | | | | | | $648,000 | Construction |
| | | | | | | $23,000 | User |

DI = distress index, a measure of pavement condition
Scale values: 0 = no distress, 50 = reconstruction required
RSL = remaining service life, the remaining time over which a pavement can be preserved

Source: Galehouse et al. 2003

In these tables, pavement condition is represented by a distress index (DI) that ranges from 0 (new pavement) to 50 (reconstruction required). For the traditional alternative, the pavement is allowed to deteriorate until it requires reconstruction. This option incurs $998,000 in construction costs and $40,000 in user costs. Under the preservation alternative, preservation treatments are periodically applied to the pavement to extend its service life. This option incurs $648,000 of construction costs and $23,100 in user costs. Thus, the application of preventive maintenance treatments to the pavement results in a construction cost savings of $350,000 per lane-mile and a user cost savings of $16,900 per lane-mile during the 25-year lifecycle of the pavement. The California Department of Transportation (Caltrans) (2013) estimates that preventive maintenance costs approximately $106,000 per lane-mile and major reconstruction work costs eight times that amount.

Planning for new transportation infrastructure includes both maintenance and operation costs. Maintaining existing infrastructure, especially pavements in poor condition, has become very challenging with limited funding allocated for pavement infrastructure. Particularly in the United States, there has been an increase in the demand for transportation accompanied by public expectations of higher quality of service regarding safety, economics, environmental considerations, convenience, and security. These challenges are enormous because transportation agencies are trying to preserve and maintain the existing infrastructure while spending more money and energy on building new roads, transit systems, airports, and pedestrian facilities (Ferragut and McNeil 2008). The major benefit of TAM is not only to maintain the existing infrastructure in good condition, but also to extend the service life of existing assets through the use of a "mix of fixes" approach that emphasizes preventive maintenance over rehabilitation. TAM principles can be implemented through a well-designed plan that takes into consideration the normal deterioration of transportation assets and applies preventive maintenance programs at optimum times throughout the service life of the assets.

### 3.4 The TAM Approach

Currently, many state and local transportation agencies are managing their assets individually instead of using a comprehensive approach. In other words, agencies are analyzing and treating each individual segment as one tangible object that has no impact on the rest of the pavement infrastructure system. TAM takes the tangible object and integrates multiple MR&R decision analyses for pavements into one system as a whole. The TAM system incorporates a variety of attributes that allow for effectively implementing pavement management decisions. Some attributes that influence pavement deterioration include pavement type (asphalt, concrete, etc.), length, width, function class, annual average daily traffic (AADT), freight traffic, budget, climate, and soil subgrade conditions. Decision analysis using these pavement attributes allows for "what if" analyses of pavement MR&R decisions.

Some common goals for transportation agencies using TAM include keeping pavement infrastructure in the same or better condition than before, implementing a logical capital improvement plan, and efficiently using limited funds for MR&R. Although various agencies may have differing specific goals, they still follow the same general approach in developing an effective TAM program.

Figure 3.2 shows the steps of the TAM approach, including evaluating existing practices, identifying community goals, taking an inventory of assets, and making decisions.

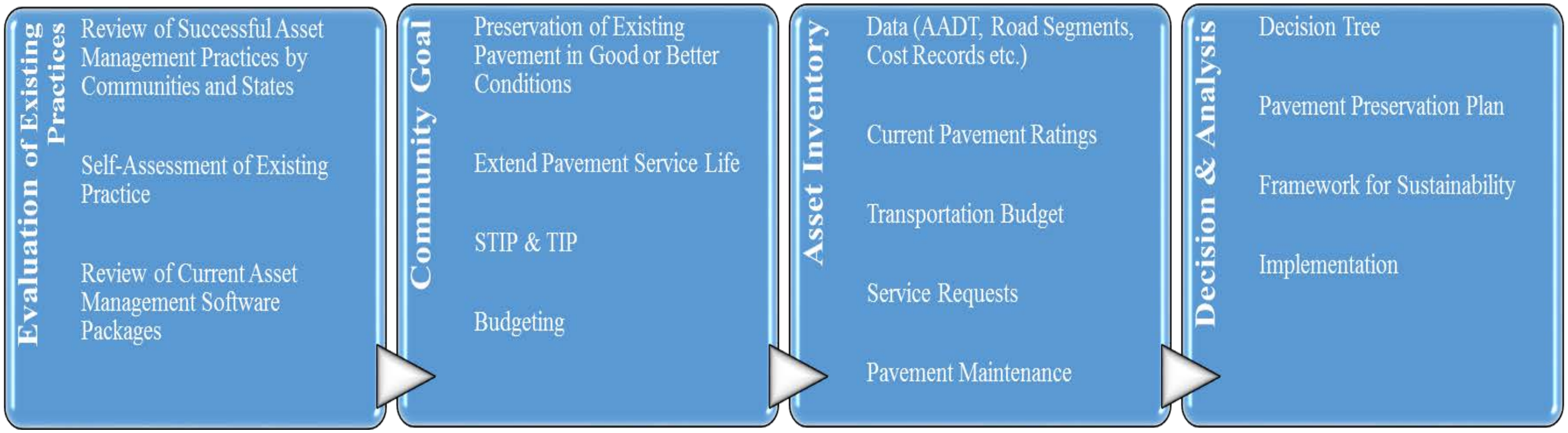



**Figure 3.2. TAM approach**

Agencies can learn a lot about TAM by reviewing the successful TAM practices of other communities with similar populations, budgets, and infrastructure types. A self-assessment can help an agency evaluate its own practices. Agencies can then develop their goals for preserving existing pavements, extending the remaining service life of pavements, and meeting budget targets. Once the goals are developed, an asset inventory should be conducted to assess the current state of the agency's infrastructure. For pavements, the types of data that should be collected during the inventory stage include AADT, geometric data such as lane width, pavement ratings of the road segment, and pavement type. The inventory data need to be integrated with other data such as transportation budget, historical data for pavement service requests (potholes, pavement raveling, standing water, etc.), and historical cost data for pavement MR&R. These data are analyzed to develop a pavement preservation plan that emphasizes a "mix of fixes" approach that uses a variety of pavement MR&R strategies. Finally, a framework for the sustainability of the TAM program should be developed to ensure that the benefits of the program are realized in the long term.

# CHAPTER 4. PAVEMENT ATTRIBUTES FOR TAM

This chapter discusses some of the important pavement attributes that should be considered in a TAM program, including pavement rating systems and treatment types.

## 4.1 Pavement Rating Systems

There are multiple pavement rating systems available for transportation agencies to use. The goal in this project was to select a pavement rating system that best fit the needs of the city. Grandview indicated a preference for a low-cost and efficient pavement rating system that captures sufficient information to track pavement performance and develop and update a pavement preservation plan. The pavement rating systems are selected based on cost-effectiveness, equipment and personnel needs, and interoperability (ability to incorporate data into TAM software or a geographical information system [GIS]). Some appropriate pavement rating systems include PCI (ASTM 2009), present serviceability index (PSI) (Alkire 2016), remaining service life (RSL) (Elkins et al. 2013), and Pavement Surface Evaluation and Rating (PASER) (Walker 2002). While state DOTs may have the budget and workforce to undertake extensive roadway data collection and analysis, local communities need to find a rating system that meets their needs and is accurate and cost-effective.

### *4.1.1 Pavement Condition Index (PCI)*

PCI was initially developed by the U.S. Army Corps of Engineers and then standardized in ASTM D5340, *Standard Test Method for Airport Pavement Condition Index Surveys* (ASTM 2009). This index categorizes pavement condition based on observations of the severity and extent of various pavement distresses. The PCI values range from 0 to 100, which represent failed and excellent pavement conditions, respectively. One major benefit of PCI is that it helps determine required maintenance activities. However, this index is more complex than other simplified indices such as PASER and present serviceability rating (PSR) and requires extensive data collection.

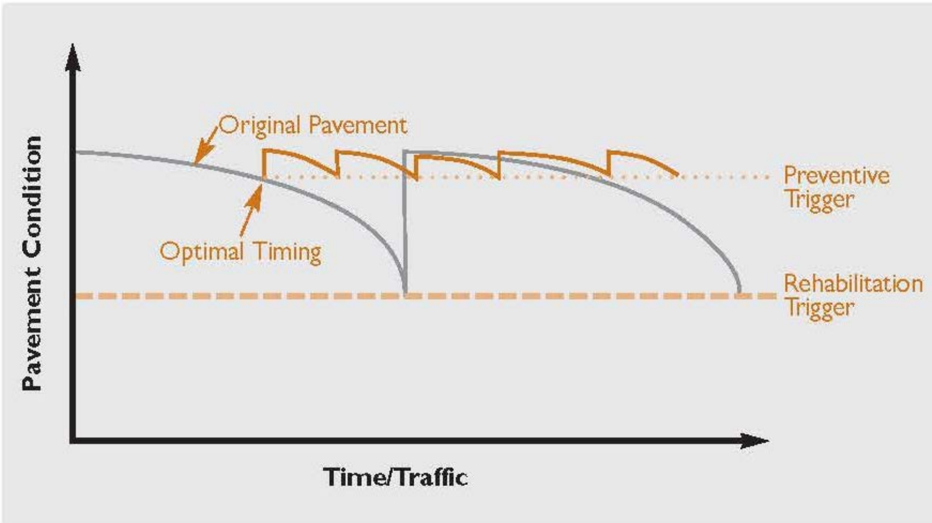
### *4.1.2 Present Serviceability Index (PSI)*

PSI originated in the AASHO Road Test during the 1950s, in which raters in a moving vehicle determined pavement condition values based on the quality of the ride (Alkire 2016). The resulting rating is known as PSR. Statistical relationships were then developed between the panel ratings and pavement distresses, such as cracking, rutting, and roughness, to determine PSI. The PSI value ranges from 0 (very poor condition) to 5 (excellent condition) and is calculated from the slope variance and the mean rut depth and amount of cracking and patching of the pavement. States are still required to submit PSR data to the FHWA.

*4.1.3 Remaining Service Life (RSL)*

RSL represents the number of years that a pavement is expected to last until rehabilitation is required (Elkins et al. 2013). It is a very important parameter to consider, especially for prioritizing maintenance operations with limited available funds in pavement management systems. RSL has two conditions: pavement life and pavement service life. Pavement life is the number of years between new pavement construction and the first rehabilitation activity. The service life of a pavement is the period between two successive construction activities. Predicting the remaining service life is vital because it describes when the pavement will reach its terminal condition and require rehabilitation.

Many transportation agencies have set their pavement TAM goals for MR&R trigger points using RSL (Galehouse et al. 2003). The pavement deterioration curve shown in Figure 4.1 describes changes in pavement condition over time and traffic.




Galehouse et al. 2003, *TR News*

**Figure 4.1. Pavement deterioration curve**

The deterioration curve determines the MR&R trigger points. Based on the goals of a transportation agency, MR&R strategies are applied once a pavement hits a trigger point.

*4.1.4 Pavement Surface Evaluation and Rating (PASER)*

PASER allows transportation agencies to understand and rate the surface conditions of pavements in their jurisdiction through a visual inspection (Walker 2002). PASER ratings vary from 1 to 10, with 1 being the worst and 10 being the best. The PASER manual (Walker et al. 2002) highlights key distresses in pavements that should be noted when visual inspections are conducted. These distresses include block cracking, drainage issues, edge cracking, fatigue cracking, longitudinal cracking, roughness, rutting, transverse cracking, and utility cuts/potholes. After the visual inspections are completed, ratings are applied to the roads. These ratings are then compared to a score computation sheet that lists recommended maintenance strategies, as shown in Table 4.1.

**Table 4.1. PASER ratings with recommended MR&R strategies**

| PASER Rating | Distress Type | MR&R Strategy |
|---|---|---|
| Rating 9 & 10 | None | No maintenance required |
| Rating 8 | Transverse cracking, reflection of pavement joints, and all cracks sealed | Little or no maintenance |
| Rating 7 | Slight raveling and traffic wear | Routine maintenance, crack sealing and minor patching |
| Rating 5 & 6 | Moderate raveling, longitudinal cracks on pavement edges, and rutting distortions | Preservative treatments (seal coating) |
| Rating 3 & 4 | Severe raveling, longitudinal/transverse cracking, patches are in fair to poor condition | Structural improvement and leveling (overlay or recycling) |
| Rating 1 & 2 | Alligator cracking, rutting 2 in. deep, potholes, and patches in poor condition | Reconstruction |

Source: Walker et al. 2002

PASER ratings prove to be beneficial for local communities due to their cost-effectiveness, ease of use, and minimal workforce requirements for data collection. The city chose to use the PASER system due to its ease of use.

## 4.2 Treatment Types

Treatments types can vary from minor operations, including overlays, to major new construction operations. Each pavement has its own characteristics (flexible, rigid, or composite), and the maintenance treatments have different effects on each type. These effects need to be considered when predicting the service life of a pavement. For example, a chip seal is estimated to extend the service life of a pavement by three to six years (Galehouse 2002). Understanding the key characteristics of the pavements in a jurisdiction plays a pivotal role in effectively monitoring the conditions of an agency’s pavements. The materials and construction quality have a direct impact on pavement structure and service life.

## 4.3 Traffic Loading

The standard unit used to transform different traffic loads into a single 18,000 pound axle is the equivalent single axle load (ESAL) (Urling 2016). High traffic loads can result in harmful pavement conditions such as rutting, transverse cracking, and alligator cracking. The use of ESALs facilitates the quantification of traffic loads from a diverse traffic composition, including heavy vehicles.

# CHAPTER 5. BEST PRACTICES FOR TAM

An overview of the existing best practices, at both the state and local level, was undertaken through a review of existing literature and interviews with local communities.

## 5.1 MAP-21 Implementation

The Moving Ahead for Progress in the 21st Century Act (MAP-21) transportation legislation supports TAM (MAP-21 2012). MAP-21 establishes a base for infrastructure performance tracking and holds all states and communities accountable for improving the condition and performance of transportation infrastructure (Hawkins and Smadi 2013). MAP-21 requires state DOTs to supply risk-based TAM plans (TAMPs) by reporting the conditions of bridges and pavements according to guidelines defined by the U.S. DOT (Park et al. 2014). MAP-21 specifies that there is no “one size fits all” solution for developing a TAMP. This legislation helps agencies work towards maintaining assets in a state of good repair.

The FHWA has adopted a flexible strategy that will make individual state TAMPs interoperable with the national requirements. MAP-21 does not require a list of projects in each state’s TAMP. Instead, it requires investment strategies for a list of projects applicable to the statewide transportation improvement plan (STIP). These TAMPs thus focus on the investment strategies in the state and not on work that is already in the STIP. In order to develop these investment plans, data-driven decisions must be made focusing on the overall life of the infrastructure. The projects developed from these data-driven decisions are applied to the STIP.

At a MAP-21 peer exchange, several states presented TAMP best practices, including topics such as performance measures, development and risk, and compliance (Park et al. 2014). The Louisiana Department of Transportation and Development (LaDOTD) focused its TAMP on data, funding, and assessing the condition of current infrastructure. LaDOTD expressed the importance of early buy-in from executives to facilitate coordination and implementation. The Georgia Department of Transportation (GDOT) highlighted the key elements that go into a TAMP: start with familiar data (pavement and bridges) and have a plan (target goals). The resulting TAMP is a living document and changes over time, and constant data collection and analysis are needed to maintain an effective TAM practice. The Pennsylvania Department of Transportation (PennDOT) indicated that measuring pavement failure using the International Roughness Index (IRI) and average daily traffic (ADT) is a beneficial way of tracking pavement deterioration. PennDOT also stressed the importance of having one person managing the day-to-day process of TAMP development. TAMP is a beneficial communication tool, and the audience should be considered when finalizing the TAMP.

## 5.2 State TAM Practices

The implementation of effective TAM practices involves the self-assessment of an agency’s jurisdiction, goal setting, analysis, and support (Hawkins and Smadi 2013). Agencies at the state level can help local agencies understand their current infrastructure condition and implement effective practices such as pavement management, bridge management, culvert management, life-cycle cost analysis, economic analysis, data integration, and safety management. Table 5.1 shows a sample of various TAM practices implemented throughout the United States (Kuhn et al. 2011). The table shows that four states have a comprehensive TAM system, five states have a pavement management–focused TAM system, and three states have a bridge TAM system.

**Table 5.1. State practices of TAM**

| | | Focused TAM Systems | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **States** | **Comprehensive TAM** | **Pavement Management** | **Bridge Management** | **Culvert Management** | **Life-cycle Cost Analysis** | **HERS-ST** | **Economics** | **Data Integration** | **Safety Management** |
| **Alabama** | | | | X | | | | | |
| **Arizona** | | | | | | | | X | |
| **California** | X | | X | | | | | | |
| **Colorado** | | | | | X | | | X | |
| **Florida** | | | X | | | | X | | |
| **Georgia** | | X | | | X | | | | |
| **Indiana** | | | | | | X | | | |
| **Iowa** | | | | | | | | | X |
| **Maryland** | | | | X | | | | | |
| **Michigan** | | X | | | | | | X | |
| **Minnesota** | | | | X | | | | | |
| **New Mexico** | | | | | | X | | | |
| **New York** | | X | | | | | X | | |
| **North Carolina** | X | | | | | | | | |
| **Ohio** | X | | | | | | X | | |
| **Oregon** | | | | | | X | | | |
| **Pennsylvania** | | | | X | | | | X | |
| **South Dakota** | | | X | | | | | | |
| **Texas** | | X | | | | | | | |
| **Virginia** | | | | | | | | X | |
| **Washington** | X | X | | | | | | | X |

Source: Kuhn et al. 2011

The overall goal of many communities is to minimize the life-cycle costs of managing and maintaining their assets. Other common goals include reducing traffic fatalities and serious injuries on the road network, preserving transportation infrastructure condition to ensure mobility and safety, reducing congestion on the roadway, and developing maintenance programs that reduce the amount of replacement and rehabilitation activities. These performance measures are usually implemented by applying percentages to the roadway network (e.g., maintain 80% of Interstates in good or better condition). Select state TAM practices are described in more detail in the following sections.

### *5.2.1 California*

Caltrans developed a comprehensive TAM using an integrated maintenance management system (IMMS) (Takigawa 2001). The IMMS has the following features: forecasting for work to be performed on assets, activity-based costing for all assets, decision making tools, inventory of assets, tracking of service calls, inventory analysis of asset conditions, asset deterioration analysis, and historical analysis of asset costs and the activities performed on the assets. These features were chosen based using pavement management systems, level of service, and bridge management systems. This IMMS contributes to buy-in from key decision makers and provides marketing benefits, a proof-of-concept pilot, team integration (technical, functional, testing, and training), and quality assurance for all aspects of the TAM.

### *5.2.2 Colorado*

The Colorado Department of Transportation (CDOT) utilizes a life-cycle cost analysis (LCCA) approach to TAM (FHWA 2010). The LCCA process incorporates both statistical research and project data. CDOT identifies tasks as “near term” when identifying goals for immediate accomplishment (FHWA 2010). The organization of Colorado’s TAM allows all departments and management levels to be a part of the implementation process and contribute to the viewpoints, processes, tools, and perspectives applied to the TAMP. Colorado uses a four-step implementation plan that includes providing leadership and executive buy-in; developing goals, targets, performance measures, and analytic tools; communicating “what is TAM;” and making better use of intelligent transportation systems (ITS) and information technology (IT). Colorado’s TAM system breaks the network into categories of Interstate and non-Interstate systems.

### *5.2.3 Georgia*

GDOT began to develop a TAM approach in late 2009 (GDOT 2014). GDOT plans to preserve and maintain its assets and develop concrete and well-vetted policies for implementing the TAM. GDOT has developed goals, for example, that at least 90% of its Interstates should be in fair or better condition. One of the main approaches that Georgia is taking to the TAM process is LCCA. In order to provide better coordination of LCCA, Georgia developed a taskforce made up of experts from various offices. Incorporation of LCCA into the early stages of project development benefits GDOT by allowing it to take necessary actions early.

### *5.2.4 New York*

New York State Department of Transportation (NYSDOT) was one of the first states to automate its highway systems in terms of data collection and processing for pavements, bridges, and safety (FHWA 2003). The Intermodal Surface Transportation Efficiency Act of 1991 made NYSDOT redefine its TAM to focus in more detail on individual assets such as pavements and bridges. In 1997, NYSDOT decided to create a taskforce for preparing a blueprint to accelerate development of its TAM system. Economic evaluation uses project scoping and the evaluation of alternative solutions to identified problems.

There are four main objectives of the current NYSDOT transportation management system. For pavement management, NYSDOT uses automation for data collection, inventory, inspection, and forecasting. This system was improved significantly in the years 1981, 1991, and 2001. LCCA is used to investigate alternative pavement treatments and evaluate projects in deeper detail than network-level analysis. LCCA bridge management uses a special type of LCCA, called formal least-cost analysis, to assess and compare different suggested alternatives (e.g., rehabilitation versus replacement). LCCA safety management uses crash data to evaluate and determine potentially high-accident locations. Finally, LCCA mobility uses a congestion needs assessment model (CNAM) to estimate and forecast the locations and magnitudes of traffic congestion incidents mainly on the state highway system.

NYSDOT created a TAM Tradeoff Model as a prototype. The prototype TAM Tradeoff Model allows for comparisons of benefits and costs among candidate projects and calculates the rate of return for each candidate project.

### *5.2.5 Utah*

The Utah Department of Transportation (UDOT) created a TAM program that sets performance goals and monitors its roadway assets for conformance with these goals (FHWA 2012). UDOT encourages the exchange of information regarding TAM experiences between regions through forums. Guidelines created by UDOT encourage consistency in data collection. UDOT gives special focus to assets related to roadway safety such as pavement markings, guardrail, traffic signals, and signs.

Utah began its TAM program in 1997 using Maintenance Management Quality Assurance (MMQA) to conserve infrastructure assets, analyze the efficiency of maintenance strategies, and make improvements to the maintenance strategies (FHWA 2012). MMQA provides guidance for condition thresholds that trigger maintenance actions, information on the allocation of transportation maintenance funds, tools to communicate needs and decisions to key stakeholders, and tools to help measure the level of service on the highway system.

UDOT leverages innovative technologies to help inventory and manage its assets. In 2010, UDOT began a MAP-21 initiative to integrate various pavement, bridge, and traffic datasets into a web-based GIS platform (Dingess 2014). This initiative encouraged transparency and cooperation between departments. In 2011, UDOT implemented an asset inventory initiative using a mobile platform with Light detection and ranging (LIDAR) sensors, global positioning system (GPS), cameras, a surface profiler, a laser crack measurement instrument, and an instrument to measure sign retroreflectivity (Dingess 2014). This system was used to collect TAM data such as geometry, pavement distresses, bridge clearances, and sign information. UDOT has a comprehensive asset inventory and a process for extracting TAM data.

## 5.3 TAM Practices for Local Communities

A review of existing TAM practices by local communities was undertaken. This review included teleconferences or meetings with representatives from local agencies and a literature search. This review provided valuable "dos and don'ts" for TAM practices and a better understanding of the different ways to approach TAM. TAM software systems used by these communities are described in Chapter 6.

### *5.3.1 Belton, Missouri*

Belton, Missouri is located near Kansas City, Missouri. Belton has a comprehensive TAM system that includes pavements, sidewalks, pavement markings, signs, storm water facilities, and sanitary sewers. Belton uses Cartegraph Operations Management System (OMS) for its TAM software. Belton has 115 miles of roads and rates one-fourth of the city pavements each year. Belton employees perform inspections using tablets, which helps reduce the amount of paperwork. Belton performs maintenance on its best roads first to help keep them in good condition. The Belton budget uses a two-year cycle to maximize the dollars spent. Equipment purchases provide Belton with efficient and cost-effective solutions for maintenance. The total reconstruction budget for Belton is approximately $20 million, with a 10-year plan of approximately $2 million/year. The use of TAM helps in presenting information to the City Council.

### *5.3.2 Boone County, Missouri*

Boone County, Missouri has approximately 230 miles of roads and uses Cartegraph OMS and GIS for its TAM program. Boone County is very involved with implementing TAM practices for a variety of assets, including asphalt pavement, concrete pavement, culverts, striping, storm inlets, and signs.

For asphalt pavements, Boone County uses road segments between intersections but also evaluates project groups in which segments are grouped into polygons. Each segment is rated by construction inspectors every three years based on different distresses. The county uses a customized rating system based on PASER for asphalt pavements. Boone County has done full-depth reclamation but not recycling.

For concrete pavements, Boone County models and rates each concrete panel because concrete distresses are localized. The ratings for the concrete panels include three categories: good, damaged, or needs replacement. Concrete pavement repairs can include replacement of individual panels or replacement of sections. Boone County utilizes its own treatment system for pavement maintenance. The county has developed a five-year plan for pavements and has the next set of future maintenance projects scheduled.

Boone County takes inventory of all striping and has striping projects programmed on a cyclical basis. The county has unit cost data so it can easily estimate the costs of striping. The county estimates that using TAM for striping has reduced annual striping costs from $110 thousand to $80 thousand.

The use of TAM has provided many benefits for Boone County. The budget has remained the same or has decreased in past several years, but road conditions are improving. The use of TAM also helps justify budget decisions and provide numbers to back up decisions to stakeholders in the decision making process. TAM helps the county streamline the decision making process and thereby saves time and money. In implementing TAM, the county suggests setting goals for the use of the data before data are collected.

#### *5.3.3 Chesterfield, Missouri*

Chesterfield, Missouri is a relatively new city near St. Louis that was established in 1988. Chesterfield uses the TAM approach of keeping good roads in good condition. Chesterfield was not able to find an existing TAM system that met its needs so it developed its own application, which has evolved into a management information system. The system manages any capital item that has a life expectancy, such as park lights or pavement. GIS is used to manage the data for the 172 centerline miles of pavement and 1,000 cul-de-sacs. Pavements consist of mostly concrete. The city has been able to develop a cost-effective way of integrating pavement data so as to be interoperable with GIS. The interoperability of these pavement data allows for predictive decisions, analysis, and reporting. This predictive approach uses methods other than full replacement or rehabilitation of pavements. TAM has helped the city communicate information to the public and has helped to pass bond issues for capital improvements.

#### *5.3.4 Columbia, Missouri*

The City of Columbia, Missouri currently uses Hansen software and GIS for its TAM. The city has 18 years of pavement and other asset (e.g., signs) data in the Hansen software. Columbia uses the PASER system for evaluating pavements. Every other year, Columbia collects pavement condition data on its arterials and major collector roadways. Ratings for other roads in the city are collected once every seven years. District managers collect the PASER scores. Although the city has the data, generating output reports in a format that is suitable for decision makers and the public is difficult. The city is in ways to generate more user-friendly reports and communicate information to stakeholders more effectively.

*5.3.5 Greene County, Missouri*

Greene County in southwestern Missouri encompasses 1,250 lane-miles and uses PubWorks as its TAM program. Greene County performs overlays on 10% of its roads each year. The county uses the PASER system for its pavements. It also manages other assets such as box culverts and bridges. Greene County would like to increase the reporting functionality of its TAM system. The county uses laptops or smart devices for its field inventory.

*5.3.6 Lee's Summit, Missouri*

Lee's Summit, Missouri is located near Kansas City, Missouri. The city implements TAM using CityWorks and MicroPaver integrated into its GIS. The city manages a variety of assets, including sidewalks, pavements, signs, and manholes. The city has approximately 1,000 lane-miles of pavement, which are mostly asphalt. The city rates one-fourth of its pavement per year using PCI. The city has a one-half-cent sales tax for roads. Although the city has implemented TAM, it is concerned about the condition of its storm water facilities. The city has data regarding the sizes and locations of culverts but does not have good data on the condition of the culverts.

*5.3.7 Lenexa, Kansas*

Lenexa, Kansas, has a comprehensive TAM program that addresses a variety of assets, such as pavements, signs, and signals. The city uses Lucity for its TAM system. Each year Lenexa updates its pavement management program to record data on pavements, curbs and gutters, sidewalks, ramps mandated by the Americans with Disabilities Act, pavement markings, parking lots, and trails (Lenexa 2013). In 2013, Lenexa hired a consultant to determine the PCI for 247 lane-miles of pavement in its jurisdiction. Lenexa uses a wide variety of pavement preservation methods such as crack sealing, rejuvenator, slurry seals, mill and overlay, hot in-place recycling, and reconstruction. The use of a TAM system has helped Lenexa communicate information to the public and decision makers.

*5.3.8 Overland Park, Kansas*

The TAM program for Overland Park, Kansas, encompasses a variety of assets, such as pavements, storm water facilities, bridges, signs, and pavement markings. The city uses Lucity and MicroPAVER for its TAM system. Overland Park has been collecting TAM data since 1984 and has approximately 2,000 lane-miles of pavement. Overland Park uses PCI to rate its pavements and collects pavement inventory data using tablets. The city has a five-year capital improvement program in which it publishes upcoming maintenance projects. It has found the pavement management system to be beneficial for identifying the underlying causes of pavement problems.

*5.3.9 Kalamazoo County, Michigan*

Kalamazoo County, Michigan, uses Roadsoft for its TAM system. The county has a pavement management system and has begun to implement TAM to maintain its pavement markings and culverts. The county evaluates its pavements using the PASER system. Pavement inventory data are collected using laptops. Color-coded maps showing PASER values are available online for each of the townships within the county. The county finds its TAM system to be very beneficial in helping it make decisions. It emphasizes the importance of TAM education and recommends having a plan for the use of TAM data before the data are collected.

## 5.4 Michigan Transportation Asset Management Council

Michigan has a centralized TAM system for local governments. The Michigan Transportation Asset Management Council (TAMC) oversees the TAM efforts of local communities in Michigan (Michigan TAMC 2016a). The TAMC reports to the Michigan State Transportation Commission. Local communities in Michigan are required to file annual reports with the TAMC describing their finances and road projects. The TAMC publishes an annual report. The 2015 report provides forecasts for pavement and bridge conditions (Michigan TAMC 2016b). Pavements in Michigan are expected to decline until 2019, at which point conditions will begin to improve. The overall condition of bridges in the state of Michigan is expected to decline in the next 10 years. The TAMC has also published a guide to help local agencies implement TAM (Opus International Consultants 2011).

# CHAPTER 6. EVALUATION OF CURRENT TAM SOFTWARE PACKAGES

## 6.1 Overview of Existing TAM Software Packages

Over the past decade, companies, university researchers, and other interested transportation agencies have been developing and producing increasingly user-friendly and efficient TAM software. These programs have been used widely throughout the United States. The following sections describe some of the currently available TAM software systems.

### *6.1.1 Beehive*

Beehive is designed to service small cities with a population ranging from 5,000 to 40,000. This software is web-based and can handle a variety of assets, including streetlights, equipment fleets, signs, water facilities, storm water facilities, electric utilities, wastewater facilities, streets, and other facilities (Beehive Industries 2015). The modules are sold separately, so a client only needs to purchase the modules needed by a particular community. Beehive has mobile functionality through Android and iOS applications. A mobile application allows a user to add to or update the asset inventory in the field. An internet connection is not needed for field updates. The data update automatically as soon as the mobile device or tablet connects to the internet. Beehive does not have full pavement management functionality but integrates with other pavement management systems such as MicroPAVER.

Beehive allows the user to upload a variety of file formats, such as spreadsheets, databases, CAD files, or even GIS shapefiles. It integrates with ESRI GIS mapping software and Google maps. The user can access Google Street View for a given location. Beehive also helps manage work orders and has the capability to generate queries and filter data.

### *6.1.2 Cartegraph*

Cartegraph OMS enables users to manage assets in tandem with jobs, resources, and requests from the center of government municipal operations (Cartegraph 2016). The software is capable of handling different asset categories, including transportation, signals, water, sewers, storm water, flood defense, and parks.

Cartegraph is a web-based system and uses an iPad application to help make data collection in the field more effective and efficient. The iPad application allows the user to attach a photo to specific pavement segments from the iPad photo gallery or from the camera directly. Cartegraph currently does not have an Android application. The system is compatible with Google Maps and ESRI GIS software. The attribute data are organized into columns similar to spreadsheets, so adding or modifying data in these spreadsheets can be done easily.

The pavement module calculates PCI using U.S. Army Corps of Engineers standards. Data on pavement cracks, potholes/patches, rideability, and surface type can be collected onsite and in the office. The user in the field chooses from a list of the most frequent pavement distresses and inputs both the severity and estimated area of that distress. The PCI ranges from 0 to 100 and can be customized by the user through the assignment of weights to different pavement distresses. PASER scores can be used by customizing the PCI by dividing it by 10. Furthermore, performance curves can be used to assess the current condition of assets. In addition, the user is able to see the estimated service life for assets after inputting the planned maintenance and repair activities.

Reporting features in Cartegraph can be selected using parameters or date range. These reports can be customized by task or work order. Cartegraph can be integrated with YourGov so that citizen requests can be analyzed by date, frequency, and location.

*6.1.3 Lucity*

Lucity is a comprehensive infrastructure management program that was originally released in the 1980s (Lucity 2016). It can be run on both desktop and web platforms. It has mobile applications for both Android and iOS. It handles a variety of assets, including pavements, signs, storm water facilities, traffic signals, and street lights. Lucity provides users with integrated maintenance management, asset inventory, and inspection with GIS compatibility. It has big data capabilities and work order generation and tracking.

Lucity’s pavement module utilizes a similar rating system as that used by Cartegraph. Asset inventories can be updated using a laptop (user must be online for the web platform) or tablet (user can be online or offline). Photographs and other files can be attached to the segments.

Lucity tracks pavement performance history and performs analyses to help the user optimize limited funds. The default performance curves in Lucity can be customized by the user. In addition, the user is able to see the estimated service life for assets after potential maintenance and repairs are implemented. The analysis module of Lucity provides recommendations for specific projects based on the available budget and other parameters. Different scenarios can be run to compare the results.

Lucity integrates directly with ESRI GIS software in both the online and desktop environments. It can generate reports in a variety of formats, such as text files or spreadsheets. It also has modules to process work orders and track citizen requests.

*6.1.4 PubWorks*

PubWorks is comprehensive work order management software for public works departments (PubWorks 2016b). PubWorks helps users with work orders, service requests, fixed assets, fleet maintenance, GIS-integrated asset mapping, and job costs. There are several modules included in the software, such as road, bridge, fleet, streets, traffic, water, storm water, signs, signals, facilities, and parks. Regarding pavement management, this software has a built-in module to track and record road pavement treatment history and rating measurements. The software is compatible with both the PCI and PASER systems (PubWorks 2016a).

*6.1.5 Roadsoft*

Roadsoft is a pavement TAM system used for collecting, storing, and analyzing data associated with transportation infrastructure (CTT 2012). Roadsoft modules include bridges, traffic counts, crashes, culverts, roads, intersections, point pavement markings, signs, and traffic signals. Roadsoft includes a Laptop Data Collector (LDC) module to collect inventory data in the field using a laptop and GPS unit. Over 400 road agencies and consultants use Roadsoft to manage various assets. The software is developed and maintained by a team of software engineers and civil engineers at the Center for Technology & Training (CTT) at Michigan Technological University. The Michigan TAMC provides the software free of charge to local communities in Michigan, and it is available for purchase by agencies outside Michigan.

Roadsoft pavement management and analysis tools provide an optimal “mix of fixes” through the use of pavement deterioration curves, statistical analysis, and current pavement data. The user specifies the budget, types of pavement treatments, discount rate, and number of years. Roadsoft calculates funding levels for different maintenance categories. The user then examines the street network to develop projects and assign treatments to specific segments. For the pavement module, the PASER rating system is used to evaluate different street segments within the area under study.

Other features of Roadsoft include the use of a GIS-based map interface for a jurisdiction’s assets. Shapefiles can be exported from Roadsoft for use in other GIS programs such as ArcGIS. Mobile data collection is accomplished by using a GPS tracking device to monitor data collection points for the system through a laptop. Roadsoft includes data mining and report generation capabilities to provide summaries for key decision makers.

*6.1.6 StreetSaver*

StreetSaver is web-based software developed in 2005 for pavement management that is primarily used on the west coast (MTC 2016). The software does not have the capability to evaluate assets other than pavements, although the StreetSaver Plus version also includes sign asset management functionality. Several modules are included under the pavement section that cover functions such as the analysis of pavement sections, inspections, maintenance treatments, GIS, budgeting, and reporting. For pavement inspection, StreetSaver utilizes a composite index based on modified ASTM Standard D6433, which covers up to 95% of road distresses.

The condition assessment includes a walking survey that examines seven types of distresses. StreetSaver analyzes pavement distress by severity, area, section, and stresses. Various parameters such as date, thickness, square footage, type of slab, and rehabilitation history allow the user to easily locate and compare similar projects. The data can be updated using spreadsheets.

Once the pavement inspection results and parameters are recorded, a decision tree analysis for budgeting is performed according to the agency’s budget, specifications, and ratings. The decision tree describes local policies and goals for maintenance strategies. Developing the decision tree is considered one of the main steps in evaluation, in which the user predefines the trigger values in terms of rating values and available budgets for existing assets.

The analysis module allows for the evaluation and comparison of different scenarios. StreetSaver has a project selection tool that recommends pavement maintenance projects. The new service life of different pavement sections can be updated based on the applied treatments. There are two types of analysis: unconstrained analysis (the user needs to set the objective value, such as achieving a PCI value over 80 or 90) and constrained analysis (the user needs to include available resources and the analysis period). In addition, the user needs to input discount rate, interest rate, and starting analysis year.

StreetSaver uses its own GIS system, and the vendor will make an initial map conversion for an additional fee. Shapefiles are interoperable for use with other GIS systems. The results of the decision tree analysis can be incorporated into budget reports, GIS mapping, and TAM. Other detailed graphs are available to illustrate different scenarios for maintenance strategies.

#### *6.1.7 Utah Transportation Asset Management Software (TAMS)*

TAM software (TAMS) was developed by the Utah Local Technical Assistance Program (LTAP) for local governments in Utah. TAMS focuses primarily on pavement management, although it does have a module for sign asset management (Utah LTAP 2016). This software runs only on Windows XP, so it requires a computer with Windows XP loaded natively, Windows 7 Professional with Windows XP Mode, or a virtual machine running Windows XP. The system does not have any mobile applications. The software is free for Utah cities and counties and is available at a low one-time cost for agencies outside Utah.

The pavement management system of TAMS uses RSL to assess the condition of pavements. The RSL is determined through a visual inspection of both the severity and extent of pavement distresses. The visual inspection can be performed using a laptop. The distress ratings are based on a scale of 0 to 9. The RSL is determined from the distress ratings based on a scale of 0 to 20 years. It is critical for users to clearly understand the nature of the distresses to be able to properly identify and rate them. The user does not need to evaluate all of the distresses in order for the RSL to be calculated.

Once the survey of the existing pavement condition is completed, TAMS can be used for analysis at the network level. TAMS forecasts the expected pavement deterioration and helps generate optimal treatment strategies. TAMS can be used for optimization and provides a recommended mix of treatments for a given budget. However, TAMS does not recommend specific projects.

TAM uses its own GIS system. Shapefiles can be imported and exported to and from other GIS systems. The data files and parameters are stored in a Microsoft Access database. The user can customize the parameters. TAMS has reporting tools and can generate graphs for different scenarios. It can also generate performance charts to help the user track pavement condition.

### *6.1.8 Civic Insight*

Civic Insight was developed by the engineering firm of Bartlett and West and focuses on handling service requests and work orders. It can handle a variety of assets, such as utilities and fire hydrants. It can be configured for traffic signs and signals. Because it is primarily a work order management system, it only considers pavement management from a high-level perspective.

### *6.1.9 MicroPAVER*

MicroPAVER applies the PCI rating system and was developed by the U.S. Army Corps of Engineers (Siffert 2016). MicroPAVER facilitates the optimal allocation of funding for MR&R and can be used to evaluate different scenarios for different funding levels. The inventory process with MicroPAVER involves determining units for sampling, identifying and recording distresses, and determining the PCI. MicroPAVER can be used for analyses at both the network and project levels (Borstad 2012). The process of implementing MicroPAVER includes defining the network, determining the current pavement condition, predicting the future condition of pavement on the network, establishing a maintenance strategy and funding levels for the network, and implementing project maintenance. MicroPAVER includes 20 pavement distresses that are evaluated with respect to both severity and extent.

## 6.2 Evaluation of Software Packages for the City of Grandview

To help the City of Grandview select the TAM software that best fits its needs, online demos were tested for the following systems: Beehive, Cartegraph, Civic Insight, Lucity, Roadsoft, StreetSaver, and TAMS. A spreadsheet was developed to record the results of the demo tests. This evaluation spreadsheet takes into consideration four main categories: company services, quality and extent of TAM features, work orders, and GIS. The proposed criteria for evaluating the TAM software covered the most important features of any TAM program and software system. The initial criteria for the software evaluation were developed based on a study by the Water Finance Research Foundation (2012) and refined based on discussions with the city. Each evaluation category has several subcategories, as shown in Table 6.1.

**Table 6.1. Software evaluation criteria**

| Company Services | TAM Features | Work Orders | GIS |
|---|---|---|---|
| Services/ Implementation | Pavement Management | Work Orders & Work Flow | GIS Mapping |
| Support/Training | Ease of Rating System | Inventory | ESRI GIS Integration |
| Specialization | Incorporation of other Assets | Licensing and Permits | Mobile Capabilities |
| Ease of Platform | Condition Assessment | Citizen Request | Mobile Devices (iOS) |
| Ease of use | Risk Management | | Mobile Devices (Android) |
| Historical Data Incorporation | Asset Inventory/Hierarchy | | Photo Attachment |
| | Reporting Tools | | Offline Capabilities |
| | Analysis Tools | | |

The category for Company Services describes how well the software vendor provides services, including permits, licensing, and training. The TAM Features category takes into account the types of assets covered as well as the available historical data inventory, analysis tools, risk assessment tools, and reporting features. The Work Orders category includes work orders and system functionality regarding citizen requests. The GIS category describes how well the system interfaces with GIS maps. Offline capabilities and mobility functions are essential components in the GIS category.

The spreadsheet calculates a weighted score for each TAM software program based on rating values and weights entered by the user. The rating values range from one to five for each subcategory, and a rating value of zero means that either the given attribute is not available for that software or the transportation agency does not want to evaluate that attribute in the software package. The user can specify the weights used for each category. Based on the weights and ratings entered, a normalized score is calculated by the spreadsheet for each software package. The software with the highest normalized score is selected as the best software program for a given community.

Table 6.2 summarizes the scoring submitted by the city and indicates that the Grandview selected Roadsoft as the TAM software program that best fit its needs.

**Table 6.2. Scoring summary of TAM software from the City of Grandview**

| Software | Subtotals (Normalized Scores) | | | | Final Score |
|---|---|---|---|---|---|
| | Company Services | Asset Management | Work Orders | GIS | |
| Beehive | 16.9 | 14.2 | 0.0 | 34.7 | 65.7 |
| Cartegraph | 22.3 | 27.5 | 0.0 | 37.3 | 87.1 |
| Civic Insight (Bartlett and West) | 11.6 | 4.2 | 0.0 | 16.0 | 31.7 |
| Lucity | 23.1 | 28.3 | 0.0 | 34.7 | 86.1 |
| Roadsoft | 23.1 | 30.0 | 0.0 | 34.7 | 87.8 |
| StreetSaver | 19.6 | 27.5 | 0.0 | 24.0 | 71.1 |
| TAMS | 20.5 | 27.5 | 0.0 | 26.7 | 74.6 |

The city was not interested in using software for managing work orders, so a weight of 0% was assigned to this category. The city assigned the following weights to the other three categories: 26.7% for Company Services, 33.3% for TAM Features, and 40% for GIS. Because Grandview preferred to perform the initial analysis based on qualifications instead of cost, rating values of 0 were assigned to the cost subcategory for all categories. Other software packages that scored well were Cartegraph, Lucity, and TAMS.

## CHAPTER 7. INVENTORY AND ANALYSIS

This chapter describes the methodology and results for the implementation of pavement management in Grandview. The process included analysis of existing data, data collection, and analysis to develop a pavement preservation plan for the Grandview.

### 7.1 Software and Pavement Rating System

As described in Chapter 6, the research team assisted the city with the evaluation of several existing TAM software packages. Grandview selected Roadsoft as the system that best fit its needs. Roadsoft uses the PASER system for evaluating pavement condition. The PASER system is based on a visual inspection in which roads are evaluated on a scale from 1 to 10, as described in Chapter 4.

### 7.2 Treatment Types/Surface Definition

This section describes the types of treatments the city uses, along with these treatments' costs, maximum and minimum trigger ratings, and reset ratings. Grandview uses crack seal (CS) and seal coat (SC) for preventive maintenance (PM), mill and overlay (MO) for rehabilitation (RH), and reconstruction (RC). The treatments are shown in Table 7.1 along with their trigger bounds, reset values, and costs.

**Table 7.1. Treatments implemented in Grandview**

| | Treatment Surface Definition | | | | | | |
|---|---|---|---|---|---|---|---|
| **Treatment Type** | **Type** | **Min. Trigger** | **Max. Trigger** | **Reset Rating** | **New Surface** | **$/yd$^2$** | **$/Lane-Mile*** |
| Reconstruction | RC | 1 | 2 | 10 | Yes | $14.00 | $49,280.00 |
| Mill and Overlay | RH | 3 | 4 | 9 | No | $7.98 | $28,090.00 |
| Seal Coat | PM | 6 | 6 | 8 | No | $2.33 | $8,202.00 |
| Crack Seal | PM | 5 | 7 | 8 | No | $0.71 | $2,500.00 |

RC=reconstruction, RH=rehabilitation, PM=preventive maintenance
* Cost of each treatment from current vendor prices that the city uses when applying treatments in the jurisdiction for the year 2016

Each treatment has two trigger values, as shown in the table: minimum (Min.) and maximum (Max.). The minimum and maximum trigger ratings represent the bounds for each treatment, meaning that the treatment is not applied if the PASER value is not within these trigger bounds. The minimum trigger rating represents the upper bound of the treatment, meaning that the treatment is not applied until the PASER rating on the link or segment reaches this value. A link is defined as the portion of road between two intersections on a roadway. A segment is made up of a series of links that are on the same roadway name from point A to point B. The maximum trigger rating represents the lower bound of the treatment, meaning that the treatment is not applied to the link or segment if the PASER value goes below this rating. For example, if the minimum trigger rating equals 7, the maximum trigger rating equals 5, and the PASER for the link equals any value between 5 and 7, then the treatment may be applied. If the PASER equals 1 through 4 or 8 through 10, then the treatment is not considered and a different treatment or no treatment is selected. The reset rating represents the new PASER value on the segment after the treatment is applied and therefore reflects how much each treatment restored the pavement condition. These trigger and reset values were established by the research team based on input from the city and were presented to the city for approval and comments. The trigger values were assigned to each treatment based on the appropriateness of their use for pavement with a given PASER value and the extent to which they would sustain the pavement over time.

### 7.3 Budget Data

The Grandview Public Works Department receives funding from the Transportation Sales Tax Fund for the Annual Slurry Seal Program and Annual Overlay Program to allocate funding for MR&R. Grandview provided the research team with the yearly budget forecast for the next five years (2016 through 2020). The budget per year is $440,000, with a 2% discount rate (Table 7.2). This budget was used in all optimizations for fiscal years 2016 through 2020.

**Table 7.2. Cost of each treatment per lane-mile with 2% discount rate**

| | Yearly Cost/Lane-Mile | | | | |
|---|---|---|---|---|---|
| **Treatment Type** | **2016** | **2017** | **2018** | **2019** | **2020** |
| Crack Seal | $2,500.00 | $2,550.00 | $2,600.00 | $2,650.00 | $2,700.00 |
| Seal Coat | $8,202.00 | $8,366.04 | $8,530.08 | $8,694.12 | $8,858.16 |
| Mill and Overlay | $28,090.00 | $28,651.80 | $29,213.60 | $29,775.40 | $30,337.20 |
| Reconstruction | $49,280.00 | $50,265.60 | $51,638.11 | $52,236.80 | $53,222.40 |

The city also requested the evaluation of two alternative scenarios for the time period from 2021 through 2040 to investigate the impacts of a vote in 2021 to increase the sales tax to provide funding for transportation projects. If the vote does not pass, then the budget for MR&R will stay at $440,000. If the vote passes, the total budget for pavement MR&R will increase by 25%, giving a total annual budget of $550,000. Two optimizations were performed for these two scenarios using discount rates of 2% and 4%.

### 7.4 Historical Data

Before establishing a TAM plan, the research team needed to know the historical trends and status of the pavements currently in the City of Grandview. The status of the network was determined by reviewing historical data on pavement service requests and PASER values throughout the city and by conducting a pavement inventory. The research team conducted an analysis of service request cards from 2003 through 2015, including yearly and monthly breakdowns of request cards for new curbs, sidewalks, potholes, and removal/replacement of sidewalks and curbs. In addition, an analysis of PASER ratings and treatment data for 1935 through 2015 was conducted to investigate treatment trends on all of Grandview’s pavements.

*7.4.1 PASER Values*

Pavement rating data for the years 2010 and 2014 were provided by the city. The PASER system was used to evaluate the surface condition of different street segments. Figure 7.1 illustrates the historical PASER ratings for the city.

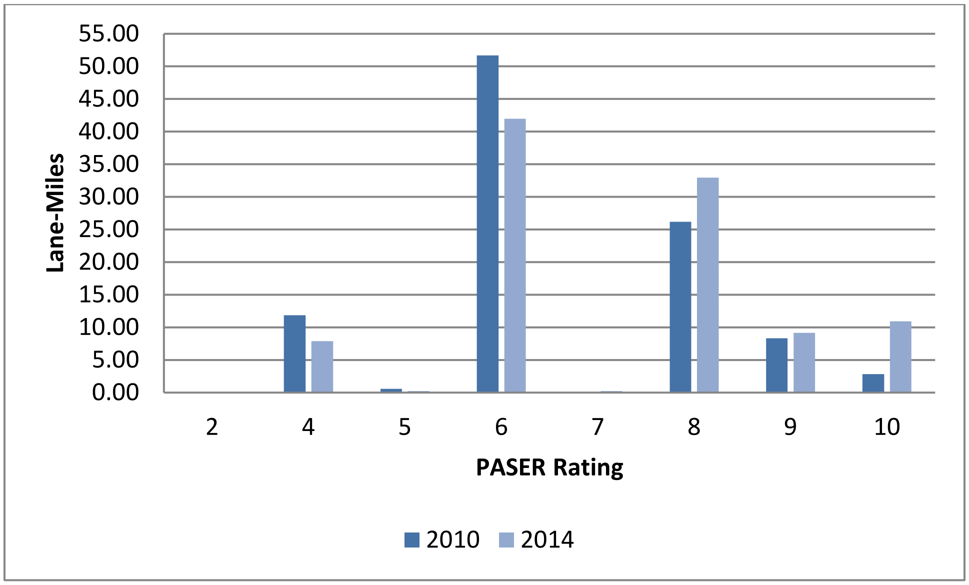



**Figure 7.1. PASER ratings for Grandview in 2010 and 2014**

The figure shows that the number of lane-miles with a PASER rating of 4 or 6 decreased while the number of lane-miles with a PASER rating of 8, 9, or 10 increased between 2010 and 2014.

*7.4.2 Treatment Types*

Grandview recorded a mix of MR&R treatments applied throughout its jurisdiction. These treatments consisted of the following:

- Seal coat
- Overlay
- Reconstruction

Figure 7.2 illustrates the among the between number of street segments receiving treatments, MR&R type, and year.

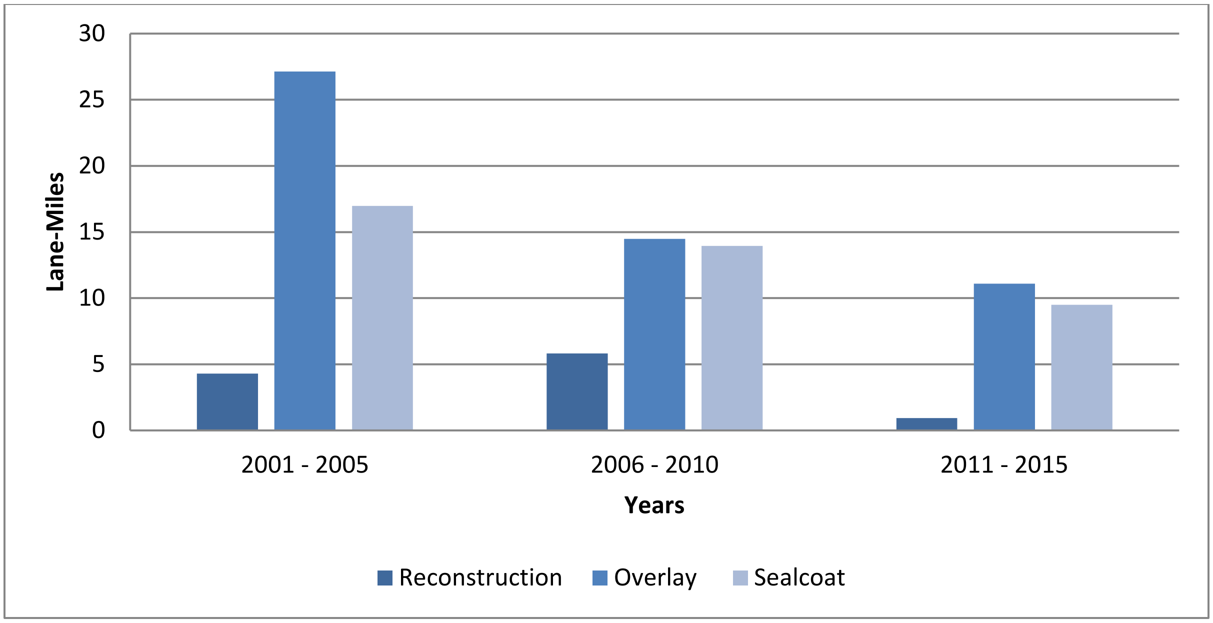



**Figure 7.2. Pavement maintenance by year and treatment type for Grandview**

There is no specific or repeated pattern among different years. The majority of Grandview's maintenance activity has been overlay.

*7.4.3 Service Requests*

The service requests received by the city between July 2003 and 2015 were reviewed to identify trends in the maintenance history. The city received 2,796 service requests during this time period, including 593 requests related to Grandview's pavement. Grandview's pavement service requests (Figure 7.3) included new curbs, new sidewalks, potholes, removal/replacement of curbs, and removal/replacement of sidewalks.

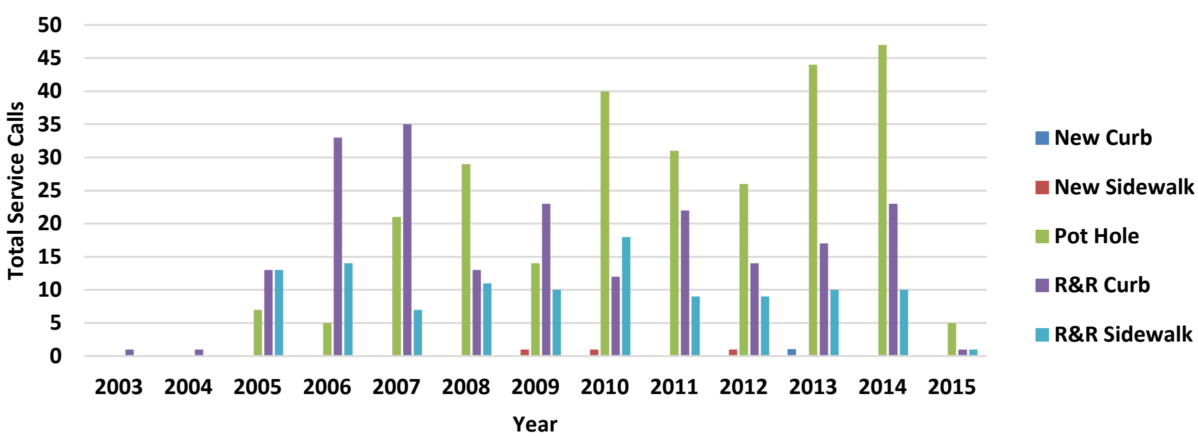



**Figure 7.3. Pavement service requests for the City of Grandview**

Potholes and removal/replacement of sidewalks were the most frequent pavement service request types, totaling approximately 80% of all pavement service requests received by Grandview. Potholes accounted for approximately 46% of the 593 service requests in the 12-year period, while removal and replacement of curbs accounted for approximately 35% of all service requests. The number of pothole requests has generally increased since 2003.

A review of the service requests by month shows that the highest number of service requests occurred during the summer months (Figure 7.4).

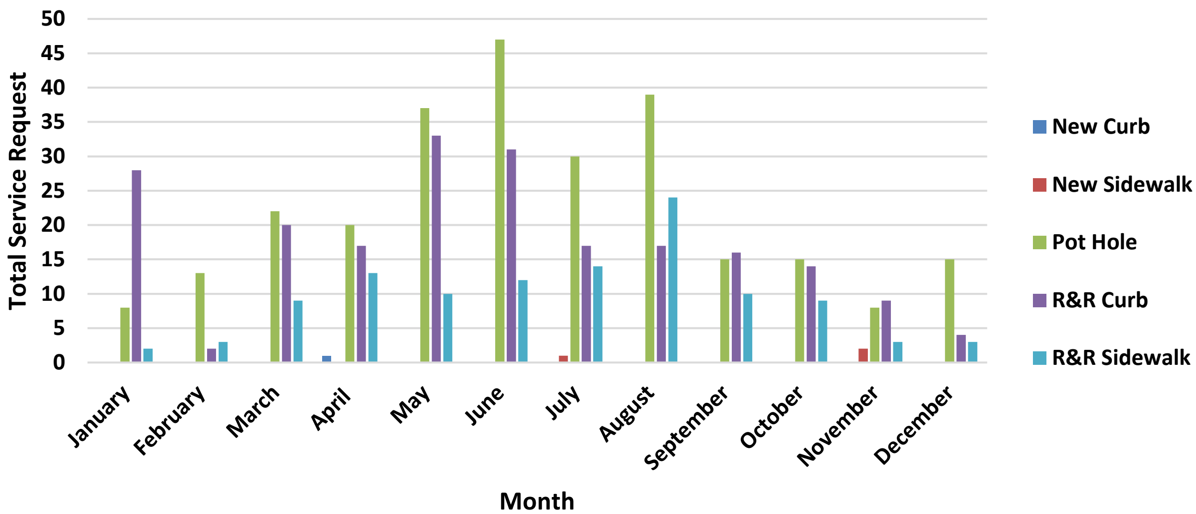



**Figure 7.4. Monthly pavement requests for Grandview**

The city should plan for the fact that the most active time span is during the construction season. Accurately tracking trends in service requests allows Grandview to budget accordingly for staffing, materials, and equipment.

Figure 7.5 shows a map of Grandview produced using GIS that identifies the locations of pothole requests recorded since 2008.

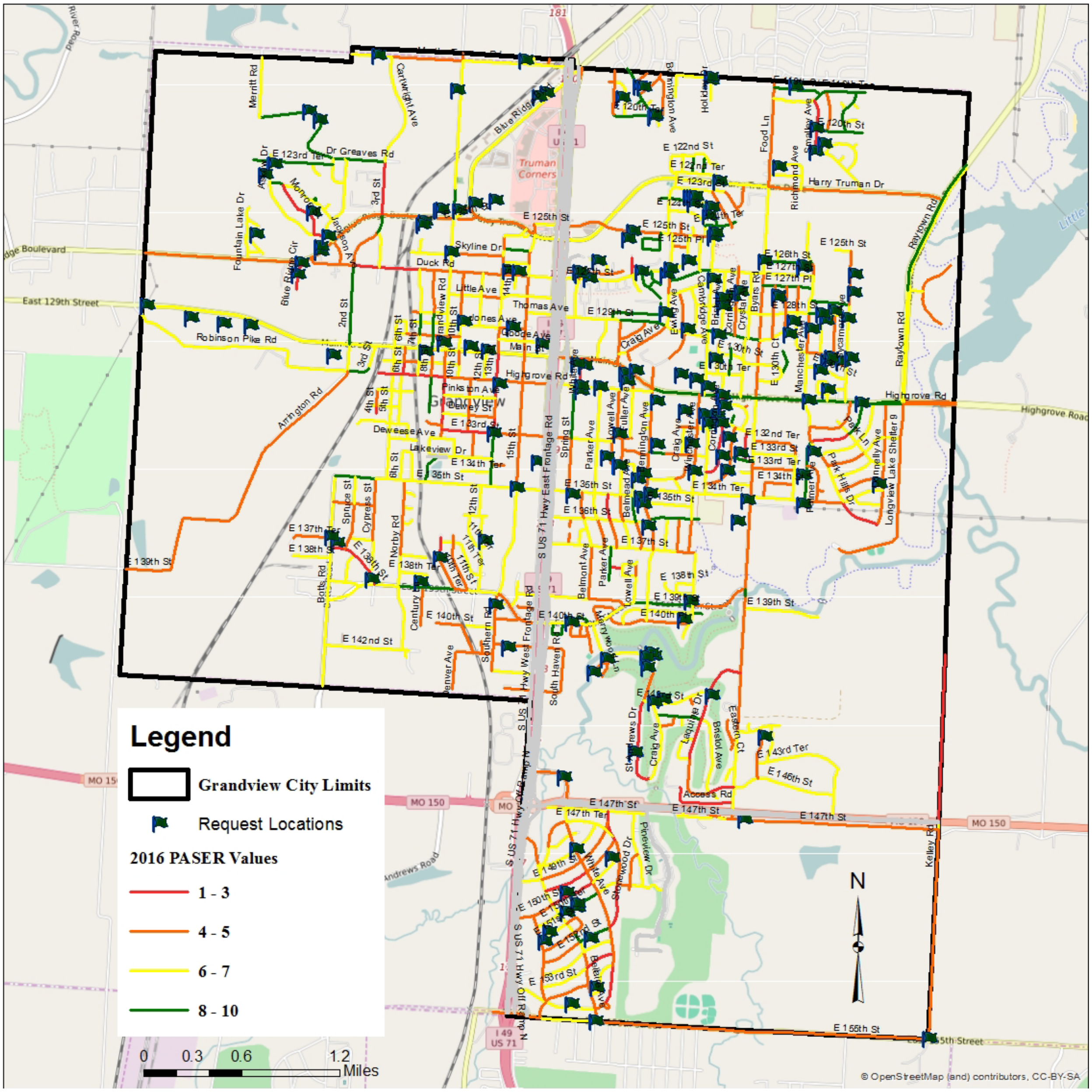





**Figure 7.5. All road segments with PASER ratings and pothole service requests for Grandview in 2016**

The colored line segments represent the 2016 PASER values that were determined for all street segments included in Grandview's pavement inventory. The figure shows that the pothole service requests (represented as diamonds) are distributed evenly throughout the city.

## 7.5 Data Collection

The Grandview data collection included evaluating roadway condition, surface geometry, shoulder characteristics, and curb and gutter details. These data were collected by driving in a motor vehicle over each link in the network. The Grandview road network consists of 1,310 links on 234 different segments. The data collection required a minimum of two people.

The research team utilized two methods to collect the pavement data during the field inventory. Because Roadsoft was in the process of being acquired and configured for use by Grandview at the time of the initial data collection, most of the initial data collected were recorded in a spreadsheet and later transferred to Roadsoft. Subsequent data collection for missing segments was conducted using the Roadsoft LDC module, which utilizes GPS to select segments graphically for data entry. The equipment used for the field data collection included the following:

- One laptop with Microsoft Office capabilities and LDC software
- One analog or digital Rolatape device
- One camera
- One GPS unit: Globalsat BU-353-S4
- Personal protective equipment: safety vest, hard hat, and safety glasses

Additionally, Google Maps (2016) was used to check surface widths in areas where such field data could not be collected. These areas were located on major roadways or areas where traffic was too congested to physically measure the roadway/shoulder widths in real-time. Before the data attributes were finalized, the research team established the data requirements for Grandview and Roadsoft.

### *7.5.1 Grandview and Roadsoft Data Requirements*

The research team consulted with the city and reviewed Roadsoft data requirements to determine which pavement attributes should be collected and recorded in the Roadsoft database. The list of attributes developed by the research team (Table 7.3) included lane width, number of lanes, pavement surface type, shoulder width, shoulder type, type of curb (straight back, rolling, or none) located on each side of the segment, starting point and ending point of each PASER value recorded, functional class, and PASER value for the segment.

**Table 7.3. Attribute descriptions for field data collection**

| Attribute | Description |
|---|---|
| **ObjectID** | Individual identification for each segment that is measured |
| **Evaluator** | Name of evaluator for the road segment |
| **Date** | Date the data entry was made |
| **Street_Name** | The road segment that is being rated |
| **Street_From** | The intersection where the pavement rating begins |
| **Street_To** | The intersection where the pavement rating ends |
| **Direction** | The direction of travel on the road segment |
| **Segment_Length** | The length between the Street From and Street To. The odometer should be used as the measurement parameter if LDC is not being used. |
| **Lane_Width** | Lane width of the entire road segment, from curb to curb or shoulder to shoulder |
| **Number_of_Lanes** | The number of lanes on the link |
| **Function_Class** | The type of service each link provides for Grandview |
| **Pavement_Type** | The type of material the pavement surface is composed of |
| **PASER_Rating** | PASER value, 1–10: 1 = worst possible condition and 10 = best. |
| **Curb_Presence** | Specifies if there is curb or no curb located on the road segment and which side the curb is located on per direction of travel |
| **Type_of_Curb** | If there is a curb on the individual road segment, specifies whether it is a straight back curb or a rolling back curb |
| **Shoulder_Width** | Width of the roadway shoulder |
| **Shoulder_Type** | The material that the shoulder surface pavement on the side of the road is composed of |
| **Comments** | Any additional information that any of the other attributes is not able to cover |

### *7.5.2 Consistency in Data Collection*

When multiple evaluators are collecting data in the field, it is important to ensure the consistency of rating results among evaluators. In order to maximize data consistency and limit data misinterpretation, the team created a spreadsheet macro for validating the attributes needed during the data collection. The value of each attribute in the spreadsheet was controlled through data validation for consistent and efficient data collection. The data validation only allowed information to be entered via dropdown list or to be typed in a certain format. If the attribute of the link was entered incorrectly, then the input was rejected with an error message and the user was required to re-enter the information. If the link had unique characteristics not provided in the dropdown lists, the evaluator could provide these roadway characteristics in the spreadsheet under the Comments attribute.

The data validation assigned to the attributes from Table 7.3 included the following:

- **Street_Name**, from and to consisted of a dropdown list or user-entered field. The parameters of the macro consisted of 234 unique segment names that comprise the Grandview network.
- **Pavement_Type** was made up of four specific categories (Concrete, Asphalt, Composite, and Gravel) and one general category (Other). If the evaluator selected Other, additional clarification was needed in the comments section.
- **Direction** of travel included four possible options: North (N), South (S), East (E), and West (W). These could be selected through dropdown list or could be typed.
- **Function_Class** consisted of three classes (minor arterial, major collector, and local roads) assigned by the Mid-America Regional Council (MARC) in the City of Grandview.
- **PASER_Rating** consisted of numerical whole numbers ranging from 1 to 10.
- **Curb_Presence** consisted of four different options that could be selected via dropdown: None, Left Side, Right Side, or Both Sides.
- **Type_of_Curb** was defined as Not Applicable (N/A), Rolling Curb, Straight Back, Left Rolling and Right Straight, or Left Straight and Right Rolling.
- **Shoulder_Type** was made up of four specific categories (Concrete, Asphalt, Composite, and Gravel) and one general category (Other). If the evaluator selected Other, the evaluator needed to provide clarification in the comments section. If there was no shoulder, the evaluator selected None.

To help further ensure consistency in the ratings, the Grandview public works director (Randolph) accompanied the research team at the beginning of the data collection to rate some of the road segments in the city. This process allowed for discussion between the city and the research team regarding the appropriate PASER values for the city's streets. This calibration process was completed when both the research team and the city were assigning the same PASER values to road segments without prior discussion. Calibration between Grandview and the research team prevented assumptions/misinterpretations of the PASER values for segments within the city's network.

#### *7.5.3 Roadsoft Data Entry*

Historical pavement treatment data and current inventory data collected in the spreadsheet were entered manually into Roadsoft. For ease of navigation through the various data points, a Microsoft Access database file consisting of three tables was created. The first two tables contained historical pavement data. The third table contained spreadsheet data from the 2016 data collection activities.

The first table contained the PASER values recorded in the years 2010 and 2014, along with the date and type of the last treatment made on that link. The PASER values for the years 2011, 2012, and 2013 are predictions or ratings not reviewed by the city, so they were excluded from the Roadsoft data entry based on a recommendation by the city.

The second table in the database file included pavement treatment history and consisted of maintenance type and year of completion for each individual link. The maintenance types included reconstruction, overlay, and seal coat. Based on discussions with the city, treatments for links with a limited treatment history (i.e., last treatment completed before the year 2000) were excluded from the Roadsoft data entry because the treatments recorded on these links do not reflect the 2016 PASER rating. For instance, if a link had a PASER value greater than five and the last treatment was made before the year 2000, then the treatments would be excluded. Including inaccurate treatment entries for a link can lead to invalid Roadsoft calculations of pavement deterioration.

To facilitate manual Roadsoft data entry, a query was developed in the database file for easy joining of data among the three tables. The query uses the segment name field to select the segments that are within Grandview's network. For a segment to be selected in the query, the user selects the segment via dropdown list or by typing the segment's name. After the segment is selected, the query filters the data into a table that shows only the data pertaining to the specific segment. This query allows the user to review a pavement's historical and current data efficiently and limit errors in data transformation.

#### *7.5.4 Laptop Data Collector*

The LDC software included with Roadsoft was the second data collection method used by the research team. The LDC works in conjunction with Roadsoft on the Microsoft Windows platform to collect field inventory data. The LDC connects to a GPS unit that tracks the vehicle's position on the roadway in correlation with the Roadsoft map (in this case, of Grandview). Before the Grandview data were exported from the main Roadsoft database to the LDC, the data attributes that Grandview requested were added in the user defined fields.

Once the Roadsoft database was exported to the LDC and the GPS unit was calibrated, the data collection began. As the vehicle changed links on the segment, the LDC automatically selected the new segment being traversed, thus facilitating data entry in the field. The data collected using the LDC was exported to Roadsoft once data collection was complete; the new data were then updated with current/historical data according to their respective links.

#### *7.5.5 RoadBump Pro*

During the inventory and analysis activities, the research team reviewed alternative methods to collect and analyze roadway conditions for Grandview. One system that was investigated was RoadBump Pro by Grimmer Software. RoadBump Pro is a professional road maintenance tool used with Android devices to measure roadway condition with respect to location and speed (Grimmer Software 2016). The GPS location is recorded once every second, and the accelerometer (roadway condition) data are recorded approximately 100 times per second. RoadBump Pro has the ability to export roadway data via Dropbox, email, Bluetooth, Google Drive, or wifi. RoadBump Pro provides two types of pavement ratings for each data collection activity, IRI and PSR.

In an independent study, data generated by RoadBump Pro were compared to Automatic Road Analyzer (ARAN) data at the National Center for Asphalt Technology (NCAT) at Auburn

University (Grimmer Software 2016). The ARAN inertial profiler uses a van for high-speed profiling and continuous rut depth measurement with full-lane scanning lasers. RoadBump Pro showed an IRI rating within 2% of the values measured with ARAN, with no section being off by more than 7.5% at a speed of 55 mph. RoadBump Pro shows great potential for accurate measurement of roadway conditions on Interstates.

For the present study, the goal of the research team was to perform tests to determine whether RoadBump Pro could accurately measure the condition of the roadway in stop-and-go conditions and at travel speeds under the recommended speed (50 to 60 mph) and be able to be calibrated with the PASER values of the evaluators.

In the three field tests conducted in Columbia, Missouri, routes were selected in order to test how well RoadBump Pro performs on roadways of different classifications and conditions. The roadway classifications included Interstates, arterial roads, and collector roads. Testing was done in order to determine how well the software performed under different conditions, including different prevailing speeds, speed variances, traffic volumes, and traffic signals. As the field test was conducted, the research team evaluated the roadways using the PASER system. When computing the PASER rating, necessary modifications were made so that the values could be compared with RoadBump Pro's PSR. The weighted average for the PASER value of each segment was calculated and then divided by two for comparison with PSR, because PSR is measured on a scale from one to five. Figure 7.6 shows the map of the data collected along with the IRI and speed measurements per recording (in./mi).

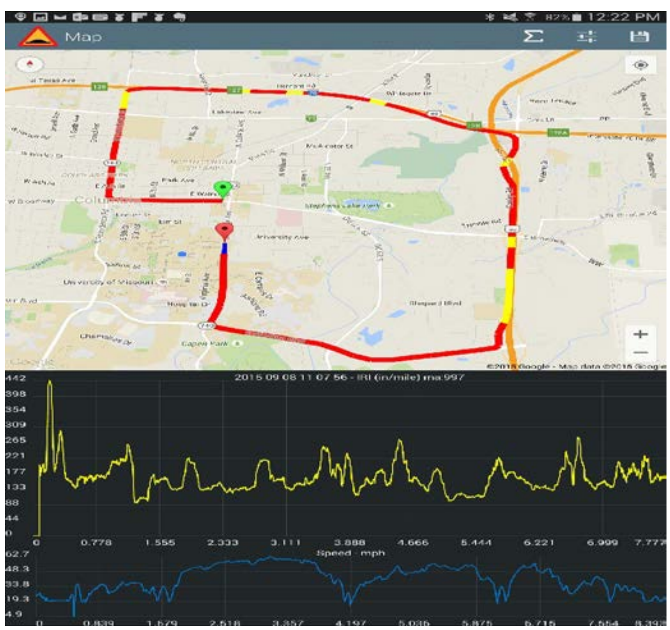



**Figure 7.6. Roadway condition map and IRI/speed recordings (in./mi) measured during Columbia, Missouri road test**

Upon completion of the field test, RoadBump Pro provided an instantaneous summary of the results. In the summary output and data exportation process, the software analyzes all data between the starting point and stopping point. The data in the summary and export include average IRI, average PSR, distance traveled, latitude and longitude data, maximum/minimum speed, average speed, segment length, a colored-coded map showing road condition, and the vehicle/device constant applied during the recording process (Figure 7.7).

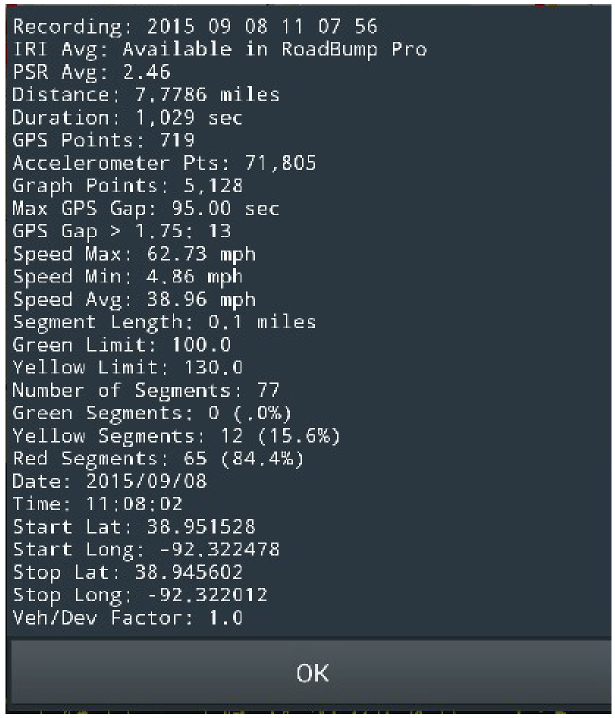



**Figure 7.7. RoadBump Pro summary output from Columbia, Missouri field test**

From the results, RoadBump collected very effective data when comparing speed variances, geographical references, and distances. Discrepancies in the PASER and PSR values were observed. One reason for these discrepancies may be that the speed of the test vehicle was lower than the recommended speed. RoadBump did provide promising roadway condition data in comparison to the data collected by evaluators when the PSR and PASER values were compared on Interstates or areas with consistent traffic speeds for longer than a half-mile. Another concern encountered during the field test was that the program sometimes restarted during data collection. This could possibly be due to speed variances and stops at traffic signals or stop signs.

Due to the inconsistency of the RoadBump data, the research team decided to not use this software for data collection. The research team believes that RoadBump may be more appropriate for the evaluation of pavement conditions in rural areas with higher speeds and less frequent stops.

### 7.6 Development of Pavement Preservation Plan

This section covers the process of developing a pavement preservation plan to help the city meet its goals and manage its pavement infrastructure more efficiently. The researchers performed analyses for two time periods: 2016 through 2020 and 2021 through 2040. The analysis for the first time period was based on the current budget funding levels and included recommendations for specific projects. The analysis for 2021 through 2040 was based on a potential future sales tax increase in 2021 to increase transportation funding by 25%. The analysis for this time period involved four different scenarios based on two discount rates and two funding levels, depending on the results of the sales tax vote. For the 2021 through 2040 analysis, only the total number of lane-miles to be treated per treatment type was determined; specific treatment recommendations were not allocated due to the longer time horizon and uncertainty of pavement conditions.

The Roadsoft program provides the user with an optimization tool that formulates the number of lane-miles per treatment to be implemented over a user-specified range of years, discount rate, and annual budget. The scenario optimizations performed in this project used the treatment trigger ratings developed for the city that were described in Section 7.2. The general output summary for each scenario provides details for the Grandview network such as average PASER rating (APR), budget per year, and the number of lane-miles for each type of treatment. The Roadsoft optimization tool provides recommendations for the allocation of funding among pavement treatments but does not recommend specific projects.

### *7.6.1 Overview of Scenarios for 2016 through 2020*

In this analysis, four scenarios for fiscal years 2016 through 2020 were generated to provide Grandview with the best “mix of fixes” that satisfies the goals established at the beginning of the project. The parameters of each scenario in this section include a $440,000 per year budget, a 2% discount per year on material costs, and the types of pavement treatments utilized by the city.

The research team generated the following eight scenarios in Roadsoft for evaluation:

- **Optimized**. This scenario used the surface optimization tool in Roadsoft to produce the total number of lane-miles per treatment. The research team made no modifications after the optimization. The Roadsoft optimization uses the approach of keeping the good roads in good condition.

- **Optimized with Reconstruction.** This scenario used the same trigger values as the Optimized scenario, but the research team altered the number of lane-miles per treatment for the last two years. The lane-miles for each type of treatment were adjusted due to the fact that the city needs to meet grant requirements for reconstruction on Martha Truman Road. The goal of this scenario was to increase the overall APR and bring some of the links with PASER values of less than 3 to good condition (PASER value greater than 7). Therefore, for the first three years of the scenario the research team used the funding allocations by treatment type from the Roadsoft scenario. For the years 2019 and 2020, the research team applied some reconstruction and overlay treatments to certain road segments to meet grant requirements, leading to fewer seal coat and crack seal treatments to stay under the yearly budget. Applying additional overlay and reconstruction to Grandview’s network helped to address grant requirements and bring some of the Grandview roads that were in poor condition to good condition.

- **TIGER Tree.** This scenario used the same allocation of lane-miles as the Optimized with Reconstruction scenario, with the addition of a decision tree analysis to recommend specific projects. This scenario takes the data from the Optimized with Reconstruction scenario and applies specific treatments to links for Grandview through decision tree analysis. The methodology for this analysis is described in Section 7.6.5.

- **No Treatment.** In this scenario, no treatments or any type of preventive maintenance were applied to the system for the next five years of the scenario (2016 through 2020). In order to compare results, the research team ran a simulation using Roadsoft's rebuild RSL tool. This simulation required that all historical and 2016 PASER values be entered. Once the historical and current data were entered, the computer system clock was fast-forwarded to the year 2017 with zero treatments applied. The 2017 Grandview PASER values were recalculated automatically using the pavement deterioration curve according the current year as determined by the computer system's clock. For analysis, an APR was created for each year after the RSL was rebuilt. This process was repeated for the years 2018, 2019, and 2020.

- **Deferred Maintenance.** This scenario is based on the approach of fixing the bad roads first. To perform this analysis, the Roadsoft optimization tool was used with only two treatments: overlay and reconstruction. The budget was split evenly between overlay and reconstruction. The Roadsoft optimization tool generated a five-year summary of the number of lane-miles to be treated using the current budget and discount rate.

- **Fixed Budget.** The difference between this scenario and the Optimized, Optimized with Reconstruction, and TIGER Tree scenarios is that the Fixed Budget scenario used a predetermined amount for specific pavement treatments instead of allowing the funding for specific treatments to be optimized. This scenario is based on the Grandview's capital project funding for specific treatments in the next five years. The budgets used were strictly applied from the Grandview's annual slurry seal program and annual overlay program. The seal coat budget allocated for the next five years was $65,000 per year. The overlay budget for the next five years was $375,000 per year. This scenario was the baseline comparison for all scenarios generated.

- **Overlay Only.** This scenario is based on the premise that Grandview would use the entire budget for only mill and overlay treatments throughout the network. The optimization tool was utilized by allocating $440,000 with a 2% discount rate for the next five years to the mill and overlay treatments.

- **Reconstruction Only.** This scenario is based on the approach of fixing the bad roads first using the Roadsoft optimization tool with only reconstruction treatments.

Table 7.4 shows the number of lane-miles for each treatment type for the eight scenarios.

**Table 7.4. Scenario summary of lane-miles treated per year**

| Year | Treatment Type | Lane-Miles per Scenario: Optimized | Optimized w/ Reconstruction | TIGER | Fixed Budget | Deferred Maintenance | No-Treatment | Reconstruction Only | Overlay Only |
|---|---|---|---|---|---|---|---|---|---|
| 2016 | Crack Seal | 54.4 | 54.4 | 53.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Seal Coat | 37.1 | 37.1 | 37.3 | 7.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mill and Overlay | 0.0 | 0.0 | 0.0 | 13.4 | 7.8 | 0.0 | 0.0 | 15.7 |
| | Reconstruction | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 | 0.0 | 8.9 | 0.0 |
| 2017 | Crack Seal | 39.3 | 39.3 | 38.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Seal Coat | 16.6 | 16.6 | 16.9 | 7.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mill and Overlay | 7.0 | 7.0 | 6.9 | 13.1 | 7.7 | 0.0 | 0.0 | 15.4 |
| | Reconstruction | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 | 0.0 | 8.8 | 0.0 |
| 2018 | Crack Seal | 66.8 | 61.4 | 61.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Seal Coat | 0.0 | 0.0 | 0.0 | 7.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mill and Overlay | 9.1 | 9.6 | 9.6 | 12.8 | 7.5 | 0.0 | 0.0 | 15.0 |
| | Reconstruction | 0.0 | 0.0 | 0.0 | 0.0 | 4.3 | 0.0 | 8.6 | 0.0 |
| 2019 | Crack Seal | 74.2 | 22.0 | 22.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Seal Coat | 0.0 | 0.0 | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mill and Overlay | 8.2 | 8.5 | 8.5 | 12.6 | 7.4 | 0.0 | 0.0 | 14.7 |
| | Reconstruction | 0.0 | 2.5 | 2.5 | 0.0 | 4.2 | 0.0 | 8.4 | 0.0 |
| 2020 | Crack Seal | 70.9 | 38.7 | 38.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Seal Coat | 0.0 | 0.0 | 0.0 | 7.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Mill and Overlay | 8.2 | 8.9 | 8.9 | 12.8 | 7.2 | 0.0 | 0.0 | 14.4 |
| | Reconstruction | 0.0 | 1.2 | 1.2 | 0.0 | 4.1 | 0.0 | 8.2 | 0.0 |

For all three of the scenarios (Optimized, Optimized with Reconstruction, and TIGER Tree) that allow for the full mix of treatments, crack seals are the most prevalent treatment each year. The Optimized Scenario treats 392 lane-miles, with approximately 92% of the lanes miles falling under the crack seal and seal coat treatment types. The Optimized with Reconstruction scenario includes an additional 3.7 lane-miles of reconstruction. As described above, the Optimized with Reconstruction and TIGER Tree scenarios used the same allocation of treatment types. The Deferred Maintenance strategy is only able to treat 59.04 lane-miles of road, which is approximately 19% of the lane-miles in the most optimized scenario.

### *7.6.2 Scenario Results for 2016 through 2020*

This section covers the results of the eight scenarios for Grandview for 2016 through 2020. The results include a breakdown of the APR per year for each scenario, a net worth calculation of the pavements per year for each scenario, the total lane-miles per treatment per scenario, and the impact of Frontage Road on the network. For comparative analysis, the research team used the Fixed Budget scenario as the baseline for the seven other scenarios. The Fixed Budget scenario was chosen as the baseline for comparison because, based on the proposed budgets for the annual seal coat and overlay programs, this scenario represents the city's typical approach before the implementation of the TAM system.

In order to examine the eight scenarios, the research team compared the lane-miles of treatment, APR, and net worth of Grandview's pavement per year under each scenario. The APR is the weighted average PASER rating of the entire Grandview network. Equation 7.1 is the formula for the APR for each year ($APR_y$).

$$APR_y = \sum_y \frac{(PV_i \times L_i)}{\sum L_n} \tag{7.1}$$

Where,

- $APR_y$ = average PASER rating of the network for a given year
- $PV_i$ = PASER rating on link $i$
- $L_i$ = length in lane-miles of link $i$
- $\sum L_n$ = sum of lane-miles within the network

The Optimized scenario proved to be most beneficial in terms of the APR for the entire system and the number of lane-miles treated, thus showing the value of the "mix of fixes" approach. The results showed that the APR of the Grandview network increased approximately 8.70% (Figure 7.8) from the network's initial condition (APR = 5.79) before treatments were made in the year 2016.

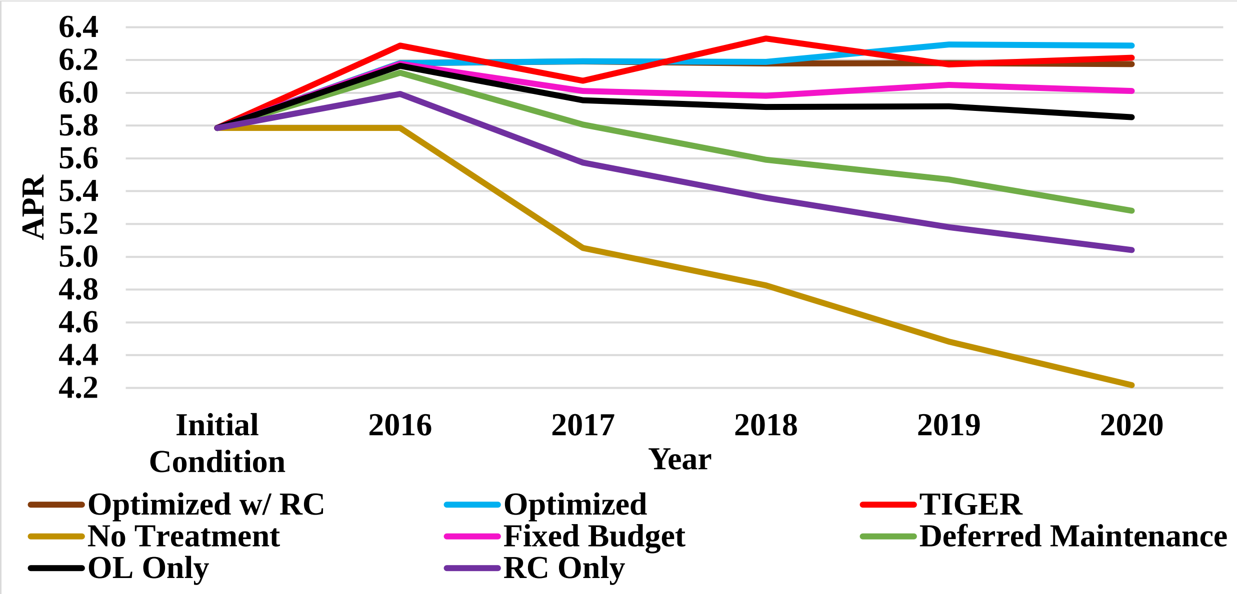



**Figure 7.8. APR of the Grandview network per optimization per year**

The Optimized with Reconstruction scenario showed a 6.74% increase in the APR for the entire Grandview network. The TIGER Tree scenario showed a 7.40% increase in the APR for the Grandview network. If Grandview were to apply no treatments, the APR of the network would decrease by 27.11%. The Fixed Budget scenario increased the network's APR by 2.79%. The Overlay Only scenario showed a 0.10% increase in the APR from the initial condition. After the mill and overlay treatments were applied in the year 2016, the APR under the Overlay Only scenario decreased by approximately 6%. The Deferred Maintenance scenario showed a decrease of 9.26% in the APR from the initial condition. The Reconstruction Only scenario resulted in a 13.22% decrease in the APR from the initial condition.

Table 7.5 shows the yearly post-treatment APR values for the entire Grandview pavement network for the next five years.

**Table 7.5. Yearly pavement network APR for each scenario for Grandview**

| | PASER Year | | | | |
|---|---|---|---|---|---|
| **Scenario** | **2016** | **2017** | **2018** | **2019** | **2020** |
| **Optimized w/ Reconstruction** | 6.182 | 6.191 | 6.179 | 6.181 | 6.176 |
| **Optimized** | 6.182 | 6.193 | 6.188 | 6.295 | 6.289 |
| **TIGER Tree** | 6.288 | 6.074 | 6.331 | 6.173 | 6.214 |
| **No Treatment** | 5.786 | 5.053 | 4.826 | 4.482 | 4.217 |
| **Fixed Budget** | 6.176 | 6.005 | 5.962 | 6.009 | 5.947 |
| **Deferred Maintenance** | 6.122 | 5.802 | 5.582 | 5.453 | 5.250 |
| **Overlay Only** | 6.165 | 5.949 | 5.897 | 5.887 | 5.792 |
| **Reconstruction Only** | 5.993 | 5.574 | 5.361 | 5.180 | 5.021 |

As mentioned above in Section 7.6.1, the Fixed Budget scenario was the baseline for comparison with the other seven scenarios. To perform the comparative analysis, the research team compared the 2020 post-treatment APR for each of the seven scenarios to the results of the Fixed Budget scenario. The Optimized scenario showed the best result, with a 5.75% APR increase for the pavement network compared to the Fixed Budget scenario. The TIGER Tree scenario generated the second highest ratings, with a 4.49% gain in the year 2020 APR. The Deferred Maintenance scenario showed a loss of 11.73% and the Overlay Only scenario showed a decrease of 2.61% from the Fixed Budget scenario. Among all of the scenarios that used treatments, the Reconstruction Only scenario showed the biggest loss in APR (15.58%) when compared to the Fixed Budget scenario.

The net worth of Grandview's pavement network was calculated using the initial cost of reconstruction ($49,280) for one lane-mile of treatment and the current number of lane-miles per PASER rating. The initial cost of reconstruction was based on data provided by the City. The present worth of the network was found to depreciate as PASER rating decreases (Table 7.6).

**Table 7.6. Net worth of each PASER rating**

| PASER Rating | Depreciation | Net Worth/ Lane-Mile |
|---|---|---|
| **10** | 1 | $49,280.00 |
| **9** | 0.97 | $47,801.60 |
| **8** | 0.95 | $46,816.00 |
| **7** | 0.9 | $44,352.00 |
| **6** | 0.85 | $41,888.00 |
| **5** | 0.65 | $32,032.00 |
| **4** | 0.3 | $14,784.00 |
| **3** | 0.2 | $9,856.00 |
| **2** | 0.1 | $4,928.00 |
| **1** | 0.05 | $2,464.00 |

Equation 7.2 expresses how the present worth of each scenario per year was calculated.

$$PV_{pr} = \sum(L_{pr} \times NW_{pr}) \quad \textbf{(7.2)}$$

Where,

- $PV_{pr}$ = present worth per PASER value
- $L_{pr}$ = length in lane-miles per PASER value
- $NW_{pr}$ = net worth per PASER value

The current present worth of the Grandview network, after the year 2016 data collection, was $9,725,940. To formulate the present value of the network for each of the eight scenarios, the research team used the net present value (NPV) formula to determine the benefits of each scenario.

Equation 7.3 expresses how the NPV of each scenario per year was calculated (FHWA 2002).

$$NPV_y = PV_{pr} \times \frac{1}{(1+r)^n} \quad \textbf{(7.3)}$$

Where,

- $NPV_y$ = net present value for a given year
- $PV_{pr}$ = present worth per PASER value
- $r$ = real discount rate
- $n$ = number of years in the future when the costs will be incurred

Figure 7.9 and Table 7.7 show the change in present value over time for each of the eight scenarios.

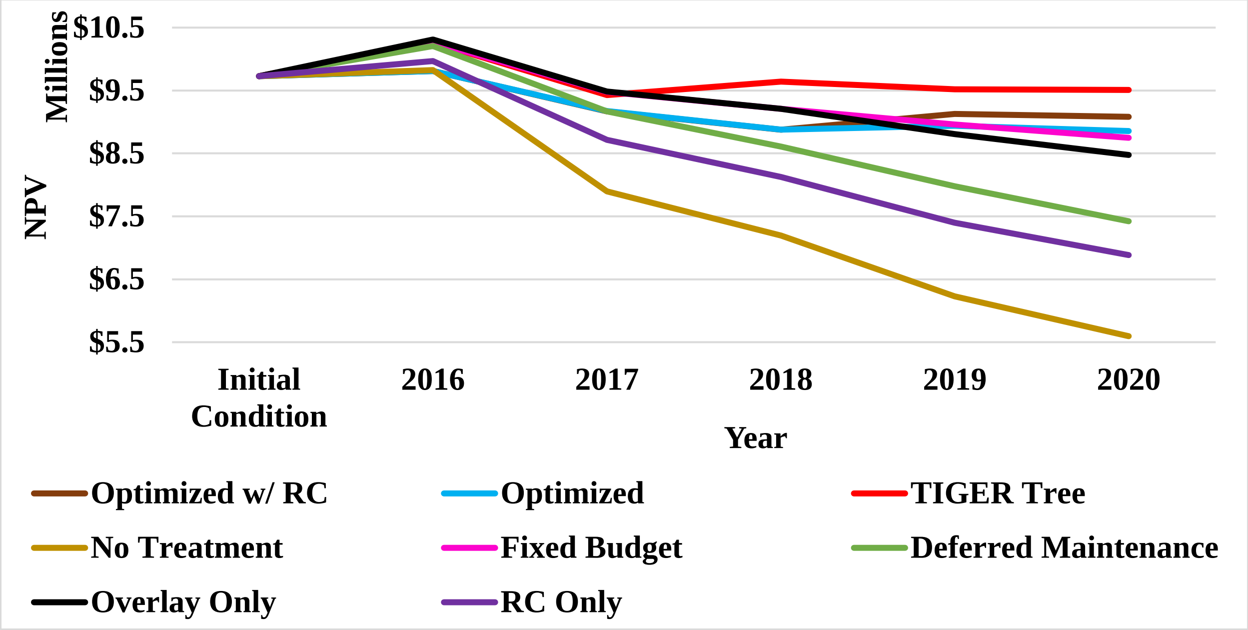



**Figure 7.9. NPV of Grandview's network**

**Table 7.7. NPV scenario breakdown for the next five years (2016 through 2020)**

| | Present Value of Pavement Network | | | | |
|---|---|---|---|---|---|
| **Optimization** | **2016** | **2017** | **2018** | **2019** | **2020** |
| Optimized w/ Reconstruction | $9,809,297 | $9,169,950 | $8,877,278 | $9,126,174 | $9,084,016 |
| Optimized | $9,809,297 | $9,173,201 | $8,876,292 | $8,940,881 | $8,855,996 |
| TIGER Tree | $10,266,351 | $9,427,568 | $9,640,439 | $9,520,417 | $9,509,564 |
| No Treatment | $9,824,507 | $7,894,804 | $7,195,801 | $6,229,979 | $5,595,568 |
| Fixed Budget | $10,267,922 | $9,481,163 | $9,207,786 | $8,960,585 | $8,748,470 |
| Deferred Maintenance | $10,207,051 | $9,166,123 | $8,607,223 | $7,977,045 | $7,422,238 |
| Overlay Only | $10,310,396 | $9,482,438 | $9,211,002 | $8,805,803 | $8,475,767 |
| Reconstruction Only | $9,968,102 | $8,717,303 | $8,127,510 | $7,400,410 | $6,884,754 |

The TIGER Tree scenario had the highest present worth of $9,509,565 after the 2020 treatments. After the year 2020, the present value of Grandview's network under the Optimized scenario was $8,855,996. Under the Optimized with Reconstruction scenario, the present value of Grandview's network after the year 2020 was $9,084,015. The baseline Fixed Budget scenario led to a present worth of $8,748,470. As expected, the No Treatment scenario led to the lowest present worth of $6,056,822.46.

As mentioned above in Section 7.6.1, the Fixed Budget scenario was the baseline for comparison to the other seven scenarios. The 2020 post-treatment NPV for each of the seven scenarios was compared to the results of the Fixed Budget scenario. The TIGER Tree scenario showed the best results, with an 8.70% increase in present value compared to the Fixed Budget scenario. The Optimized scenario showed a 3.84% increase in the year 2020 post-treatment NPV compared to the Fixed Budget scenario. The Deferred Maintenance scenario resulted in a loss of 15.16% in NPV while the Overlay Only scenario showed a decrease of 3.12% compared to the Fixed Budget scenario. Among all scenarios that used treatments, the Reconstruction Only scenario showed the biggest loss (21.30%) in NPV when compared to the Fixed Budget scenario. The results of this analysis demonstrate the effectiveness of the "mix of fixes" approach.

*7.6.3 Analysis of Frontage Road Improvements*

An additional analysis of the eight scenarios (Figure 7.10) was performed to show the effects on APR when the transportation sales tax budget for infrastructure projects is supplemented by outside funding.

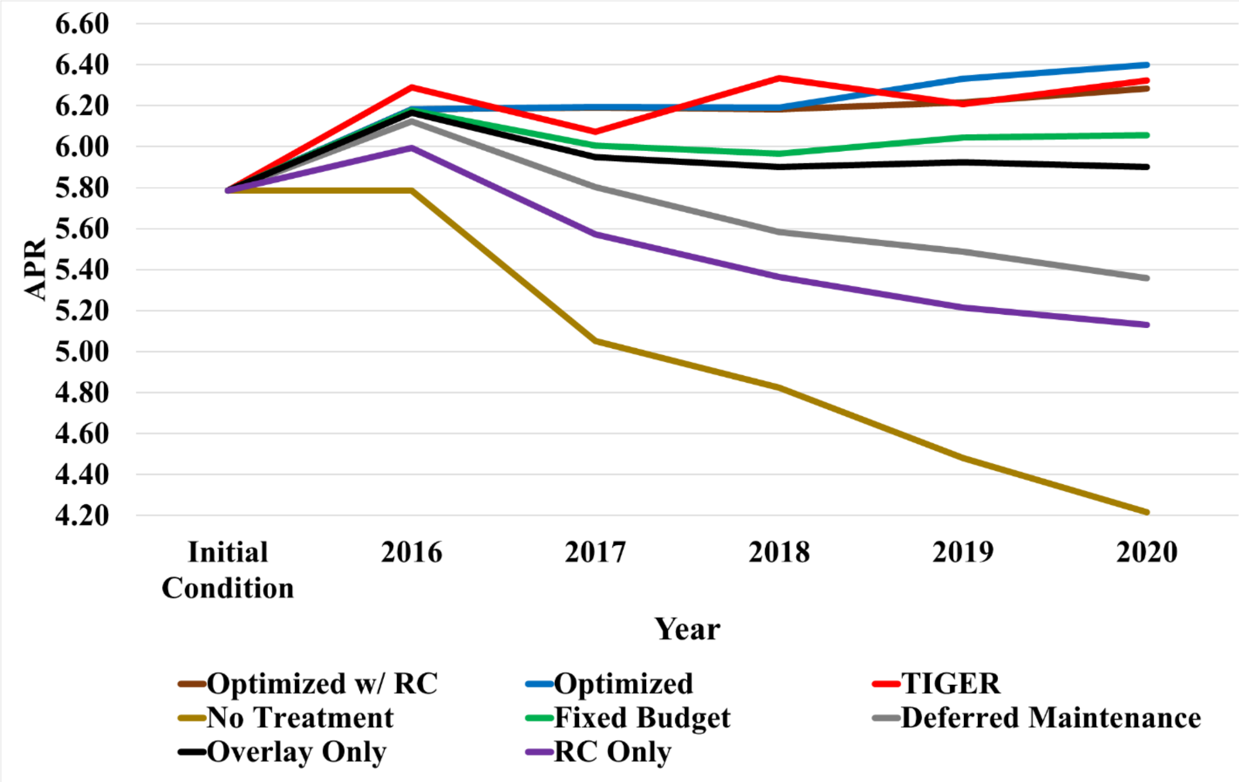



**Figure 7.10. APR with Frontage Road improvements**

Grandview has received outside funding in the form of a grant to make improvements on parts of East Frontage Road and West Frontage Road paralleling I-49. The improvements consist of reconstruction in the years 2018 through 2020. To show the overall improvements to the network resulting from the Frontage Road grant and the transportation sales tax budget, the Frontage Road lane-miles were added to each scenario in phases according to the city's plan for implementation.

With the augmented network, the Optimized scenario proved to be most beneficial in terms of the APR for the entire system based on the number of lane-miles treated. The results for this scenario showed an approximately 10.6% increase in the APR over the baseline scenario. The Optimized with Reconstruction scenario showed an 8.6% increase in the APR for the entire Grandview network. The TIGER Tree scenario showed a 9.3% increase in the APR for the Grandview network. If no treatments were applied, the APR of the network decreased by 28.1%.

*7.6.4 Recommendations for 2016 through 2020*

The research team recommends using the TIGER Tree scenario when implementing MR&R for the years 2016 through 2020. Using the TIGER Tree scenario satisfies the goals established by the city. Although the Optimized scenario shows the biggest APR improvement, the scenario does not include reconstruction. If Grandview only wanted to improve the APR and increase the number of lane-miles to be treated, then the Optimized scenario would be the best treatment scenario. The TIGER Tree scenario helps to keep the good roads in good condition while allowing for some reconstruction of roads in poor condition to meet Grandview's TAM needs. The TIGER Tree scenario utilizes a data-driven approach to selecting specific projects for this time period.

Figure 7.11 shows the 2016 pre-treatment PASER values for the Grandview network, while Figure 7.12 shows the calculated 2020 PASER values for the TIGER Tree scenario treatments without the Frontage Road improvements.

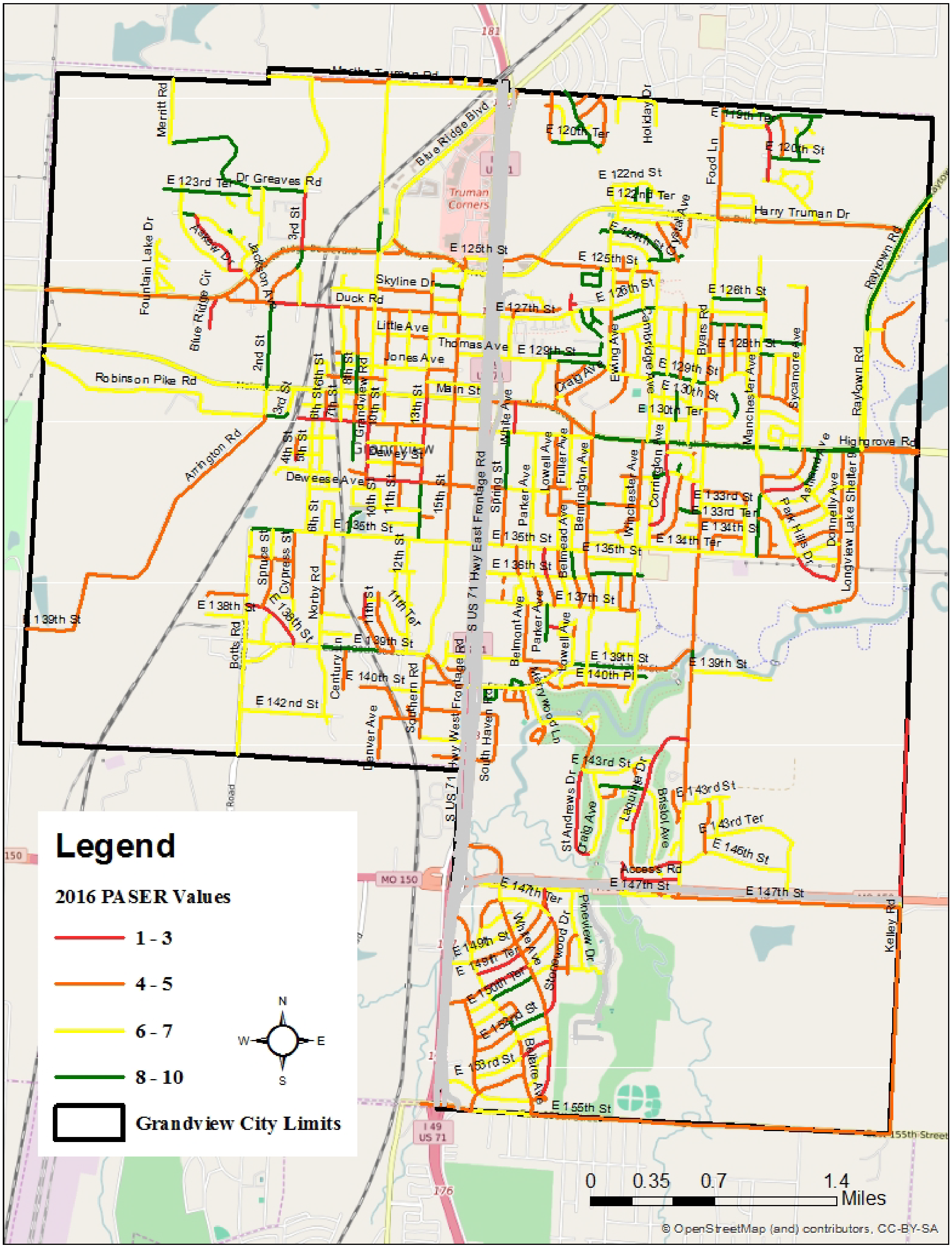





**Figure 7.11. Pre-treatment 2016 PASER ratings for each link within the City of Grandview**

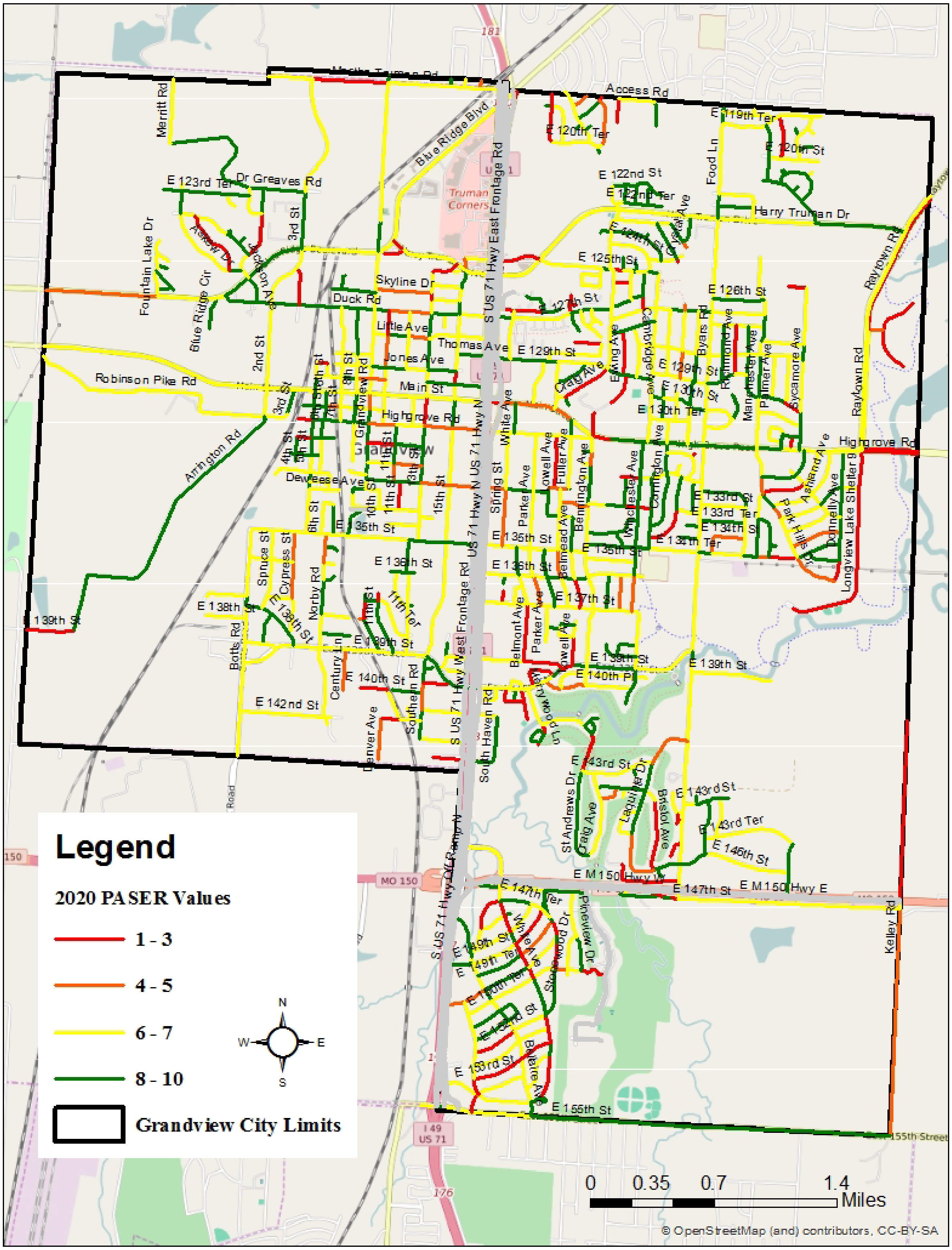





**Figure 7.12. TIGER Tree scenario 2020 PASER ratings for each link within the City of Grandview**

For the TIGER Tree scenario without the Frontage Road improvements, in the year 2020 approximately 16% of lane-miles will be in very poor condition (PASER 1 to 3), 8% in poor condition (PASER 4 to 5), 49% in good condition (PASER 6 to 7), and 27% in very good condition (PASER 8 to 10). Table 7.8 shows how the APR of Grandview's network changes each year before and after treatments are applied. Appendix Table B.1 shows a detailed breakdown of lane-miles per PASER rating pre- and post-treatment.

**Table 7.8. APR under TIGER Tree scenario for each year pre- and post-treatment**

| | APR | |
|---|---|---|
| **Year** | **Pre-Treatment** | **Post-Treatment** |
| **2016** | 5.782 | 6.278 |
| **2017** | 5.452 | 6.057 |
| **2018** | 5.824 | 6.311 |
| **2019** | 5.779 | 6.154 |
| **2020** | 5.736 | 6.185 |

*7.6.5 Selection of Projects for 2016 through 2020*

The following sections describe how the research team utilized a decision tree methodology to select specific projects for 2016 through 2020 based on the allocation of funding determined by the Optimized with Reconstruction scenario. A spreadsheet was developed by the research team to implement the decision tree approach for selecting projects based on the allocation of funding to different treatment types. A decision tree is a pictorial representation of the decision making process and includes both choice nodes (indicating when a decision needs to be made) and chance nodes (describing a state of nature) (Arsham 2015). The decision tree analysis allows for rational and weighted comparisons of individual links in the Grandview network based on the links' physical characteristics. The TIGER Tree scenario reduces reliance on biased stakeholder opinion regarding the locations of treatments and enhances the benefits of the treatments in terms of the APR and RSL of the overall network.

7.6.5.1 Overview of Decision Tree Methodology

The research team developed a decision tree spreadsheet tool that uses current and historical pavement data to quantify the pavement's characteristics by assigning probabilities to each attribute that affects the deterioration of the pavement. Using the pavement data exported from Roadsoft, the decision tree spreadsheet integrates the attribute data according to the current year of evaluation (Table 7.9).

**Table 7.9. Roadsoft outputs for the decision tree**

| Attribute | Description |
|---|---|
| **Roadsoft ID** | Automatically generated from the Roadsoft program |
| **PRNo** | Segment referencing system provided for easy locating in Roadsoft |
| **NFC** | National Functional Class |
| **Seg Name** | Name of the segment evaluated |
| **From Desc** | Intersection starting point of the Seg Name |
| **To Desc** | Intersection ending point of the Seg Name |
| **Number of Lanes** | Number of lanes on the Seg Name |
| **Width (ft)** | Width of the entire Seg Name |
| **Length (ft)** | Distance of the Seg Name in feet |
| **Length (Line Mile)** | Distance of the Seg Name in Center Line Miles |
| **Last Rating** | Seg Name calculated PASER rating produced |
| **Service Request** | Number of service located in between the From and To Desc |

The data for each attribute consists of historical data and current inventory data collected in the year 2016. For the succeeding years 2017 through 2020, the pavement APR and RSL are formulated based on whether a treatment is applied on an individual link. The probabilities in the decision tree reflect how each link and/or segment is expected to deteriorate in comparison with the other links/segments in the city in terms of a given attribute. These probabilities are described in the following sections.

7.6.5.2 PASER Value (PV)

The first level of the decision tree involves the PASER value. The 2016 PASER values come from the data collection completed by the research team. For the subsequent years 2017 through 2020, the PASER rating is calculated based on the treatments implemented and the pavement deterioration curve if no treatment is made. If a treatment is applied to a link, then the link's PASER rating is updated according to the treatment type's PASER reset value (Table 7.1). If no treatments were applied to a link in the previous year, then Roadsoft calculates the PASER value based on the historical data (treatments and ratings) through the pavement deterioration curve.

For each PASER value, probabilities (Table 7.10) were assigned to each link by the research team.

**Table 7.10. PASER rating probabilities**

| PASER Rating | Probability |
|---|---|
| **PASER (X=7)** | 0.2510 |
| **PASER (X=6)** | 0.3050 |
| **PASER (X=5)** | 0.1990 |
| **PASER (X=4)** | 0.1500 |
| **PASER (X=3)** | 0.0500 |
| **PASER (X=2)** | 0.0250 |
| **PASER (X=1)** | 0.0200 |
| **Check** | 1.0000 |

Probability values were assigned using engineering judgment based on the general shape of the pavement deterioration curve. As described above in Figure 3.1, pavements deteriorate more rapidly in the later stages of their life-cycle (Galehouse et al. 2003). Because TAM emphasizes preventative maintenance, links in good condition (PASER values between 6 and 7) are more likely to be selected for treatment. Table 7.10 follows the deterioration curve by allocating approximately 55% of the total 100% probability of being selected to those links with a PASER rating between 6 and 7 because these PASER values fall within the optimal timing period to make a treatment. The PASER value of 6 receives the highest probability because it falls on the threshold between good and fair condition. The probability of a link in poor condition (PASER value between 4 and 5) being selected is approximately 25% lower. This decrease in the probability of being selected is due to the increased construction cost and the low amount of lane-miles that can be treated in a fiscal year. The PASER value of 4 is on the threshold between poor and very poor condition and does not receive a higher probability of being treated because TAM emphasizes preventative maintenance. The links in very poor condition (PASER value between 1 and 3) together only make up approximately 9.5% of the total probability of being selected due to the high treatment cost (approximately $33,334 per lane-mile), the closure time required for rehabilitation projects, and the emphasis of TAM on keeping good roads in good condition.

These probabilities can be adjusted by the user as long as the probabilities follow the deterioration curves. The PASER values indicating good condition should have higher probabilities than the PASER values indicating poor and very poor conditions. The probabilities for PASER values indicating poor and very poor conditions should rapidly decrease.

7.6.5.3 Service Requests (SR)

The probability of a service request on a given link was examined to help achieve the goal of reducing pothole service requests by 10% over the next 10 years. As described above in Section 7.4.3, historical data for pothole service requests were reviewed. A spatial map (Figure 7.5) was created to show the service request locations. The spatial map was then overlaid with the Grandview road network in Roadsoft. A user-defined field, Service Request, was created in Roadsoft to allow these service request locations to be recorded in the Roadsoft database. The initial recording of requests was made by inspecting the two superimposed maps. If any service requests were made on the link, the number of requests for the specific link was entered in the field. If no service requests were made on the link, the number of service requests entered in this field was zero. If service requests were made and a treatment was subsequently applied on the link, the requests were excluded.

The service request probabilities (Table 7.11) were determined by the research team based on engineering judgment.

**Table 7.11. Service request probabilities**

| Service Request | Probability |
|---|---|
| **High: P(X > 2)** | 0.513 |
| **Medium P(1 ≤ X ≤ 2)** | 0.365 |
| **Low P(X < 1)** | 0.122 |
| **Check** | 1.0000 |

Because service requests reflect pavement condition and link utility, a link with a high number of historical service requests is generally a high priority for pavement maintenance. Service request probability works in conjunction with the number of service requests made on an individual link. Links with a high number of service requests receive a higher probability value to increase the likelihood that these links will be selected for pavement treatment. Therefore, a link with a high number of service requests is more likely to receive treatment than a link with a low number of service requests. Links with service requests are assigned a probability of approximately 88% of the total probability for service requests. A probability of 12% is assigned to links with zero service requests so that the link is not excluded completely from consideration for treatment. Zero service requests on a link does not necessarily reflect the PASER value or RSL, and therefore the link needs to have a probability assigned. Considerations for incorporating service requests in future research are discussed in Section 8.2.

7.6.5.4 National Functional Class (NFC)

National functional class (NFC) was also used to define the relative importance of a link within the network. The Grandview road network includes three functional classes: minor arterial, major collector, and local road. Minor arterial roadways typically have high average daily traffic levels and a large number of commercial vehicles, both of which lead to faster pavement deterioration, making these roads the highest priority for treatment. Conversely, local roads are the lowest priority because they are mainly in residential areas with lower traffic volumes that therefore experience less pavement deterioration. Major collectors are in retail areas and penetrate into residential areas and funnel trips from local roads to arterial roadways. The NFC probabilities assigned by the research team are shown in Table 7.12.

**Table 7.12. National functional class probabilities**

| National Functional Class | Probability |
|---|---|
| **Minor Arterial** | 0.4030 |
| **Major Collector** | 0.3510 |
| **Local Roads** | 0.2460 |
| **Check** | 1.0000 |

7.6.5.5 Remaining Service Life (RSL)

RSL represents the expected remaining lifespan of pavements (Elkins et al. 2013). The RSL of a pavement is calculated based on the number of treatments made on a roadway with respect to time and the PASER value assigned to the individual link on the Grandview network. Similarly to the PASER probabilities, RSL probabilities (Table 7.13) were divided into seven subcategories based on engineering judgment and the general shape of the pavement deterioration curve.

**Table 7.13. Remaining service life probabilities**

| Remaining Service Life | Probability |
|---|---|
| **RSL ($X \geq 10$)** | 0.020 |
| **RSL ($5 < X \geq 10$)** | 0.050 |
| **RSL ($0 < X \leq 5$)** | 0.120 |
| **RSL ($-5 < X \leq 0$)** | 0.150 |
| **RSL ($-10 < X \leq -5$)** | 0.200 |
| **RSL ($-15 < X \leq -10$)** | 0.220 |
| **RSL ($X \leq -15$)** | 0.240 |
| **Check** | 1.000 |

If a segment has a RSL value greater than 5, then the probability of that road being selected makes up only 7% of the total probability. For a segment with a low RSL, the probability for that road to be selected is higher.

RSL was used minimally in the decision tree formulation due to the limited treatment history provided by the city. As time progresses and the amount of treatment history increases on each segment, the accuracy of the Roadsoft RSL output will improve as the data validation improves. RSL is based on the Roadsoft calculation of deterioration with respect to the link's treatment history and the current and historical PASER value(s) assigned to the link. A negative RSL value for a link can be interpreted to mean that the link has not had a treatment for an extended period of time and the segment has a PASER value of less than four.

7.6.5.6 Treatment Type (TT)

The treatment type probabilities (Table 7.14) are based on the treatment surface definition trigger ratings in Table 7.1.

**Table 7.14. Decision tree treatment probability according to the PASER rating**

| | Treatment Probability | | | | |
|---|---|---|---|---|---|
| **PASER Value** | **Crack Seal** | **Seal Coat** | **Overlay** | **Reconstruction** | **Check** |
| **PASER (X=7)** | 75.21% | 24.79% | 0.00% | 0.00% | 100% |
| **PASER (X=6)** | 29.21% | 70.79% | 0.00% | 0.00% | 100% |
| **PASER (X=5)** | 15.01% | 64.30% | 20.69% | 0.00% | 100% |
| **PASER (X=4)** | 0.00% | 20.00% | 60.00% | 20.00% | 100% |
| **PASER (X=3)** | 0.00% | 0.00% | 60.00% | 40.00% | 100% |
| **PASER (X=2)** | 0.00% | 0.00% | 0.00% | 100.00% | 100% |
| **PASER (X=1)** | 0.00% | 0.00% | 0.00% | 100.00% | 100% |

Once the roadway feature probabilities were determined, treatment probabilities were used to assign the likelihood of a particular treatment being applied for a given PASER value. These probabilities were developed based on engineering judgement to conform with the maximum and minimum treatment trigger values described above. If the PASER rating falls within the maximum and minimum trigger ratings for a treatment, then a probability is assigned to the treatment. When the PASER value approaches the maximum trigger rating, the probability of making that treatment begins to decrease, and vice versa for the minimum trigger rating. For a PASER value that falls within the minimum and maximum trigger values of more than one treatment, the higher probability is assigned to the treatment type that would best suit the link with that PASER value.

7.6.5.7 Selecting the Treatments

The probability of making a treatment on a link ($PT_i(p)$) was established after the treatment type probability was multiplied by the roadway feature probability (RFP) (Equation 7.4) for each link within the Grandview network.

$$PT_{i,j} = (PV_i \times FC_i \times SR_i \times RSL_i) \times TT_{i,j} \tag{7.4}$$

Where,

- $PT_{i,j}$ = probability of making treatment type *j* on link *i*
- $PV_i \times FC_i \times SR_i \times RSL_i$ = roadway feature probability for link *i*
- $PV_i$ = Probability of PASER rating on link *i*

- $FC_i$ = Probability of functional class on link *i*
- $SR_i$ = Probability of service requests on link *i*
- $RSL_i$ = Probability of RSL on link *i*
- $TT_{i,j}$ = Treatment probability for treatment type *j* on link *i*

Once these probabilities were calculated, they were then organized according to treatment type (crack seal, seal coat, overlay, and reconstruction). Next, each link probability $PT_{i,j}$ was placed in sequential order by treatment type to show the highest probabilities for a specific treatment at the top of the list. The links with the highest probability per treatment were selected until the sum of the lane-miles for each treatment matched the number of lane-miles per treatment formulated by the optimization method (Table 7.4).

An example of the use of this decision tree methodology is shown in Table 7.15.

**Table 7.15. Decision tree example**

| | **Link 1** | **Link 2** |
|---|---|---|
| **Attributes** | | |
| **PASER** | 5 | 7 |
| **Service Requests** | 3 | 1 |
| **Functional Class** | Local Road | Minor Arterial |
| **RSL** | 3 | 12 |
| **Attribute and Treatment Type Probabilities** | | |
| **$PV_i$** | 0.199 | 0.251 |
| **$FC_i$** | 0.246 | 0.4 |
| **$SR_i$** | 0.513 | 0.37 |
| **$RSL_i$** | 0.12 | 0.02 |
| **TT (Crack Seal)** | 0.1501 | 0.7521 |
| **TT (Seal Coat)** | 0.643 | 0.2479 |
| **TT (Mill and Overlay)** | 0.2069 | 0 |
| **TT (Reconstruction)** | 0 | 0 |
| **Results** | | |
| **PT (Crack Seal)** | 0.00377 | 0.000264 |
| **PT (Seal Coat)** | 0.01614 | 0.000639 |
| **PT (Mill and Overlay)** | 0.00519 | 0.00 |
| **PT (Reconstruction)** | 0.00 | 0.00 |

In this example, Link 1 has a lower PASER rating and more service requests than Link 2. However, Link 1 is a local road while Link 2 is a minor arterial. As shown in the results, Link 1 has a higher probability of being treated with seal coat, while Link 2 has a higher probability of being treated with seal coat or crack seal. Therefore, Link 1 should prioritize seal coat and mill and overlay, while Link 2 should prioritize crack seal. Link 2 should not be considered for mill and overlay, while neither link should be considered for reconstruction. A final determination of which treatment types to apply to each link would be based on the number of lane-miles available for each treatment type and the probability of treatments for the other links on the network.

Figure 7.13 shows a graphical representation of the example from Table 7.15. The figure demonstrates how the decision tree spreadsheet filters the Roadsoft output for each roadway feature to allocate a probability to each treatment that indicates the suitability of that treatment for Link 1.

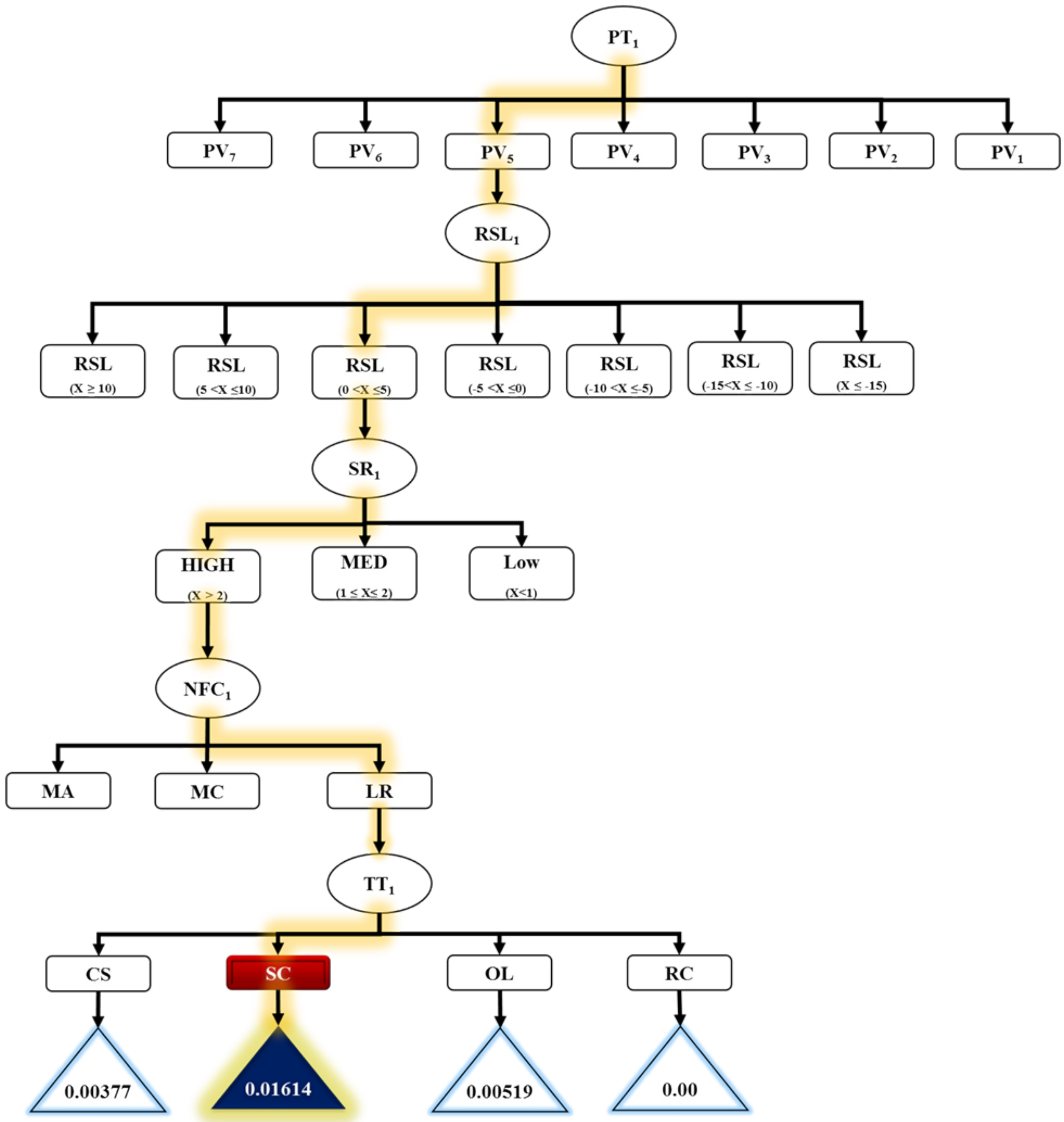



**Figure 7.13. Example of decision tree methodology based on roadway attributes**

For example, the Roadsoft output for Link 1 indicates a PASER rating of 5, a RSL of 3, three service requests, and classification as a local road. From the output, it can be seen that seal coat is the best treatment for this link, with a 0.02% probability. The probabilities for the other treatments are as follows: 0.004% (crack seal), overlay (0.005%), and reconstruction (0.00%).

This decision tree methodology can be customized to meet the needs of individual communities. Communities can modify the probabilities or introduce other attributes to meet their needs and network goals. For example, a community that places greater value on minor arterials can increase the functional class probability for minor arterials and decrease it for the other functional classes. Communities could add other attributes such as land use, number of lanes, availability of alternate routes, and utility for other modes such as bicycles or pedestrians.

7.6.5.8 Integration of Decision Tree Analysis into Roadsoft

The decision tree spreadsheet was integrated with Roadsoft using the following procedure. A comma-delineated value (CSV) file containing the year 2016 attributes in Table 7.3 was exported from Roadsoft to the decision tree spreadsheet. The treatments for 2016 were then selected based on the highest probabilities for each treatment and link until the total lane-miles selected for treatment matched the output for the Optimized with Reconstruction scenario. The selected 2016 treatments were applied to the Roadsoft database. Once the 2016 treatments were applied to the Roadsoft database, the RSL and PASER values were recalculated to generate the new RSL and PASER values for the year 2016 after treatments were applied. The system's date and time were then fast-forwarded to the subsequent year, i.e., 2017. The RSL was recalculated to show the new condition of the network based on the deterioration that occurred since the 2016 treatments were applied. Once the 2017 PASER ratings were updated, the CSV file containing the attributes from Table 7.3 was exported to the decision tree. The probabilities for the treatments were recalculated and then filtered to match the 2017 lane-miles of the Optimized with Reconstruction scenario. For analysis and tracking of the Grandview network, a report of the APR per surface type for the year 2017 was exported to show how the treated and non-treated roads deteriorated from 2016 through 2017 (i.e., to observe before-and-after effects). This process was then repeated for the years 2018, 2019, and 2020 to create a treatment list and before-and-after comparisons of APR for each year.

7.6.5.9 Summary of Decision Tree Results

The decision tree approach recommends 1,398 treatments (Appendix C) consisting of crack seal, seal coat, overlay, and reconstruction for the years 2016 through 2020. The treatments recommended by the research team using the decision tree improve the current pavement condition while the buying power of the city's road budget decreases 2% annually. It is anticipated that improvements to pavement condition will help reduce the number of future service requests. This decision tree method also meets the current grant requirements of maintaining particular segments in Grandview using reconstruction treatments.

### *7.6.6 Development of Pavement Preservation Plan for 2021 through 2040*

An analysis for 2021 through 2040 was also performed. This analysis was based on the projected Grandview network in the year 2021, which accounts for all treatments that were determined from the TIGER Tree scenario for 2016 through 2020 and Frontage Road improvements. The Frontage Road improvements were included because they will be implemented by 2021. Roadsoft optimization was performed for four different scenarios based on the two funding levels and two discount rates described in Section 7.3. Due to the longer time horizon and future uncertainties, the analysis included the allocation of funding among treatment types but did not recommend specific projects.

The results of this analysis are shown in Figure 7.14.

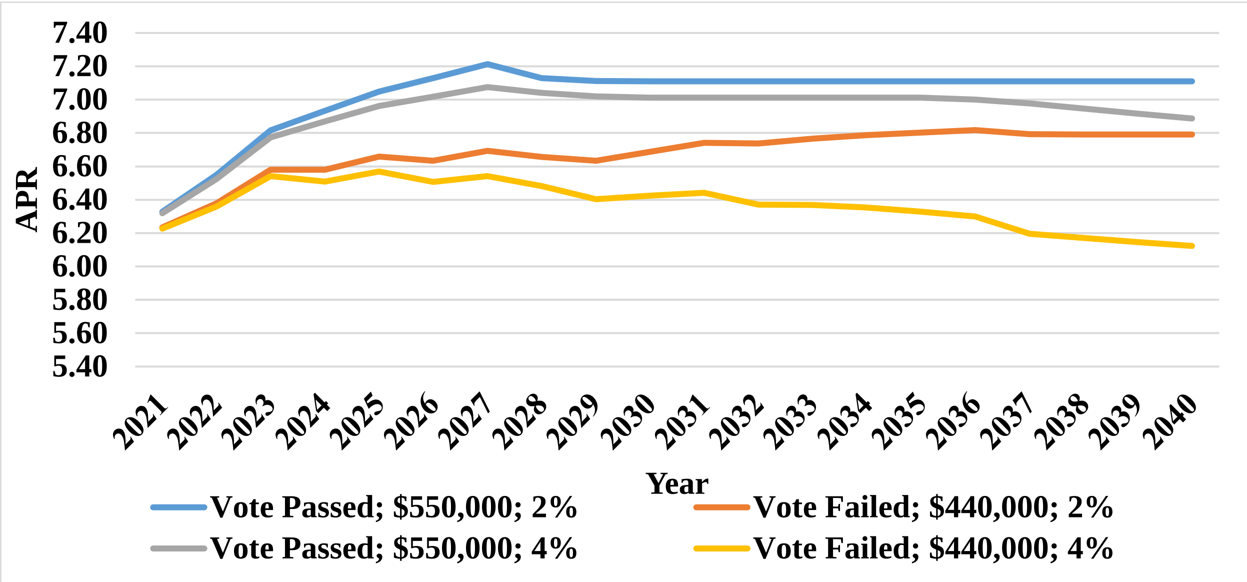



**Figure 7.14. Results for scenarios from 2021 through 2040**

If the sales tax vote passes and the 2% discount rate remains throughout the 20 years, the overall PASER rating of the system will increase to 7.11, which represents a 12% increase from the year 2021. If the sales tax vote fails and the discount rate increases to 4%, then the overall PASER rating of the system will be 6.12. The results show that approval of the sales tax increase will make a significant impact in improving the overall condition of Grandview's network. The discount rate also affects the results considerably. As described above, one of the goals for the city is to increase the average pavement condition 3% to 5% annually after year 5.

# CHAPTER 8. RECOMMENDATIONS FOR SUSTAINABILITY

The overall goal of this project is to help Grandview implement and maintain a TAM system to help maximize the condition of its infrastructure with limited resources. This chapter provides some recommendations for the long-term sustainability of the system.

## 8.1 Data Collection

When conducting future data collection throughout the city, it is recommended to use the LDC. The LDC is the most efficient way to collect data with respect to time and workforce because the majority of the pavement attributes that are needed (i.e., curb and gutter detail, service requests, prior ratings, and treatments) already exist in the Roadsoft database from the initial data collection. Although the spreadsheet was used for a majority of the data collection in this project, the LDC proved to be more effective when data from the LDC or historical data were imported into Roadsoft's main database. The importing and exporting features in the LDC facilitate data management. Once the Grandview data collection is completed each day using the LDC, the user exports the data to an external hard drive. The user can then import the data into the main Roadsoft database. Once the importing is complete, the Grandview network contains the data collected for the day and all previous data entered. The research team recommends that the user create a backup of the database before and after importing new data into the main Roadsoft database.

The research team recommends that two or more evaluators perform the field data collection. To ensure consistency, evaluators should be trained in the same way. At the beginning of the data collection, a calibration process should be used to ensure consistency between evaluators.

It is recommended that 1/3 of Grandview's network should be evaluated in the field per year. The field inventory should include PASER values and any changes to the other attributes that had been previously collected. Figure 8.1 shows the recommended spatial distribution of the data collection over a three-year cycle.

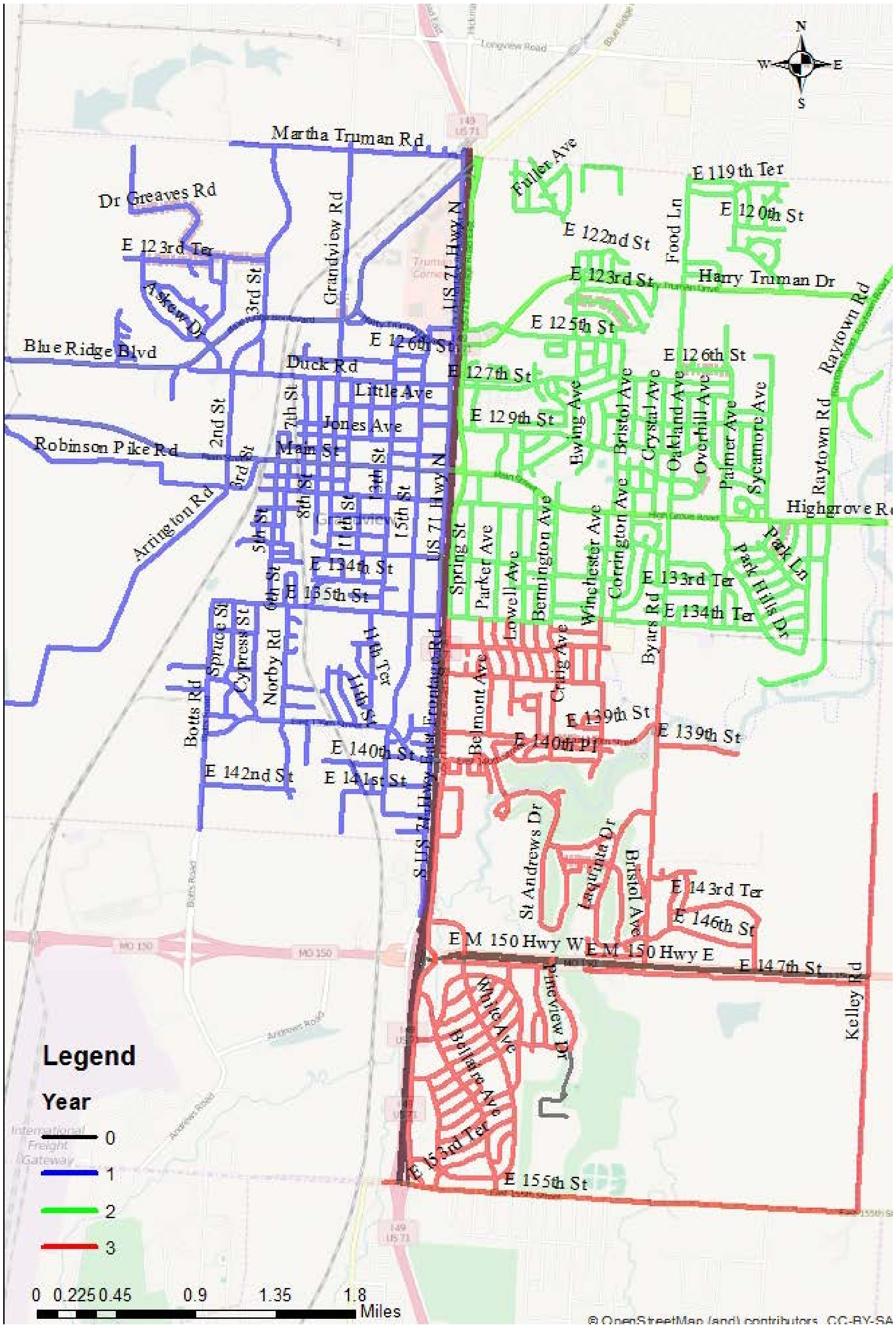





**Figure 8.1. Grandview map showing data collection over a three-year cycle**

The blue lines on the map represent PASER ratings that should be collected in year one (1), green lines represent PASER ratings that should be collected in year two (2), red lines represent PASER ratings that should be collected in year three (3), and black lines represent roads that are not maintained (0) by the city. This map should be used as a reference when conducting the data collection using the LDC.

Conducting the data collection on a three-year cycle facilitates treatment and pavement deterioration monitoring. Updating the PASER ratings leads to precise data-driven decisions when tracking pavement performance throughout the network.

In addition, the pavement treatments performed each year should be added to the Roadsoft database. This process will allow for the production of future pavement preservation plans and will assist the city in tracking pavement performance over time.

### 8.2 Service Request Tracking and Updating

Service requests act as a living part of the decision tree and at a minimum should be updated annually before the treatment selection process begins. The service request attribute in Roadsoft may also be updated more frequently if individual service requests for a link are received. The service request attribute should also be updated each time a treatment is made on a link. If a treatment is applied to an area where service requests have been made, then all service requests on the treated link should be saved as historical data and reset to zero.

Before the service requests are reset to zero after a treatment is applied, Grandview should export all service request data into a Microsoft Access database file reserved for historical data. This tracking will help provide information regarding general trends in service requests. These data may also help reveal treatment longevity. If a service request is made on the same link/segment 10 years after treatment, then the treatment lasted 10 years before service was needed. Tracking service requests can help Grandview perform a treatment before a service request is even made.

### 8.3 Analysis

The research team recommends that the pavement preservation plan be updated each year based on the updated PASER values, previous treatments applied, any applicable changes to the budget, and other factors. It is recommended that a five-year plan of projects be maintained. This procedure will help the city plan for future projects, anticipate future performance, and provide stakeholders with information regarding future roadway improvements. This five-year plan can be updated using Roadsoft to determine the allocation of funding and the decision tree analysis spreadsheet to select specific projects. Pavement preservation plans for longer time horizons can be developed as needed. Due to uncertainties for time horizons longer than five years, it may be more appropriate to limit the analysis to the allocation of funding among pavement treatment types instead of selecting specific projects.

### 8.4 Stakeholder Reporting

GIS integration is an important component of a TAM system. Roadsoft integrates with GIS through the importing and exporting of shapefiles. Maps showing road segments color-coded by

PASER values could be created in GIS for distribution to decision makers and shareholders. Showing changes to the network over time using color-coded maps helps stakeholders visualize the overall effects of different scenarios on the network. GIS maps could show the before-and-after PASER results of treatments and non-treatments, as shown in Figures 7.11 and 7.12.

The second reporting method that coincides with GIS integration is the before-and-after comparison of yearly APR. The Roadsoft program can be used to generate reports showing the number of lane-miles per PASER value and the APR for the Grandview network. The number of lane-miles per PASER value and the network's APR should be exported before and after treatments are applied to show the impacts that the treatments have on the overall system. This reporting function would be most beneficial when Grandview applies for road treatment grants or requests additional transportation funding for the city. The reports will show real-time information regarding Grandview's current overall pavement condition for a given year.

# CHAPTER 9. CONCLUSIONS

Agencies are beginning to realize that some means and methods for managing pavements are not the most optimal. These means and methods are limited by inadequate budgets (funding to support services), limited resources (training and implementation), deteriorating pavements (backlogs of required maintenance), and the increased public demands placed on transportation networks. The use of TAM empowers public agencies to invest their limited infrastructure funding using means and methods that will provide the greatest return on investment through the use of data-driven decision making that emphasizes keeping good roads in good condition.

In this project, a TAM system was implemented for the City of Grandview. The implementation process included many aspects. First, existing TAM practices were surveyed through a literature review and interviews with other communities. TAM goals were then developed for Grandview. In addition, several TAM systems were evaluated to determine the system that best fit the city's needs. Historical data regarding pavement condition, treatments, and service requests were analyzed. A complete pavement inventory of all streets within the city limits was performed, and both short-term and long-term pavement preservation plans were developed. Finally, recommendations for measures to ensure the sustainability of the TAM system were developed.

The ultimate goal of this project was to help Grandview make data-driven decisions to maximize infrastructure performance through the implementation of TAM. The implementation of TAM for Grandview as described in this report accomplishes this goal through the following steps:

- When using the decision tree, follow the pavement treatments (Appendix C) recommended by Roadsoft with the Optimized with Reconstruction scenario.
- Record pavement conditions (PASER values) for approximately one-third of the network each year (Figure 8.1) to accurately track and monitor pavement deterioration over time.
- Update the pavement preservation plan annually based on the updated PASER ratings, applied treatments, and any budget changes.
- Record all service requests.
- Produce APR reports for the entire network before and after each treatment is made via GIS and spreadsheet database tools.

The implementation of a TAM process and decision tree spreadsheet tool for Grandview has led to the following accomplishments:

- A TAM software evaluation spreadsheet was developed to help the city select a TAM system that best meets its needs and goals.
- An approach using best practices based on the TAM practices of other communities was developed for the city.
- TAM software was implemented and customized to meet the needs of Grandview.
- A complete pavement inventory was conducted of all roadways under the jurisdiction of the city.

- Approximately 7,000 pavement data points of historical and current data were integrated into the TAM software (Roadsoft).
- Approximately 1,400 MR&R treatment recommendations were provided for the next five years (2016 through 2020) that are designed to improve pavement condition by 16% while the buying power of the city decreases 2% annually.
- For the years 2021 through 2040, the number of lane-miles to be treated for different scenarios at different funding levels and discount rates was estimated.
- An automated treatment selection and allocation method via decision tree was developed.

The TAM approach used in this project can be customized for and implemented in other communities. The decision tree model benefits communities by accounting for all pavement assets and recommending the most cost-effective solutions for pavement MR&R to help communities obtain “the biggest bang for their buck.” The decision-based model takes into account various attributes (pavement rating, RSL, roadway classification, AADT, community budget, etc.). The TAM implementation framework established in this project can be customized based on the needs and goals of individual communities. The decision tree spreadsheet tool is an innovative solution to the challenges that local communities face due to the limited funding available for transportation infrastructure. The implementation of TAM will help local communities develop a pavement maintenance program that helps them maximize their limited resources through a “mix of fixes” approach that emphasizes keeping good roads in good condition.

## REFERENCES


Alkire, Bernie D. 2016. Module 6: Pavement Condition Indices. *CE 5403 Lecture Notes*. www.cee.mtu.edu/~balkire/CE5403/Lec12.pdf. (June 20, 2016).

ASTM International. 2009. *Standard Test Method for Airport Pavement Condition Index Surveys*, ASTM D5340-10. www.astm.org/Staandards/D5340.htm.

Arsham, H. 2015. Decision Tree and Influence Diagram. home.ubalt.edu/ntsbarsh/business-stat/opre/partIX.htm#rtreeinflunce. (July 31, 2016).

Beehive Industries. 2015. Our Software. beehiveindustries.com/our-software/. (July 10, 2015).

Borstad, T. A. 2012. *MicroPAVER: Technology That Works… for You*. 39th Annual Rocky Mountain Asphalt Conference & Equipment Show, Fort Collins, Colorado, February 22, 2012. www.rmaces.org/docs/micropaver_presentation-borstad_feb_2012.pdf. (June 20, 2016).

Caltrans. 2013. *2013 State of the Pavement Report: Based in the 2013 Pavement Condition Survey*. California Department of Transportation, Division of Maintenance, Pavement Program. www.dot.ca.gov/hq/maint/Pavement/Pavement_Program/PDF/2013_SOP_FINAL-Dec_2013-1-24-13.pdf.

Cambridge Systematics, Inc., Parsons Brinckerhoff Quade and Douglas, Inc., Roy Jorgensen Associates, Inc., and Paul D. Thompson. 2002. *Phase I Report, Task 2 of 3: Asset Management Framework*. NCHRP Web Document 41 (Project SP20-24[11]): Contractor's Final Report. onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w41_task2.pdf. (June 16, 2016).

Cartegraph. 2016. Cartegraph Feature Tour. www.cartegraph.com/meet-cartegraph/feature-tour/. (May 10, 2016).

Center for Technology & Training (CTT). 2012. *Integrated Roadway Asset Management*. roadsoft.newapple.trans.mtu.edu/sites/roadsoft/files/RoadsoftMI.pdf. (December 14, 2015).

Dingess, R. 2014. Better reporting: Utah DOT's data and planning tools provide a guide to the future and power of network-level asset data. *Roads & Bridges*, Vol. 52, No.1.

Elkins, G. E., Thompson, T. M., Groeger, J. L., Visintine, B., and Rada, G. R. 2013. *Reformulated Pavement Remaining Service Life Framework*. Federal Highway Administration, Turner-Fairbank Highway Research Center, McLean, VA.

Federal Highway Administration (FHWA). 1999. *Asset Management Primer*. Federal Highway Administration, Office of Asset Management, Washington, DC.

———. 2002. *Life–Cycle Cost Analysis Primer*. Federal Highway Administration, Office of Asset Management, Washington, DC.

———. 2003. *Economics in TAM: The New York Experience*. Transportation Asset Management Case Studies. Federal Highway Administration, Washington, DC.

———. 2007. *Asset Management Overview*. FHWA-IF-08-008. Federal Highway Administration, Washington, DC.

———. 2010. *Life–Cycle Cost Analysis: The Colorado Experience*. Transportation Asset Management Case Studies. Federal Highway Administration, Washington, DC.

———. 2012. *Managing and Maintaining Roadway Assets: The Utah Journey*. Transportation Asset Management Case Studies. Federal Highway Administration, Washington, DC.

Ferragut, T. and McNeil, S. 2008. *Transportation Asset Management: Strategic Workshop for Department of Transportation Executives: Transportation Research Circular E-C131*. Transportation Research Board, Washington, DC.

Galehouse, L. 2002. Strategic Planning for Preventive Maintenance: Michigan Department of Transportation's "Mix of Fixes" Program. *Transportation Research News*, No. 219, pp. 3–8.

Galehouse, L., Moulthrop, J. S., and Hicks, R. G. 2003. Principles of Pavement Preservation: Definitions, Benefits, Issues, and Barriers. *Transportation Research News*, No. 228, pp. 1–6.

Georgia DOT. 2014. *2014–2018 Transportation Asset Management Plan*. Georgia Department of Transportation. www.dot.ga.gov/BuildSmart/Programs/Documents/AssetMgmt/TAMPlan.pdf. (June 20, 2016).

Grimmer Software. 2016. RoadBump. www.grimmersoftware.com/roadbump.html. (June 20, 2016).

Haas, K. and Hensing, D. 2005. *Why Your Agency Should Consider Asset Management Systems for Roadway Safety*. Federal Highway Administration, McLean, VA.

Hawkins, N. and Smadi, O. 2013. *NCHRP Synthesis 439: Use of Transportation Asset Management Principles in State Highway Agencies*. National Cooperative Highway Research Program, Washington, DC.

Kraus, D. 2004. The Benefits of Asset Management and GASB 34. *Leadership and Management in Engineering*, Vol. 4, No. 1, pp. 17–18.

Kuhn, B. T., Jasek, D., Carson, J., Theiss, L., Songchitruksa, P., Perkins, J., Yang, Y., and Mwakalong, J. 2011. *Research on Asset Management for Safety and Operations*. FHWA/TX-12/0-6390-1. Texas A&M Transportation Institute, College Station, TX.

Lenexa, Kansas. 2013. 2014 Pavement Management Program. www.ci.lenexa.ks.us/Assets/departments/pmp/pdfs/2014%20Pavement%20Management%20Program%20GB%20Original.pdf. (June 20, 2016).

Lucity. 2016. Software Specifics. www.lucity.com/Software/Deployment-Integration-Reporting. (May 10, 2015).

Metropolitan Transportation Commission (MTC). 2016. StreetSaver: Keeping Good Roads Good. streetsaveronline.com/. (May 10, 2015).

Michigan Transportation Asset Management Council (TAMC). 2016a. About Us. tamc.mcgi.state.mi.us/TAMC/#/aboutus. (June 20, 2016).

———. 2016b. *Michigan's Roads and Bridges 2015 Annual Report*. Michigan Transportation Asset Management Council.

Mizusawa, D. and McNeil, S. 2009. Generic Methodology for Evaluating Net Benefit of Asset Management System Implementation. *Journal of Infrastructure Systems*, Vol. 15, No. 3, pp. 232–240.

Opus International Consultants Inc. 2011. *Local Agency Guidelines for Developing an Asset Management Process and Plan*. Michigan Transportation Asset Management Council.

Park, H.-A., Robert, W., and Lawrence, K. 2014. *2014 Transportation Asset Management Peer Exchange - Preparing for MAP-21 Implementation*. FHWA–HIF–14–013. Federal Highway Administration, Washington, DC.

Pubworks. 2016a. Pavement Assessment. www.pubworks.com/Departments/pavementassessment.aspx. (May 10, 2015).

Pubworks. 2016b. Products. www.pubworks.com/Products.aspx. (May 10, 2015).
Siffert, Bob. 2016. *Practical Pavement Management with Micro PAVER*. www.facers.org/wp-content/uploads/2011/01/Practical-Pavement-bob-seiffert.pdf. (June 20, 2016).
Takigawa, S. 2001. *California Department of Transportation's Asset Management Strategy: "Building and Implementing the Foundation."* Caltrans. www.slideshare.net/Jacknickelson/california-department-of-transportations-asset-management. (June 20, 2016).
U.S. Census Bureau. 2010. Quick Facts: Grandview City, Missouri. www.census.gov/quickfacts/table/PST045215/2928324. (May 5, 2015).
Urling, J. D. 2016. ESAL: Equivalent Single Axle Load. Minnesota Department of Transportation. www.dot.state.mn.us/stateaid/projectdelivery/pdp/pavement/esal-overview.pdf. (June 20, 2016).
Utah Local Technical Assistance Program (LTAP). 2016. Transportation Asset Management Software (TAMS). www.utahltap.org/software/tams.php. (May 10, 2015).
Walker, D. 2002. *Pavement Surface Evaluation and Rating*. Wisconsin Transportation Information Center, Madison, WI.
Walker, D., Entine, L., and Kummer, S. 2002. *Pavement Surface Evaluation and Rating (PASER) for Asphalt Roads*. Wisconsin Transportation Information Center, Madison, WI.
Water Finance Research Foundation. 2012. *Municipal Maintenance and Infrastructure Asset Management Systems: The 2012 Comparative Review*. www.waterfinancerf.org/studies-and-reports.html. (May 10, 2015).

# APPENDIX A. GETTING STARTED WITH ACCESS DATABASE AND ROADSOFT

## A.1 Introduction

This appendix provides some guidance for getting started using the Microsoft Access database of Grandview pavement data and the Roadsoft software.

The Microsoft Access database, GrandviewDB, is the location of all current and historical pavement data that is located in the city. GrandviewDB is made up of tables and queries that work collaboratively to help the user easily locate segments that are located in Grandview and input Roadsoft data. GrandviewDB is a utilization tool for the Roadsoft software. Since all historical and current data collection was done without the Roadsoft program, the team had to develop a way to easily manage the data and enter it into Roadsoft. GrandviewDB also stores information pertaining to Roadsoft and general items, including the following:

- File Locations
- Roadsoft Backup Information
- Roadsoft Database Information

Roadsoft is a pavement management system that analyzes data collected by the Laptop Data Collector (LDC) or manually for each individual link on a segment. Roadsoft's geographical information system (GIS) mapping tools allow users to easily select segments or search for segments on the network of Grandview.

Please follow the link for more information on how to use Roadsoft in the online Roadsoft Manual: http://roadsoft.org/sites/roadsoft/files/manual/#t=Introduction%2FIntroduction.htm.

## A.2 Getting Started

Roadsoft is the software program that is used in the implementation of Grandview's TAM system. It is used to store all current and historical data available and perform analysis to develop a pavement preservation plan for Grandview.

1. Navigate to the Website: www.roadsoft.org/downloads.

2. Select: **SetupRoadsoft7.8.7.exe –** make sure the word Update is not in the name.

    a. Once the file is finished downloading, run the file from the location the file was saved – usually in **Downloads Folder** in the C-drive.

        i. Do not run the download from the website.

3. Follow the prompts by clicking **Next**, there is no reason to change any of the prompts.

4. Once the download is complete (finish tab is selected) – Select **Finish.**

    a. Do not download SQL express when asked.

5. Open the **Roadsoft Icon** that is on the desktop.

6. When **Login Window** opens.

    a. Select the **Options**… button

    b. Select **Change Server/Database**…

        i. In the Connect to Server window, enter the server address and database name.

    c. Once Server/Database is loaded, Roadsoft will load the database and take you to the **Roadsoft User Login** window

        i. Enter the user credentials that were provided by the Administrator.

    d. Select **Login -** this will take you to the RS_Grandview Database (Figure A.1).

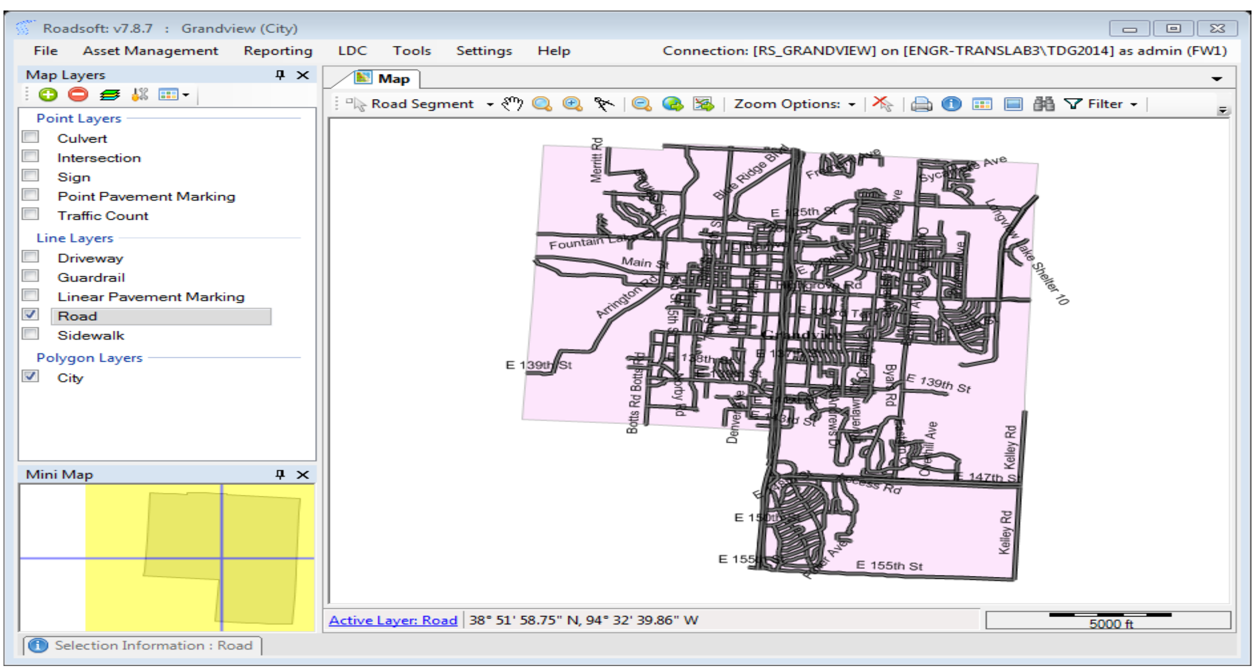



**Figure A.1. Roadsoft: v7.8.7: Grandview (City)**

To manage the Roadsoft software, use the navigation pane (left side of screenshot in Figure A.1) and refer to information in the online Roadsoft Manual at http://roadsoft.org/sites/roadsoft/files/manual/#t=Introduction%2FIntroduction.htm.

## APPENDIX B. NETWORK IMPROVEMENT RESULTS

**Table B.1. Lane-miles post and pretreatments per year using the TIGER Tree scenario**

| Surface Subtype | 2016–2020 Lane-Miles per PASER Rating | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **10** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **APR*** |
| **2016 Pre-Treatment** | 0.626 | 14.584 | 14.332 | 66.054 | 67.018 | 64.408 | 41.87 | 11.41 | 3.489 | 0.232 | 5.782 |
| **2016 Post-Treatments** | 0.626 | 14.516 | 103.958 | 12.811 | 45.727 | 48.834 | 41.958 | 11.41 | 3.489 | 0.232 | 6.278 |
| **2017 Pre-Treatment** | 0 | 0.626 | 14.588 | 103.065 | 28.84 | 38.499 | 62.028 | 22.632 | 12.286 | 0.997 | 5.452 |
| **2017 Post-Treatments** | 0 | 7.41 | 70.955 | 96.275 | 5.806 | 14.183 | 56.382 | 19.434 | 12.119 | 0.997 | 6.057 |
| **2018 Pre-Treatment** | 0 | 0 | 25.95 | 150.184 | 7.968 | 5.662 | 57.129 | 21.598 | 13.445 | 1.625 | 5.824 |
| **2018 Post-Treatments** | 0 | 9.864 | 89.356 | 95.265 | 2.74 | 4.174 | 56.556 | 11.734 | 12.247 | 1.625 | 6.311 |
| **2019 Pre-Treatment** | 0 | 0 | 24.846 | 127.828 | 44.122 | 0.429 | 45.684 | 23.492 | 13.227 | 3.933 | 5.779 |
| **2019 Post-Treatments** | 2.476 | 7.844 | 46.725 | 119.08 | 32.582 | 0.429 | 44.599 | 15.13 | 11.255 | 3.309 | 6.154 |
| **2020 Pre-Treatment** | 0 | 2.476 | 25.494 | 96.919 | 81.507 | 2.74 | 20.148 | 38.685 | 11.524 | 3.936 | 5.736 |
| **2020 Post-Treatments** | 1.188 | 10.552 | 64.183 | 88.501 | 51.236 | 2.74 | 20.148 | 30.609 | 11.158 | 3.114 | 6.185 |

## APPENDIX C. LIST OF RECOMMENDED TREATMENTS

### Table C.1. List of recommended treatments from TIGER Tree scenario

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 12 | Blue Ridge Blvd | 3rd St | Grandview Rd | 0.68 | Sealcoat | $8,202.00 | $5,593.76 |
| 2016 | 12 | Blue Ridge Blvd | Grandview Rd | Harry Truman Dr | 0.42 | Crack Seal | $2,500.00 | $1,050.00 |
| 2016 | 12 | Blue Ridge Blvd | Harry Truman Dr | S Us 71 Hwy West Frontage Rd | 3.18 | Sealcoat | $8,202.00 | $26,082.36 |
| 2016 | 12 | Blue Ridge Blvd | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2016 | 12 | Blue Ridge Blvd | Us 71 Hwy N | Us 71 Hwy N | 0.07 | Crack Seal | $2,500.00 | $162.50 |
| 2016 | 12 | Blue Ridge Blvd | Us 71 Hwy N | S Us 71 Hwy Off Ramp N | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2016 | 32 | Overhill Ave | E 134th Ter | E 134th St | 0.15 | Sealcoat | $8,202.00 | $1,213.90 |
| 2016 | 36 | Norby Rd | E 142nd St | 0 | 0.20 | Sealcoat | $8,202.00 | $1,640.40 |
| 2016 | 36 | Norby Rd | E 139th St | E 138th Ter | 0.13 | Sealcoat | $8,202.00 | $1,082.66 |
| 2016 | 36 | Norby Rd | E 138th Ter | E 138th St | 0.17 | Sealcoat | $8,202.00 | $1,361.53 |
| 2016 | 40 | E 130th St | Smalley Ave | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2016 | 40 | E 130th St | Jurisdiction Line | Sycamore Ave | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2016 | 50 | E 123rd Ter | Dead-End | Jurisdiction Line | 0.04 | Sealcoat | $8,202.00 | $328.08 |
| 2016 | 73 | 12th St | E 137th St | E 136th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2016 | 74 | Applewood Dr | E 138th St | E 137th Ter | 0.06 | Sealcoat | $8,202.00 | $475.72 |
| 2016 | 74 | Applewood Dr | E 137th Ter | E 137th Ter | 0.04 | Sealcoat | $8,202.00 | $295.27 |
| 2016 | 89 | Winchester Ave | Highgrove Rd | E 130th Ter | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2016 | 89 | Winchester Ave | E 127th Ter | E 127th St | 0.12 | Sealcoat | $8,202.00 | $1,017.05 |
| 2016 | 97 | Barat Ave | E 151st Ter | E 151st St | 0.11 | Sealcoat | $8,202.00 | $885.82 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 103 | Sunset Cir | Dead-End | Jurisdiction Line | 0.05 | Crack Seal | $2,500.00 | $130.00 |
| 2016 | 134 | Highgrove Rd | White Ave | Parker Ave | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2016 | 157 | E 137th St | Belmont Ave | Parker Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2016 | 166 | E 138th St | Norby Rd | Dead-End | 0.25 | Sealcoat | $8,202.00 | $2,066.90 |
| 2016 | 210 | 12th St | Jones Ave | Little Ave | 0.28 | Sealcoat | $8,202.00 | $2,312.96 |
| 2016 | 210 | 12th St | Little Ave | Duck Rd | 0.22 | Sealcoat | $8,202.00 | $1,804.44 |
| 2016 | 234 | Fountain Lake Cir | Jurisdiction Line | Jurisdiction Line | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 237 | 6th St | Pinkston Ave | Highgrove Rd | 0.16 | Crack Seal | $2,500.00 | $395.00 |
| 2016 | 261 | Access Rd | Newton Ave | Holiday Dr | 0.33 | Sealcoat | $8,202.00 | $2,690.26 |
| 2016 | 264 | E 139th St | Botts Rd | Spruce St | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2016 | 264 | E 139th St | Spruce St | E 140th St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 264 | E 139th St | E 140th St | E 138th St | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2016 | 264 | E 139th St | E 138th St | Norby Rd | 0.35 | Crack Seal | $2,500.00 | $870.00 |
| 2016 | 266 | Botts Rd | Dead-End | E 142nd St | 0.59 | Crack Seal | $2,500.00 | $1,470.00 |
| 2016 | 266 | Botts Rd | E 142nd St | E 140th St | 0.66 | Crack Seal | $2,500.00 | $1,650.00 |
| 2016 | 266 | Botts Rd | E 140th St | E 139th St | 0.26 | Sealcoat | $8,202.00 | $2,116.12 |
| 2016 | 266 | Botts Rd | E 138th St | E 137th Ter | 0.13 | Sealcoat | $8,202.00 | $1,082.66 |
| 2016 | 266 | Botts Rd | E 137th Ter | E 136th St | 0.51 | Crack Seal | $2,500.00 | $1,267.50 |
| 2016 | 266 | Botts Rd | E 136th St | E 135th St | 0.38 | Crack Seal | $2,500.00 | $937.50 |
| 2016 | 268 | Lowell Ave | Dead-End | Jurisdiction Line | 0.03 | Sealcoat | $8,202.00 | $278.87 |
| 2016 | 295 | E 128th St | Cambridge Ave | Winchester Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2016 | 295 | E 128th St | Winchester Ave | Bristol Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 295 | E 128th St | Bristol Ave | Corrington Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2016 | 295 | E 128th St | Corrington Ave | Crystal Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2016 | 295 | E 128th St | Crystal Ave | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 295 | E 128th St | Byars Rd | Oakland Ave | 0.12 | Crack Seal | $2,500.00 | $300.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 295 | E 128th St | Oakland Ave | Richmond Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 295 | E 128th St | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 295 | E 128th St | Overhill Ave | Manchester Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 295 | E 128th St | Palmer Ave | Smalley Ave | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |
| 2016 | 295 | E 128th St | Smalley Ave | Sycamore Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 299 | White Ave | E 129th St | E 127th St | 0.37 | Crack Seal | $2,500.00 | $930.00 |
| 2016 | 299 | White Ave | E 127th St | E 126th St | 0.06 | Sealcoat | $8,202.00 | $524.93 |
| 2016 | 313 | Goode Ave | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2016 | 313 | Goode Ave | 15th St | S Us 71 Hwy Off Ramp N | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2016 | 320 | Crystal Ave | E 130th St | E 129th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2016 | 323 | Sycamore Ave | Highgrove Rd | E 130th St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2016 | 323 | Sycamore Ave | E 130th St | E 130th St | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2016 | 323 | Sycamore Ave | E 130th St | E 129th Ter | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 323 | Sycamore Ave | E 129th Ter | E 128th St | 0.45 | Sealcoat | $8,202.00 | $3,707.30 |
| 2016 | 323 | Sycamore Ave | E 128th St | E 127th Ter | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 323 | Sycamore Ave | E 127th Ter | E 125th St | 0.51 | Sealcoat | $8,202.00 | $4,150.21 |
| 2016 | 324 | E 129th St | Byars Rd | Oakland Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2016 | 324 | E 129th St | Oakland Ave | Richmond Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2016 | 324 | E 129th St | Richmond Ave | Overhill Ave | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2016 | 328 | Bristol Ave | E 129th St | E 128th St | 0.25 | Sealcoat | $8,202.00 | $2,017.69 |
| 2016 | 328 | Bristol Ave | E 128th St | E 127th St | 0.34 | Sealcoat | $8,202.00 | $2,788.68 |
| 2016 | 331 | Overhill Ave | E 129th Ter | E 129th St | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2016 | 331 | Overhill Ave | E 129th St | E 128th St | 0.18 | Crack Seal | $2,500.00 | $460.00 |
| 2016 | 347 | E 126th St | Craig Ave | Ewing Ave | 0.19 | Crack Seal | $2,500.00 | $465.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 347 | E 126th St | Ewing Ave | Cambridge Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2016 | 354 | Southview Dr | Dead-End | Smalley Ave | 0.04 | Crack Seal | $2,500.00 | $110.00 |
| 2016 | 354 | Southview Dr | Smalley Ave | Sunset Cir | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 354 | Southview Dr | Sunset Cir | Jurisdiction Line | 0.14 | Crack Seal | $2,500.00 | $360.00 |
| 2016 | 354 | Southview Dr | Jurisdiction Line | Sunset Cir | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2016 | 354 | Southview Dr | Sunset Cir | Harry Truman Dr | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2016 | 359 | Bennington Ave | E 125th St | E 124th St | 0.22 | Sealcoat | $8,202.00 | $1,820.84 |
| 2016 | 359 | Bennington Ave | E 124th St | E 123rd Ter | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 359 | Bennington Ave | E 123rd Ter | E 123rd St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 359 | Bennington Ave | Harry Truman Dr | E 122nd Ter | 0.05 | Crack Seal | $2,500.00 | $135.00 |
| 2016 | 359 | Bennington Ave | E 122nd Ter | E 122nd St | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2016 | 365 | E 143rd St | St Andrews Dr | Craig Ave | 0.10 | Sealcoat | $8,202.00 | $853.01 |
| 2016 | 365 | E 143rd St | Craig Ave | Jurisdiction Line | 0.36 | Sealcoat | $8,202.00 | $2,919.91 |
| 2016 | 377 | E 122nd St | Food Ln | Richmond Ave | 0.30 | Sealcoat | $8,202.00 | $2,493.41 |
| 2016 | 403 | E 133rd St | 5th St | 6th St | 0.09 | Sealcoat | $8,202.00 | $721.78 |
| 2016 | 403 | E 133rd St | 6th St | 7th St | 0.09 | Sealcoat | $8,202.00 | $705.37 |
| 2016 | 409 | E 132nd St | Corrington Ave | Jurisdiction Line | 0.09 | Sealcoat | $8,202.00 | $705.37 |
| 2016 | 409 | E 132nd St | Jurisdiction Line | Crystal Ave | 0.06 | Sealcoat | $8,202.00 | $459.31 |
| 2016 | 409 | E 132nd St | Crystal Ave | E 131st St | 0.06 | Sealcoat | $8,202.00 | $459.31 |
| 2016 | 409 | E 132nd St | E 131st St | Eastern Ave | 0.06 | Sealcoat | $8,202.00 | $492.12 |
| 2016 | 409 | E 132nd St | Eastern Ave | Byars Rd | 0.07 | Sealcoat | $8,202.00 | $557.74 |
| 2016 | 411 | E 125th St | Harry Truman Dr | Belmead Ave | 0.55 | Sealcoat | $8,202.00 | $4,511.10 |
| 2016 | 411 | E 125th St | Belmead Ave | Bennington Ave | 0.07 | Sealcoat | $8,202.00 | $606.95 |
| 2016 | 411 | E 125th St | Ewing Ave | Ewing Ct | 0.04 | Sealcoat | $8,202.00 | $344.48 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2016 | 411 | E 125th St | Cambridge Ave | Winchester Ave | 0.08 | Sealcoat | $8,202.00 | $639.76 |
| 2016 | 416 | Palmer Ave | E 128th St | E 129th Ter | 0.38 | Sealcoat | $8,202.00 | $3,116.76 |
| 2016 | 437 | E 133rd St | Spring St | Parker Ave | 0.25 | Sealcoat | $8,202.00 | $2,066.90 |
| 2016 | 469 | 12th St | E 135th St | E 136th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2016 | 486 | Sycamore Ave | Jurisdiction Line | Dead-End | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 487 | Craig Ave | E 136th St | E 137th St | 0.32 | Sealcoat | $8,202.00 | $2,591.83 |
| 2016 | 512 | E 133rd Ter | 8th St | Grandview Rd | 0.15 | Sealcoat | $8,202.00 | $1,197.49 |
| 2016 | 522 | Bristol Ave | E 134th Ter | Crystal Ave | 0.10 | Sealcoat | $8,202.00 | $836.60 |
| 2016 | 522 | Bristol Ave | Crystal Ave | Corrington Ave | 0.11 | Sealcoat | $8,202.00 | $869.41 |
| 2016 | 522 | Bristol Ave | Corrington Ave | E 133rd Ter | 0.15 | Sealcoat | $8,202.00 | $1,230.30 |
| 2016 | 522 | Bristol Ave | E 133rd Ter | E 132nd St | 0.27 | Sealcoat | $8,202.00 | $2,198.14 |
| 2016 | 534 | 7th St | 6th St | E 135th St | 0.27 | Crack Seal | $2,500.00 | $680.00 |
| 2016 | 559 | E 147th St | Dead-End | Access Rd | 0.06 | Sealcoat | $8,202.00 | $459.31 |
| 2016 | 559 | E 147th St | Access Rd | Dead-End | 0.27 | Sealcoat | $8,202.00 | $2,247.35 |
| 2016 | 560 | E 147th St | Dead-End | E Outer Belt Rd | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2016 | 560 | E 147th St | Byars Rd | Kelley Rd | 1.97 | Sealcoat | $8,202.00 | $16,190.75 |
| 2016 | 605 | E 134th Ter | Winchester Ave | Bristol Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 605 | E 134th Ter | Bristol Ave | Byars Rd | 0.44 | Sealcoat | $8,202.00 | $3,625.28 |
| 2016 | 605 | E 134th Ter | Overhill Ave | Manchester Ave | 0.12 | Sealcoat | $8,202.00 | $951.43 |
| 2016 | 605 | E 134th Ter | Park Hills Dr | E 135th St | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2016 | 605 | E 134th Ter | E 135th St | Donnelly Ave | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2016 | 615 | Craig Ave | E 132nd St | E 133rd Ter | 0.26 | Sealcoat | $8,202.00 | $2,148.92 |
| 2016 | 627 | E 138th St | Jurisdiction Line | Winchester Ave | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2016 | 633 | E 137th St | 11th Ter | Dead-End | 0.04 | Crack Seal | $2,500.00 | $110.00 |
| 2016 | 640 | E 138th Ter | Dead-End | Jurisdiction Line | 0.17 | Crack Seal | $2,500.00 | $425.00 |
| 2016 | 640 | E 138th Ter | Jurisdiction Line | Winchester Ave | 0.17 | Crack Seal | $2,500.00 | $415.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 644 | E 127th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.14 | Sealcoat | $8,202.00 | $1,131.88 |
| 2016 | 644 | E 127th St | White Ave | Applewood Dr | 0.53 | Crack Seal | $2,500.00 | $1,325.00 |
| 2016 | 644 | E 127th St | Applewood Dr | Lowell Ave | 0.09 | Sealcoat | $8,202.00 | $705.37 |
| 2016 | 644 | E 127th St | Lowell Ave | Belmead Ave | 0.10 | Sealcoat | $8,202.00 | $787.39 |
| 2016 | 644 | E 127th St | Belmead Ave | Craig Ave | 0.18 | Sealcoat | $8,202.00 | $1,459.96 |
| 2016 | 692 | Corrington Ave | E 128th St | E 127th St | 0.36 | Sealcoat | $8,202.00 | $2,919.91 |
| 2016 | 712 | E 143rd St | Oakland Ct | Richmond Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2016 | 712 | E 143rd St | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 712 | E 143rd St | Overhill Ave | Dead-End | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2016 | 714 | Cambridge Ave | E 136th St | E 135th St | 0.12 | Sealcoat | $8,202.00 | $984.24 |
| 2016 | 714 | Cambridge Ave | E 135th St | E 134th Ter | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2016 | 719 | E 131st St | E 132nd St | Jurisdiction Line | 0.22 | Sealcoat | $8,202.00 | $1,837.25 |
| 2016 | 719 | E 131st St | Jurisdiction Line | Corrington Ave | 0.22 | Sealcoat | $8,202.00 | $1,820.84 |
| 2016 | 737 | Sunset Cir | Southview Dr | Jurisdiction Line | 0.08 | Sealcoat | $8,202.00 | $688.97 |
| 2016 | 737 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.02 | Sealcoat | $8,202.00 | $131.23 |
| 2016 | 737 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.21 | Sealcoat | $8,202.00 | $1,722.42 |
| 2016 | 737 | Sunset Cir | Jurisdiction Line | Southview Dr | 0.26 | Sealcoat | $8,202.00 | $2,116.12 |
| 2016 | 746 | E 130th St | Winchester Ave | Bristol Cir | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2016 | 746 | E 130th St | Corrington Ave | Crystal Ave | 0.14 | Sealcoat | $8,202.00 | $1,131.88 |
| 2016 | 746 | E 130th St | Crystal Ave | Byars Rd | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2016 | 751 | E 138th Ter | Norby Rd | Dead-End | 0.27 | Sealcoat | $8,202.00 | $2,181.73 |
| 2016 | 755 | Manchester Ave | E 127th Ter | E 127th Pl | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2016 | 755 | Manchester Ave | E 127th Pl | E 127th St | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |

**2016–2020 List of Treatments**

| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
|---|---|---|---|---|---|---|---|---|
| 2016 | 755 | Manchester Ave | E 126th St | Dead-End | 0.38 | Sealcoat | $8,202.00 | $3,149.57 |
| 2016 | 756 | Fountain Lake Cir | Dead-End | Jurisdiction Line | 0.04 | Crack Seal | $2,500.00 | $100.00 |
| 2016 | 756 | Fountain Lake Cir | Jurisdiction Line | Jurisdiction Line | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2016 | 769 | Armitage Dr | Dead-End | Jurisdiction Line | 0.06 | Sealcoat | $8,202.00 | $459.31 |
| 2016 | 771 | E 122nd Ter | Ewing Ave | Craig Ave | 0.10 | Sealcoat | $8,202.00 | $836.60 |
| 2016 | 771 | E 122nd Ter | Craig Ave | Cambridge Ave | 0.10 | Sealcoat | $8,202.00 | $853.01 |
| 2016 | 771 | E 122nd Ter | Cambridge Ave | Dead-End | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2016 | 793 | Spruce St | E 138th St | E 139th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2016 | 795 | Ewing Ave | E 122nd St | E 122nd Ter | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2016 | 812 | E 122nd Ter | Food Ln | Richmond Ave | 0.31 | Sealcoat | $8,202.00 | $2,575.43 |
| 2016 | 822 | Fuller Ave | Bennington Ave | Armitage Dr | 0.25 | Sealcoat | $8,202.00 | $2,034.10 |
| 2016 | 827 | E 129th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 827 | E 129th St | White Ave | Booth Ln | 0.29 | Crack Seal | $2,500.00 | $735.00 |
| 2016 | 827 | E 129th St | Booth Ln | E 128th Ter | 0.06 | Crack Seal | $2,500.00 | $145.00 |
| 2016 | 827 | E 129th St | E 128th Ter | Beacon St | 0.08 | Crack Seal | $2,500.00 | $190.00 |
| 2016 | 827 | E 129th St | Craig Ave | Ewing Ave | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2016 | 827 | E 129th St | Ewing Ave | Bennington Ave | 0.04 | Crack Seal | $2,500.00 | $95.00 |
| 2016 | 827 | E 129th St | Bennington Ave | Cambridge Ave | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2016 | 827 | E 129th St | Cambridge Ave | Winchester Ave | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 847 | Bennington Ave | E 140th Ter | E 139th St | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2016 | 847 | Bennington Ave | E 137th St | E 136th St | 0.29 | Sealcoat | $8,202.00 | $2,394.98 |
| 2016 | 847 | Bennington Ave | E 136th St | E 135th St | 0.17 | Sealcoat | $8,202.00 | $1,361.53 |
| 2016 | 847 | Bennington Ave | E 135th St | E 134th Ter | 0.07 | Sealcoat | $8,202.00 | $541.33 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 847 | Bennington Ave | E 134th St | E 133rd Ter | 0.24 | Sealcoat | $8,202.00 | $1,935.67 |
| 2016 | 847 | Bennington Ave | Brentwood Ct | Highgrove Rd | 0.11 | Sealcoat | $8,202.00 | $935.03 |
| 2016 | 865 | Cambridge Ave | E 126th St | E 125th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2016 | 867 | E 119th Ter | Food Ln | Smalley Ave | 0.40 | Crack Seal | $2,500.00 | $995.00 |
| 2016 | 889 | Fuller Ave | White Ave | Bellaire Ave | 0.40 | Crack Seal | $2,500.00 | $995.00 |
| 2016 | 909 | E 122nd St | Bennington Ave | Ewing Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2016 | 909 | E 122nd St | Ewing Ave | Craig Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2016 | 909 | E 122nd St | Craig Ave | Cambridge Ave | 0.15 | Crack Seal | $2,500.00 | $365.00 |
| 2016 | 909 | E 122nd St | Cambridge Ave | Dead-End | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2016 | 911 | Beacon Ave | E 119th Ter | E 120th Ter | 0.40 | Crack Seal | $2,500.00 | $990.00 |
| 2016 | 935 | Winchester Ave | E 134th Ter | E 134th St | 0.24 | Sealcoat | $8,202.00 | $2,001.29 |
| 2016 | 935 | Winchester Ave | E 133rd Ter | E 132nd St | 0.26 | Sealcoat | $8,202.00 | $2,148.92 |
| 2016 | 956 | E 127th Ter | Craig Ave | Ewing Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2016 | 956 | E 127th Ter | Ewing Ave | Cambridge Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 956 | E 127th Ter | Cambridge Ave | Winchester Ave | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2016 | 963 | E 135th St | S Us 71 Hwy East Frontage Rd | Spring St | 0.15 | Crack Seal | $2,500.00 | $385.00 |
| 2016 | 968 | Oakland Ave | E 128th St | E 127th Pl | 0.27 | Sealcoat | $8,202.00 | $2,247.35 |
| 2016 | 1006 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.09 | Sealcoat | $8,202.00 | $754.58 |
| 2016 | 1011 | Belmead Ave | E 135th St | E 134th St | 0.30 | Sealcoat | $8,202.00 | $2,477.00 |
| 2016 | 1039 | Fuller Ave | Highgrove Rd | Main St | 0.16 | Sealcoat | $8,202.00 | $1,279.51 |
| 2016 | 1049 | Southview Dr | Jurisdiction Line | Dead-End | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2016 | 1054 | E 127th St | Bristol Ave | Corrington Ave | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2016 | 1054 | E 127th St | Corrington Ave | Crystal Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 1054 | E 127th St | Crystal Ave | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $285.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1083 | E 140th St | Dead-End | Southern Rd | 0.26 | Crack Seal | $2,500.00 | $660.00 |
| 2016 | 1103 | Bristol Ave | E 130th Ter | E 130th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2016 | 1105 | E 133rd St | Park Ln | Park Entrance | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2016 | 1129 | Crystal Ave | E 129th St | E 128th St | 0.24 | Crack Seal | $2,500.00 | $610.00 |
| 2016 | 1129 | Crystal Ave | E 128th St | E 127th St | 0.38 | Crack Seal | $2,500.00 | $955.00 |
| 2016 | 1133 | Sycamore Ave | Dead-End | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2016 | 1140 | Raytown Rd | Highgrove Rd | Longview Lake Access Rd | 1.06 | Crack Seal | $2,500.00 | $2,655.00 |
| 2016 | 1171 | Smalley Ave | Highgrove Rd | E 130th Ct | 0.07 | Crack Seal | $2,500.00 | $165.00 |
| 2016 | 1171 | Smalley Ave | E 130th Ct | E 130th Ct | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2016 | 1175 | Pinkston Ave | 6th St | Dead-End | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2016 | 1194 | Park Hills Dr | Ashland Ave | Herrick Ave | 0.15 | Sealcoat | $8,202.00 | $1,263.11 |
| 2016 | 1202 | Parker Ave | E 133rd St | Highgrove Rd | 0.50 | Sealcoat | $8,202.00 | $4,117.40 |
| 2016 | 1265 | 3rd St | Main St | Robinson Pike Rd | 0.23 | Crack Seal | $2,500.00 | $570.00 |
| 2016 | 1301 | E 135th St | 12th St | 13th St | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2016 | 1301 | E 135th St | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2016 | 1301 | E 135th St | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2016 | 1308 | Unnamed Rd | Dead-End | Lawndale Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 1321 | E 140th St | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.13 | Crack Seal | $2,500.00 | $312.50 |
| 2016 | 1321 | E 140th St | Us 71 Hwy N | Us 71 Hwy N | 0.05 | Crack Seal | $2,500.00 | $112.50 |
| 2016 | 1321 | E 140th St | Us 71 Hwy N | S Us 71 Hwy East Frontage Rd | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2016 | 1321 | E 140th St | S Us 71 Hwy East Frontage Rd | Dunbar Ct | 0.10 | Sealcoat | $8,202.00 | $853.01 |
| 2016 | 1321 | E 140th St | Dunbar Ct | Dunbar Ct | 0.19 | Sealcoat | $8,202.00 | $1,541.98 |
| 2016 | 1321 | E 140th St | Dunbar Ct | Dunoon St | 0.17 | Sealcoat | $8,202.00 | $1,377.94 |
| 2016 | 1321 | E 140th St | Dunoon St | Dundee Cir | 0.10 | Sealcoat | $8,202.00 | $820.20 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1321 | E 140th St | Dundee Cir | Dunham St | 0.08 | Sealcoat | $8,202.00 | $656.16 |
| 2016 | 1321 | E 140th St | Dunham St | Dundee Cir | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2016 | 1321 | E 140th St | Dundee Cir | Merrywood Ln | 0.13 | Sealcoat | $8,202.00 | $1,082.66 |
| 2016 | 1321 | E 140th St | Merrywood Ln | Falkirk Cir | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2016 | 1321 | E 140th St | Falkirk Cir | Jurisdiction Line | 0.23 | Crack Seal | $2,500.00 | $580.00 |
| 2016 | 1321 | E 140th St | Jurisdiction Line | Falkirk Cir | 0.15 | Sealcoat | $8,202.00 | $1,213.90 |
| 2016 | 1324 | Jones Ave | Grandview Rd | 10th St | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 1324 | Jones Ave | 10th St | 12th St | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2016 | 1324 | Jones Ave | 13th St | 15th St | 0.25 | Sealcoat | $8,202.00 | $2,050.50 |
| 2016 | 1340 | E 139th Ter | Southern Rd | Dead-End | 0.08 | Sealcoat | $8,202.00 | $672.56 |
| 2016 | 1348 | Applewood Dr | Lemontree Ln | Dead-End | 0.17 | Crack Seal | $2,500.00 | $435.00 |
| 2016 | 1364 | E 140th St | Botts Rd | E 139th St | 0.49 | Crack Seal | $2,500.00 | $1,230.00 |
| 2016 | 1421 | E 141st St | Southern Rd | S Us 71 Hwy West Frontage Rd | 0.39 | Sealcoat | $8,202.00 | $3,165.97 |
| 2016 | 1428 | Smalley Ave | E 128th St | E 129th Ter | 0.42 | Sealcoat | $8,202.00 | $3,428.44 |
| 2016 | 1445 | E 130th St | Manchester Ave | Sycamore Ave | 0.40 | Sealcoat | $8,202.00 | $3,297.20 |
| 2016 | 1446 | E 147th St | Dead-End | White Ave | 0.18 | Crack Seal | $2,500.00 | $440.00 |
| 2016 | 1446 | E 147th St | White Ave | Fuller Ave | 0.40 | Crack Seal | $2,500.00 | $1,000.00 |
| 2016 | 1446 | E 147th St | Fuller Ave | Pineview Dr | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2016 | 1446 | E 147th St | Pineview Dr | Grand Summit Blvd | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 1490 | Craig Ave | E 129th St | E 127th Ter | 0.32 | Sealcoat | $8,202.00 | $2,624.64 |
| 2016 | 1490 | Craig Ave | E 127th St | E 126th St | 0.04 | Crack Seal | $2,500.00 | $100.00 |
| 2016 | 1490 | Craig Ave | E 126th St | E 125th Pl | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2016 | 1490 | Craig Ave | E 125th Pl | E 125th St | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 1515 | White Ave | E M 150 Hwy W | S Us 71 Hwy East Frontage Rd | 0.78 | Sealcoat | $8,202.00 | $6,422.17 |
| 2016 | 1561 | Park Hills Dr | E M 150 Hwy W | E 146th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2016 | 1561 | Park Hills Dr | E 146th St | E 143rd Ter | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2016 | 1567 | 6th St | Dead-End | Zumwalt Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2016 | 1576 | Unnamed Rd | Valley Brook Dr | Dead-End | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2016 | 1582 | E 155th St | E 153rd Ter | Bellaire Ave | 0.54 | Sealcoat | $8,202.00 | $4,412.68 |
| 2016 | 1585 | Duck Rd | 13th St | 14th St | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2016 | 1585 | Duck Rd | 14th St | 15th St | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |
| 2016 | 1591 | Main St | Dead-End | 2nd St | 3.05 | Crack Seal | $2,500.00 | $7,627.50 |
| 2016 | 1591 | Main St | 3rd St | 5th St | 0.27 | Sealcoat | $8,202.00 | $2,214.54 |
| 2016 | 1591 | Main St | 5th St | 6th St | 0.21 | Sealcoat | $8,202.00 | $1,738.82 |
| 2016 | 1591 | Main St | 6th St | 7th St | 0.26 | Crack Seal | $2,500.00 | $660.00 |
| 2016 | 1591 | Main St | 7th St | 8th St | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2016 | 1591 | Main St | 8th St | Grandview Rd | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2016 | 1591 | Main St | Grandview Rd | 10th St | 0.19 | Crack Seal | $2,500.00 | $472.50 |
| 2016 | 1591 | Main St | 10th St | 10th St | 0.01 | Crack Seal | $2,500.00 | $22.50 |
| 2016 | 1591 | Main St | 10th St | 12th St | 0.50 | Crack Seal | $2,500.00 | $1,260.00 |
| 2016 | 1591 | Main St | 12th St | 13th St | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2016 | 1591 | Main St | 13th St | 15th St | 0.50 | Crack Seal | $2,500.00 | $1,250.00 |
| 2016 | 1591 | Main St | 15th St | S Us 71 Hwy West Frontage Rd | 0.50 | Crack Seal | $2,500.00 | $1,240.00 |
| 2016 | 1591 | Main St | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.11 | Crack Seal | $2,500.00 | $262.50 |
| 2016 | 1591 | Main St | Fuller Ave | Bennington Ave | 0.59 | Sealcoat | $8,202.00 | $4,839.18 |
| 2016 | 1592 | Byars Rd | E 139th St | E 134th Ter | 0.88 | Sealcoat | $8,202.00 | $7,217.76 |
| 2016 | 1592 | Byars Rd | E 133rd Ter | E 133rd St | 0.11 | Sealcoat | $8,202.00 | $885.82 |
| 2016 | 1592 | Byars Rd | E 133rd St | E 132nd Ter | 0.18 | Sealcoat | $8,202.00 | $1,476.36 |
| 2016 | 1592 | Byars Rd | E 132nd Ter | E 132nd St | 0.13 | Sealcoat | $8,202.00 | $1,058.06 |
| 2016 | 1592 | Byars Rd | E 132nd St | Highgrove Rd | 0.49 | Sealcoat | $8,202.00 | $4,010.78 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1592 | Byars Rd | E 127th St | E 126th St | 0.12 | Sealcoat | $8,202.00 | $951.43 |
| 2016 | 1593 | Brentwood Ct | Dead-End | Bennington Ave | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2016 | 1594 | 13th St | Jones Ave | Little Ave | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2016 | 1594 | 13th St | Little Ave | Duck Rd | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2016 | 1595 | 15th St | Duck Rd | Skyline Dr | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2016 | 1595 | 15th St | E 126th St | Harry Truman Dr | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2016 | 1596 | Little Ave | 10th St | 12th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2016 | 1597 | Crystal Pl | Laquinta Dr | Dead-End | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2016 | 1598 | Rhodes Ave | Dead-End | 5th St | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2016 | 1598 | Rhodes Ave | 5th St | 6th St | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2016 | 1602 | Bellaire Ave | E 155th St | E 154th Ter | 0.12 | Sealcoat | $8,202.00 | $1,017.05 |
| 2016 | 1602 | Bellaire Ave | E 151st Ter | E 151st St | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2016 | 1603 | Grandview Rd | Main St | Goode Ave | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2016 | 1603 | Grandview Rd | Goode Ave | Jones Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 1603 | Grandview Rd | Jones Ave | Lena Ave | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2016 | 1603 | Grandview Rd | Lena Ave | Little Ave | 0.18 | Crack Seal | $2,500.00 | $455.00 |
| 2016 | 1603 | Grandview Rd | Little Ave | Duck Rd | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2016 | 1603 | Grandview Rd | Duck Rd | Zumwalt Ave | 0.16 | Crack Seal | $2,500.00 | $390.00 |
| 2016 | 1603 | Grandview Rd | Zumwalt Ave | Skyline Dr | 0.02 | Crack Seal | $2,500.00 | $55.00 |
| 2016 | 1603 | Grandview Rd | Skyline Dr | Blue Ridge Blvd | 0.33 | Crack Seal | $2,500.00 | $835.00 |
| 2016 | 1606 | Donnelly Ave | E 134th Ter | E 134th St | 0.11 | Sealcoat | $8,202.00 | $885.82 |
| 2016 | 1609 | 5th St | E 135th St | Deweese Ave | 0.39 | Crack Seal | $2,500.00 | $975.00 |
| 2016 | 1609 | 5th St | Deweese Ave | Butcher Ave | 0.07 | Crack Seal | $2,500.00 | $165.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1609 | 5th St | Butcher Ave | E 133rd St | 0.08 | Crack Seal | $2,500.00 | $195.00 |
| 2016 | 1609 | 5th St | Dewey Ave | Pinkston Ave | 0.15 | Crack Seal | $2,500.00 | $380.00 |
| 2016 | 1609 | 5th St | Pinkston Ave | Highgrove Rd | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2016 | 1609 | 5th St | Highgrove Rd | Rhodes Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2016 | 1609 | 5th St | Rhodes Ave | Main St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 1609 | 5th St | Main St | Goode Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 1610 | Harry Truman Dr | 15th St | S Us 71 Hwy West Frontage Rd | 0.54 | Sealcoat | $8,202.00 | $4,388.07 |
| 2016 | 1610 | Harry Truman Dr | E 125th St | Bennington Ave | 0.86 | Crack Seal | $2,500.00 | $2,140.00 |
| 2016 | 1610 | Harry Truman Dr | Bennington Ave | Crystal Ave | 0.65 | Crack Seal | $2,500.00 | $1,615.00 |
| 2016 | 1610 | Harry Truman Dr | Crystal Ave | Byars Rd | 0.24 | Sealcoat | $8,202.00 | $1,984.88 |
| 2016 | 1613 | E 140th Pl | Bennington Ave | Winchester Ave | 0.41 | Sealcoat | $8,202.00 | $3,362.82 |
| 2016 | 1615 | E 151st St | Barat Ave | Bellaire Ave | 0.29 | Sealcoat | $8,202.00 | $2,411.39 |
| 2016 | 1617 | Merrywood Ln | St Andrews Dr | E 140th St | 0.35 | Crack Seal | $2,500.00 | $880.00 |
| 2016 | 1620 | Martha Truman Rd | Dead-End | Cartwright Ave | 0.39 | Crack Seal | $2,500.00 | $980.00 |
| 2016 | 1621 | Jackson Ave | Norton Ave | Dr Greaves Rd | 0.23 | Crack Seal | $2,500.00 | $585.00 |
| 2016 | 1623 | St Andrews Dr | Riverlawn Ct | Riverlawn Dr | 0.09 | Sealcoat | $8,202.00 | $721.78 |
| 2016 | 1626 | Valley Brook Dr | Monroe St | Unnamed Rd | 0.34 | Crack Seal | $2,500.00 | $840.00 |
| 2016 | 1626 | Valley Brook Dr | Unnamed Rd | Unnamed Rd | 0.02 | Crack Seal | $2,500.00 | $55.00 |
| 2016 | 1626 | Valley Brook Dr | Unnamed Rd | Unnamed Rd | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2016 | 1626 | Valley Brook Dr | Unnamed Rd | Jackson Ave | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2016 | 1628 | Oakland Ct | Dead-End | E 143rd St | 0.08 | Crack Seal | $2,500.00 | $200.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1633 | E 146th St | Byars Rd | Richmond Ave | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2016 | 1633 | E 146th St | Richmond Ave | Park Hills Dr | 0.75 | Crack Seal | $2,500.00 | $1,880.00 |
| 2016 | 1635 | Riverlawn Dr | St Andrews Dr | Jurisdiction Line | 0.07 | Sealcoat | $8,202.00 | $574.14 |
| 2016 | 1635 | Riverlawn Dr | Jurisdiction Line | Dead-End | 0.07 | Sealcoat | $8,202.00 | $606.95 |
| 2016 | 1637 | Askew Dr | Monroe St | Valley Brook Dr | 0.69 | Crack Seal | $2,500.00 | $1,725.00 |
| 2016 | 1637 | Askew Dr | Valley Brook Dr | E 123rd Ter | 0.20 | Sealcoat | $8,202.00 | $1,673.21 |
| 2016 | 1643 | Zumwalt Ave | Dead-End | 6th St | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2016 | 1643 | Zumwalt Ave | 6th St | Grandview Rd | 0.30 | Crack Seal | $2,500.00 | $750.00 |
| 2016 | 1646 | Oxford Pl | Fountain Lake Dr | Dead-End | 0.09 | Crack Seal | $2,500.00 | $225.00 |
| 2016 | 1648 | Dewey Ave | Dead-End | 4th St | 0.05 | Crack Seal | $2,500.00 | $125.00 |
| 2016 | 1648 | Dewey Ave | 4th St | 5th St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2016 | 1648 | Dewey Ave | 5th St | 6th St | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2016 | 1654 | 2nd St | Arrington Rd | Main St | 0.25 | Sealcoat | $8,202.00 | $2,066.90 |
| 2016 | 1665 | Riverlawn Ct | Jurisdiction Line | St Andrews Dr | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2016 | 1667 | E 147th Ter | Bellaire Ave | E 148th Ter | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2016 | 1675 | E 149th St | S Us 71 Hwy East Frontage Rd | Bellaire Ave | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2016 | 1678 | E 136th Ct | Norby Rd | Dead-End | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2016 | 1679 | E 134th Cir | Dead-End | Byars Rd | 0.17 | Crack Seal | $2,500.00 | $425.00 |
| 2016 | 1680 | Holiday Dr | Access Rd | Dead-End | 0.22 | Crack Seal | $2,500.00 | $540.00 |
| 2016 | 1684 | Private Dr | Dead-End | E 126th St | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2016 | 1686 | E 135th Ct | Norby Rd | Dead-End | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 1688 | Bristol Cir | E 130th St | Dead-End | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2016 | 1702 | Pineview Dr | E 150th Ter | Stonewood Dr | 0.31 | Crack Seal | $2,500.00 | $770.00 |
| 2016 | 1704 | E 124th St | Bennington Ave | Cambridge Ave | 0.41 | Crack Seal | $2,500.00 | $1,015.00 |
| 2016 | 1705 | Cartwright Ave | Dr Greaves Rd | 1300' South of Martha Truman Rd | 0.58 | Crack Seal | $2,500.00 | $1,455.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1707 | Ewing Ct | Dead-End | E 125th St | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2016 | 1712 | E 138th Ter | Jurisdiction Line | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2016 | 1714 | Thomas Ave | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2016 | 1716 | E 148th Cir | White Ave | Dead-End | 0.06 | Crack Seal | $2,500.00 | $145.00 |
| 2016 | 1603 | Grandview Rd | 0 | Martha Truman Rd | 1.22 | Crack Seal | $2,500.00 | $3,055.00 |
| 2016 | 264 | E 139th St | 10th Ter | 11th St | 0.24 | Sealcoat | $8,202.00 | $1,968.48 |
| 2016 | 913 | E 139th St | Winchester Ave | Byars Rd | 0.56 | Sealcoat | $8,202.00 | $4,625.93 |
| 2016 | 1582 | E 155th St | Dead-End | Us 71 Hwy N | 0.13 | Sealcoat | $8,202.00 | $1,082.66 |
| 2016 | 1582 | E 155th St | S Us 71 Hwy Off Ramp N | S Us 71 Hwy East Frontage Rd | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |
| 2016 | 1582 | E 155th St | S Us 71 Hwy East Frontage Rd | E 153rd Ter | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |
| 2016 | 1592 | Byars Rd | E 147th St | E M 150 Hwy E | 0.06 | Sealcoat | $8,202.00 | $492.12 |
| 2016 | 1592 | Byars Rd | E M 150 Hwy E | E M 150 Hwy W | 0.02 | Sealcoat | $8,202.00 | $147.64 |
| 2016 | 1592 | Byars Rd | E 143rd St | Laquinta Dr | 0.56 | Sealcoat | $8,202.00 | $4,593.12 |
| 2016 | 1592 | Byars Rd | Laquinta Dr | E 139th St | 0.61 | Sealcoat | $8,202.00 | $4,986.82 |
| 2016 | 1592 | Byars Rd | E 139th St | 0 | 0.12 | Sealcoat | $8,202.00 | $967.84 |
| 2016 | 1592 | Byars Rd | E 134th Cir | E 133rd Cir | 0.11 | Sealcoat | $8,202.00 | $935.03 |
| 2016 | 1592 | Byars Rd | E 133rd Cir | E 133rd Ter | 0.07 | Sealcoat | $8,202.00 | $590.54 |
| 2016 | 1592 | Byars Rd | E 133rd Ter | E 133rd Ter | 0.10 | Sealcoat | $8,202.00 | $812.00 |
| 2016 | 1592 | Byars Rd | Highgrove Rd | E 130th Ter | 0.25 | Sealcoat | $8,202.00 | $2,017.69 |
| 2016 | 1592 | Byars Rd | E 130th Ter | E 130th St | 0.15 | Sealcoat | $8,202.00 | $1,230.30 |
| 2016 | 1592 | Byars Rd | E 130th St | E 129th St | 0.24 | Sealcoat | $8,202.00 | $1,935.67 |
| 2016 | 1592 | Byars Rd | E 129th St | E 128th St | 0.25 | Sealcoat | $8,202.00 | $2,017.69 |
| 2016 | 1592 | Byars Rd | E 128th St | E 127th Pl | 0.28 | Sealcoat | $8,202.00 | $2,263.75 |
| 2016 | 1592 | Byars Rd | E 127th Pl | E 127th St | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2016 | 1624 | Food Ln | E 122nd St | E 119th Ter | 0.62 | Sealcoat | $8,202.00 | $5,085.24 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 1654 | 2nd St | Duck Rd | 3rd St | 0.41 | Sealcoat | $8,202.00 | $3,395.63 |
| 2016 | 19 | E 139th St | Byars Rd | Dead-End | 0.72 | Crack Seal | $2,500.00 | $1,800.00 |
| 2016 | 32 | Overhill Ave | E 134th St | E 133rd Ter | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2016 | 32 | Overhill Ave | E 133rd Ter | E 133rd St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 73 | 12th St | E 139th St | 11th Ter | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2016 | 73 | 12th St | 11th Ter | E 137th St | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2016 | 89 | Winchester Ave | E 130th Ter | E 130th St | 0.21 | Crack Seal | $2,500.00 | $520.00 |
| 2016 | 89 | Winchester Ave | E 130th St | E 129th St | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2016 | 111 | E 136th St | Dead-End | 11th Ter | 0.05 | Crack Seal | $2,500.00 | $130.00 |
| 2016 | 111 | E 136th St | 11th Ter | 12th St | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2016 | 111 | E 136th St | 12th St | 12th St | 0.03 | Crack Seal | $2,500.00 | $65.00 |
| 2016 | 111 | E 136th St | 12th St | Dead-End | 0.05 | Crack Seal | $2,500.00 | $115.00 |
| 2016 | 134 | Highgrove Rd | S Us 71 Hwy East Frontage Rd | Spring St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 134 | Highgrove Rd | Spring St | White Ave | 0.05 | Crack Seal | $2,500.00 | $125.00 |
| 2016 | 134 | Highgrove Rd | Lowell Ave | Fuller Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2016 | 157 | E 137th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2016 | 157 | E 137th St | White Ave | Spring St | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2016 | 157 | E 137th St | Spring St | Belmont Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2016 | 157 | E 137th St | Parker Ave | Parker Ave | 0.06 | Crack Seal | $2,500.00 | $155.00 |
| 2016 | 157 | E 137th St | Parker Ave | Applewood Dr | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2016 | 157 | E 137th St | Applewood Dr | Lowell Ave | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2016 | 157 | E 137th St | Lowell Ave | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 157 | E 137th St | Belmead Ave | Bennington Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 157 | E 137th St | Bennington Ave | Craig Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 157 | E 137th St | Craig Ave | Winchester Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2016 | 409 | E 132nd St | Winchester Ave | Bristol Ave | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2016 | 413 | Raytown Rd | Highgrove Rd | Longview Lake Access Rd | 1.06 | Crack Seal | $2,500.00 | $2,650.00 |
| 2016 | 437 | E 133rd St | Parker Ave | Applewood Dr | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2016 | 518 | 11th Ter | E 137th St | 12th St | 0.45 | Crack Seal | $2,500.00 | $1,120.00 |
| 2016 | 605 | E 134th Ter | Bennington Ave | Cambridge Ave | 0.32 | Crack Seal | $2,500.00 | $795.00 |
| 2016 | 605 | E 134th Ter | Cambridge Ave | Winchester Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 605 | E 134th Ter | Byars Rd | Jurisdiction Line | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 614 | E 137th St | 10th Ter | 11th Ter | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2016 | 669 | 6th St | E 135th St | 7th St | 0.36 | Crack Seal | $2,500.00 | $895.00 |
| 2016 | 698 | E 135th St | Bennington Ave | Cambridge Ave | 0.44 | Crack Seal | $2,500.00 | $1,100.00 |
| 2016 | 801 | E 135th St | E 134th Ter | Donnelly Ave | 0.29 | Crack Seal | $2,500.00 | $725.00 |
| 2016 | 847 | Bennington Ave | E 140th Pl | E 140th Ter | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2016 | 847 | Bennington Ave | E 139th St | E 137th St | 0.51 | Crack Seal | $2,500.00 | $1,280.00 |
| 2016 | 925 | Pinkston Ave | 11th St | 13th St | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2016 | 930 | E 136th St | Applewood Dr | Lowell Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2016 | 930 | E 136th St | Lowell Ave | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2016 | 930 | E 136th St | Belmead Ave | Bennington Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2016 | 1602 | Bellaire Ave | E 150th Ter | E 150th St | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2016 | 1705 | Cartwright Ave | 750' South of Martha Truman Rd | Martha Truman Rd | 0.29 | Crack Seal | $2,500.00 | $735.00 |
| 2016 | 1705 | Cartwright Ave | 750' South of Martha Truman Rd | 1300' South of Martha Truman Rd | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2017 | 12 | Blue Ridge Blvd | Duck Rd | Jackson Ave | 0.39 | Mill & Overlay | $28,090.00 | $10,955.10 |
| 2017 | 12 | Blue Ridge Blvd | Jackson Ave | 3rd St | 0.83 | Mill & Overlay | $28,090.00 | $23,258.52 |
| 2017 | 264 | E 139th St | 15th St | Lawndale Ave | 0.41 | Mill & Overlay | $28,090.00 | $11,516.90 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 803 | Applewood Dr | E 134th St | E 133rd St | 0.31 | Mill & Overlay | $28,090.00 | $8,651.72 |
| 2017 | 840 | Richmond Ave | E 146th St | E 143rd Ter | 0.14 | Mill & Overlay | $28,090.00 | $3,988.78 |
| 2017 | 840 | Richmond Ave | E 143rd Ter | E 143rd St | 0.35 | Mill & Overlay | $28,090.00 | $9,719.14 |
| 2017 | 969 | Crystal Ave | E 133rd Ter | E 132nd St | 0.29 | Mill & Overlay | $28,090.00 | $8,258.46 |
| 2017 | 1515 | White Ave | Fuller Ave | E 153rd St | 0.11 | Mill & Overlay | $28,090.00 | $3,146.08 |
| 2017 | 1515 | White Ave | E 149th St | E 148th Ter | 0.12 | Mill & Overlay | $28,090.00 | $3,314.62 |
| 2017 | 1582 | E 155th St | Us 71 Hwy N | S Us 71 Hwy Off Ramp N | 0.07 | Mill & Overlay | $28,090.00 | $1,910.12 |
| 2017 | 1582 | E 155th St | Bellaire Ave | 0 | 1.01 | Mill & Overlay | $28,090.00 | $28,258.54 |
| 2017 | 1582 | E 155th St | 0 | Kelley Rd | 2.18 | Mill & Overlay | $28,090.00 | $61,292.38 |
| 2017 | 1584 | Drury Ave | Dead-End | Martha Truman Rd | 0.07 | Mill & Overlay | $28,090.00 | $1,910.12 |
| 2017 | 1588 | 10th Ter | E 139th St | E 137th Ter | 0.32 | Mill & Overlay | $28,090.00 | $8,988.80 |
| 2017 | 1603 | Grandview Rd | Martha Truman Rd | Dead-End | 0.07 | Mill & Overlay | $28,090.00 | $1,910.12 |
| 2017 | 1653 | Merrywood Cir | Jurisdiction Line | Jurisdiction Line | 0.24 | Mill & Overlay | $28,090.00 | $6,685.42 |
| 2017 | 12 | Blue Ridge Blvd | Fountain Lake Dr | Jurisdiction Line | 0.77 | Crack Seal | $2,500.00 | $1,935.00 |
| 2017 | 12 | Blue Ridge Blvd | Jurisdiction Line | Duck Rd | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2017 | 12 | Blue Ridge Blvd | S Us 71 Hwy Off Ramp N | Dead-End | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2017 | 89 | Winchester Ave | E 129th St | E 129th St | 0.05 | Crack Seal | $2,500.00 | $135.00 |
| 2017 | 89 | Winchester Ave | E 129th St | E 128th St | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2017 | 89 | Winchester Ave | E 128th St | E 127th Ter | 0.22 | Crack Seal | $2,500.00 | $540.00 |
| 2017 | 89 | Winchester Ave | E 127th St | E 125th St | 0.31 | Crack Seal | $2,500.00 | $770.00 |
| 2017 | 97 | Barat Ave | E 153rd St | E 152nd Ter | 0.12 | Crack Seal | $2,500.00 | $295.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 97 | Barat Ave | E 152nd Ter | E 152nd St | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 97 | Barat Ave | E 152nd St | E 151st Ter | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 97 | Barat Ave | E 151st St | E 150th Ter | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 97 | Barat Ave | E 150th Ter | E 150th St | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2017 | 128 | Cambridge Ave | E 124th St | E 125th St | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2017 | 134 | Highgrove Rd | Parker Ave | Lowell Ave | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2017 | 134 | Highgrove Rd | Fuller Ave | Bennington Ave | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2017 | 144 | E 133rd Cir | Dead-End | Grandview Rd | 0.15 | Crack Seal | $2,500.00 | $385.00 |
| 2017 | 152 | E 134th St | Applewood Dr | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 157 | E 137th St | Winchester Ave | Cambridge Ave | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2017 | 157 | E 137th St | Cambridge Ave | Winchester Ave | 0.06 | Crack Seal | $2,500.00 | $155.00 |
| 2017 | 179 | Lowell Ave | E 137th St | E 136th St | 0.27 | Crack Seal | $2,500.00 | $675.00 |
| 2017 | 179 | Lowell Ave | E 135th St | E 134th St | 0.30 | Sealcoat | $8,202.00 | $2,460.60 |
| 2017 | 179 | Lowell Ave | E 134th St | E 133rd Ter | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2017 | 179 | Lowell Ave | E 133rd Ter | E 133rd St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 231 | E 133rd St | Byars Rd | E 132nd Ter | 0.40 | Crack Seal | $2,500.00 | $1,000.00 |
| 2017 | 237 | 6th St | E 133rd St | Dewey Ave | 0.16 | Sealcoat | $8,202.00 | $1,279.51 |
| 2017 | 237 | 6th St | Dewey Ave | Pinkston Ave | 0.16 | Sealcoat | $8,202.00 | $1,279.51 |
| 2017 | 253 | E 136th St | Botts Rd | Spruce St | 0.20 | Crack Seal | $2,500.00 | $500.00 |
| 2017 | 253 | E 136th St | Spruce St | Cypress St | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2017 | 264 | E 139th St | 11th St | 12th St | 0.24 | Sealcoat | $8,202.00 | $1,935.67 |
| 2017 | 264 | E 139th St | 12th St | 15th St | 0.37 | Sealcoat | $8,202.00 | $3,051.14 |
| 2017 | 266 | Botts Rd | E 139th St | E 138th St | 0.33 | Crack Seal | $2,500.00 | $825.00 |
| 2017 | 266 | Botts Rd | E 138th St | E 138th St | 0.16 | Crack Seal | $2,500.00 | $397.50 |
| 2017 | 290 | E 126th St | S Us 71 Hwy East Frontage Rd | Briarwood Ct | 0.04 | Crack Seal | $2,500.00 | $105.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 312 | Cambridge Ave | E 129th St | E 128th St | 0.28 | Sealcoat | $8,202.00 | $2,329.37 |
| 2017 | 312 | Cambridge Ave | E 128th St | E 127th Ter | 0.17 | Sealcoat | $8,202.00 | $1,361.53 |
| 2017 | 320 | Crystal Ave | Highgrove Rd | E 130th Ter | 0.21 | Crack Seal | $2,500.00 | $520.00 |
| 2017 | 320 | Crystal Ave | E 130th Ter | E 130th St | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2017 | 353 | Spruce St | E 138th St | E 137th St | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2017 | 353 | Spruce St | E 137th St | E 136th St | 0.34 | Crack Seal | $2,500.00 | $840.00 |
| 2017 | 376 | Goode Ave | 5th St | 6th St | 0.10 | Sealcoat | $8,202.00 | $803.80 |
| 2017 | 376 | Goode Ave | 6th St | 7th St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2017 | 411 | E 125th St | Bennington Ave | Craig Ave | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2017 | 411 | E 125th St | Newton Ct | Ewing Ave | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2017 | 411 | E 125th St | Ewing Ct | Cambridge Ave | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2017 | 411 | E 125th St | Cambridge Ave | Cambridge Ave | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2017 | 422 | 6th St | Jones Ave | Goode Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 430 | Winchester Ave | E 139th St | E 138th Ter | 0.11 | Sealcoat | $8,202.00 | $869.41 |
| 2017 | 430 | Winchester Ave | E 138th Ter | E 138th St | 0.10 | Sealcoat | $8,202.00 | $787.39 |
| 2017 | 430 | Winchester Ave | E 138th St | E 137th St | 0.30 | Sealcoat | $8,202.00 | $2,427.79 |
| 2017 | 493 | Highgrove Rd | 11th St | 12th St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2017 | 493 | Highgrove Rd | 12th St | 13th St | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 512 | E 133rd Ter | Grandview Rd | 10th St | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2017 | 516 | E 138th St | Dead-End | Botts Rd | 0.35 | Sealcoat | $8,202.00 | $2,903.51 |
| 2017 | 527 | Spring St | Jurisdiction Line | E 137th St | 0.20 | Crack Seal | $2,500.00 | $495.00 |
| 2017 | 589 | 7th St | Deweese Ave | Butcher Ave | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2017 | 589 | 7th St | Butcher Ave | E 133rd St | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2017 | 605 | E 134th Ter | Jurisdiction Line | Overhill Ave | 0.28 | Sealcoat | $8,202.00 | $2,296.56 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 625 | E 137th Ter | Dead-End | Botts Rd | 0.37 | Crack Seal | $2,500.00 | $935.00 |
| 2017 | 647 | Lowell Ave | E 138th St | Jurisdiction Line | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 697 | E 141st St | Drury Ct | Southern Rd | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2017 | 705 | E 134th Ter | Dead-End | 13th St | 0.29 | Sealcoat | $8,202.00 | $2,362.18 |
| 2017 | 712 | E 143rd St | Byars Rd | Oakland Ct | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 719 | E 131st St | E 132nd St | Jurisdiction Line | 0.22 | Sealcoat | $8,202.00 | $1,837.25 |
| 2017 | 719 | E 131st St | Jurisdiction Line | Corrington Ave | 0.22 | Sealcoat | $8,202.00 | $1,820.84 |
| 2017 | 746 | E 130th St | Bristol Cir | Corrington Ave | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 755 | Manchester Ave | Highgrove Rd | E 130th St | 0.31 | Crack Seal | $2,500.00 | $780.00 |
| 2017 | 755 | Manchester Ave | E 130th St | E 129th Ter | 0.14 | Crack Seal | $2,500.00 | $350.00 |
| 2017 | 755 | Manchester Ave | E 128th St | E 127th Ter | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 755 | Manchester Ave | E 127th St | E 126th St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2017 | 771 | E 122nd Ter | Bennington Ave | Ewing Ave | 0.06 | Crack Seal | $2,500.00 | $160.00 |
| 2017 | 813 | Ewing Ave | E 126th St | E 125th Pl | 0.14 | Sealcoat | $8,202.00 | $1,181.09 |
| 2017 | 813 | Ewing Ave | E 125th Pl | E 125th St | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2017 | 829 | Overhill Ave | E 143rd St | E 143rd Ter | 0.35 | Crack Seal | $2,500.00 | $880.00 |
| 2017 | 847 | Bennington Ave | Brentwood Ct | Highgrove Rd | 0.11 | Sealcoat | $8,202.00 | $935.03 |
| 2017 | 872 | Craig Ave | St Andrews Dr | E 144th Pl | 0.51 | Crack Seal | $2,500.00 | $1,285.00 |
| 2017 | 872 | Craig Ave | E 144th Pl | E 144th St | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2017 | 872 | Craig Ave | E 144th St | E 143rd St | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2017 | 896 | Skyline Dr | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2017 | 901 | E 134th St | 8th St | 10th St | 0.24 | Sealcoat | $8,202.00 | $1,952.08 |
| 2017 | 901 | E 134th St | 10th St | 11th St | 0.18 | Crack Seal | $2,500.00 | $440.00 |
| 2017 | 901 | E 134th St | 11th St | 13th St | 0.18 | Sealcoat | $8,202.00 | $1,509.17 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 930 | E 136th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.18 | Sealcoat | $8,202.00 | $1,492.76 |
| 2017 | 930 | E 136th St | White Ave | Spring St | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2017 | 930 | E 136th St | Spring St | Parker Ave | 0.13 | Sealcoat | $8,202.00 | $1,049.86 |
| 2017 | 930 | E 136th St | Parker Ave | Applewood Dr | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2017 | 942 | E 142nd St | Botts Rd | Norby Rd | 0.74 | Sealcoat | $8,202.00 | $6,069.48 |
| 2017 | 942 | E 142nd St | Norby Rd | Norby Rd | 0.03 | Sealcoat | $8,202.00 | $246.06 |
| 2017 | 942 | E 142nd St | Norby Rd | Dead-End | 0.04 | Sealcoat | $8,202.00 | $344.48 |
| 2017 | 1010 | E 154th Ter | E 153rd Ter | Bellaire Ave | 0.48 | Sealcoat | $8,202.00 | $3,920.56 |
| 2017 | 1026 | 10th St | E 133rd Ter | E 134th St | 0.15 | Crack Seal | $2,500.00 | $380.00 |
| 2017 | 1029 | E 139th St | S Us 71 Hwy East Frontage Rd | Belmont Ave | 0.39 | Sealcoat | $8,202.00 | $3,215.18 |
| 2017 | 1039 | Fuller Ave | E 133rd St | Highgrove Rd | 0.45 | Sealcoat | $8,202.00 | $3,658.09 |
| 2017 | 1050 | E 133rd Ter | Park Hills Dr | Park Ln | 0.42 | Sealcoat | $8,202.00 | $3,412.03 |
| 2017 | 1058 | E 130th Ter | Winchester Ave | Bristol Ave | 0.11 | Sealcoat | $8,202.00 | $902.22 |
| 2017 | 1058 | E 130th Ter | Bristol Ave | Corrington Ave | 0.06 | Sealcoat | $8,202.00 | $475.72 |
| 2017 | 1058 | E 130th Ter | Corrington Ave | Corrington Ave | 0.06 | Sealcoat | $8,202.00 | $492.12 |
| 2017 | 1058 | E 130th Ter | Corrington Ave | Crystal Ave | 0.12 | Sealcoat | $8,202.00 | $1,017.05 |
| 2017 | 1099 | E 130th Ct | Smalley Ave | Smalley Ave | 0.35 | Sealcoat | $8,202.00 | $2,837.89 |
| 2017 | 1105 | E 133rd St | Park Hills Dr | Park Ln | 0.38 | Crack Seal | $2,500.00 | $945.00 |
| 2017 | 1116 | Richmond Ave | Harry Truman Dr | E 122nd Ter | 0.12 | Sealcoat | $8,202.00 | $984.24 |
| 2017 | 1116 | Richmond Ave | E 122nd Ter | E 122nd St | 0.10 | Sealcoat | $8,202.00 | $803.80 |
| 2017 | 1128 | E 138th St | Applewood Dr | Lowell Ave | 0.14 | Sealcoat | $8,202.00 | $1,115.47 |
| 2017 | 1194 | Park Hills Dr | E 134th Ter | E 134th St | 0.10 | Sealcoat | $8,202.00 | $853.01 |
| 2017 | 1194 | Park Hills Dr | E 134th St | E 133rd Ter | 0.15 | Sealcoat | $8,202.00 | $1,230.30 |
| 2017 | 1194 | Park Hills Dr | E 133rd Ter | E 133rd St | 0.12 | Sealcoat | $8,202.00 | $967.84 |
| 2017 | 1202 | Parker Ave | E 136th St | E 135th St | 0.25 | Sealcoat | $8,202.00 | $2,050.50 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1202 | Parker Ave | E 135th St | E 133rd St | 0.51 | Sealcoat | $8,202.00 | $4,150.21 |
| 2017 | 1210 | Spring St | E 137th St | Jurisdiction Line | 0.17 | Crack Seal | $2,500.00 | $430.00 |
| 2017 | 1210 | Spring St | Jurisdiction Line | E 136th St | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2017 | 1229 | 10th St | Main St | Goode Ave | 0.13 | Sealcoat | $8,202.00 | $1,082.66 |
| 2017 | 1229 | 10th St | Goode Ave | Jones Ave | 0.11 | Sealcoat | $8,202.00 | $918.62 |
| 2017 | 1253 | Sycamore Ave | Jurisdiction Line | Dead-End | 0.07 | Sealcoat | $8,202.00 | $574.14 |
| 2017 | 1262 | 8th St | E 133rd Ter | E 134th St | 0.12 | Sealcoat | $8,202.00 | $967.84 |
| 2017 | 1298 | E 137th St | Spruce St | Cypress St | 0.22 | Crack Seal | $2,500.00 | $560.00 |
| 2017 | 1301 | E 135th St | Cypress St | 5th St | 0.10 | Sealcoat | $8,202.00 | $836.60 |
| 2017 | 1301 | E 135th St | 5th St | 6th St | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2017 | 1301 | E 135th St | 6th St | Norby Rd | 0.04 | Sealcoat | $8,202.00 | $360.89 |
| 2017 | 1301 | E 135th St | Norby Rd | 7th St | 0.07 | Sealcoat | $8,202.00 | $541.33 |
| 2017 | 1301 | E 135th St | 7th St | Private Rd | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2017 | 1301 | E 135th St | Private Rd | 12th St | 0.54 | Sealcoat | $8,202.00 | $4,429.08 |
| 2017 | 1313 | Lawndale Ave | Unnamed Rd | E 139th St | 0.21 | Sealcoat | $8,202.00 | $1,747.03 |
| 2017 | 1321 | E 140th St | Jurisdiction Line | Falkirk Cir | 0.15 | Sealcoat | $8,202.00 | $1,213.90 |
| 2017 | 1324 | Jones Ave | Dead-End | 7th St | 0.06 | Sealcoat | $8,202.00 | $508.52 |
| 2017 | 1324 | Jones Ave | 7th St | 8th St | 0.13 | Sealcoat | $8,202.00 | $1,049.86 |
| 2017 | 1324 | Jones Ave | 8th St | Grandview Rd | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2017 | 1324 | Jones Ave | 12th St | 13th St | 0.19 | Sealcoat | $8,202.00 | $1,558.38 |
| 2017 | 1381 | E 139th Ter | Dead-End | S Us 71 Hwy West Frontage Rd | 0.17 | Crack Seal | $2,500.00 | $430.00 |
| 2017 | 1432 | E 134th Ter | 13th St | Dead-End | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2017 | 1434 | 7th St | Highgrove Rd | Rhodes Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2017 | 1434 | 7th St | Rhodes Ave | Main St | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2017 | 1434 | 7th St | Main St | Goode Ave | 0.13 | Sealcoat | $8,202.00 | $1,099.07 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1451 | Norby Rd | E 142nd St | Dead-End | 0.07 | Sealcoat | $8,202.00 | $557.74 |
| 2017 | 1459 | 10th St | Highgrove Rd | Rhodes Ave | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2017 | 1459 | 10th St | Rhodes Ave | Main St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2017 | 1490 | Craig Ave | Beacon St | Fuller Ave | 0.08 | Sealcoat | $8,202.00 | $672.56 |
| 2017 | 1490 | Craig Ave | E 127th Ter | E 127th St | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 1490 | Craig Ave | E 127th St | E 127th St | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2017 | 1515 | White Ave | Bellaire Ave | E 147th St | 0.12 | Sealcoat | $8,202.00 | $1,000.64 |
| 2017 | 1515 | White Ave | E 147th St | E M 150 Hwy E | 0.04 | Sealcoat | $8,202.00 | $360.89 |
| 2017 | 1519 | Access Rd | E M 150 Hwy E | E 147th St | 0.05 | Sealcoat | $8,202.00 | $410.10 |
| 2017 | 1548 | E 125th Ter | Jurisdiction Line | Dead-End | 0.08 | Sealcoat | $8,202.00 | $623.35 |
| 2017 | 1585 | Duck Rd | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Sealcoat | $8,202.00 | $2,050.50 |
| 2017 | 1589 | Robinson Pike Rd | Dead-End | Arrington Rd | 2.24 | Crack Seal | $2,500.00 | $5,600.00 |
| 2017 | 1590 | Drury Ct | Dead-End | E 141st St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 1591 | Main St | 2nd St | 3rd St | 0.38 | Sealcoat | $8,202.00 | $3,075.75 |
| 2017 | 1592 | Byars Rd | E M 150 Hwy W | Access Rd | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2017 | 1592 | Byars Rd | Access Rd | E 146th St | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2017 | 1592 | Byars Rd | E 146th St | Eastern Ct | 0.18 | Sealcoat | $8,202.00 | $1,492.76 |
| 2017 | 1592 | Byars Rd | Eastern Ct | Eastern Ct | 0.26 | Sealcoat | $8,202.00 | $2,165.33 |
| 2017 | 1592 | Byars Rd | Eastern Ct | E 143rd St | 0.09 | Sealcoat | $8,202.00 | $705.37 |
| 2017 | 1592 | Byars Rd | E 133rd Ter | E 133rd St | 0.11 | Sealcoat | $8,202.00 | $885.82 |
| 2017 | 1592 | Byars Rd | E 126th St | Harry Truman Dr | 0.71 | Sealcoat | $8,202.00 | $5,856.23 |
| 2017 | 1594 | 13th St | Main St | Goode Ave | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2017 | 1594 | 13th St | Goode Ave | Jones Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 1594 | 13th St | Duck Rd | Skyline Dr | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2017 | 1594 | 13th St | Skyline Dr | E 126th St | 0.07 | Crack Seal | $2,500.00 | $170.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1594 | 13th St | E 126th St | E 125th Ter | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 1595 | 15th St | Southern Rd | E 135th St | 1.04 | Sealcoat | $8,202.00 | $8,513.68 |
| 2017 | 1595 | 15th St | E 135th St | E 133rd St | 0.51 | Crack Seal | $2,500.00 | $1,270.00 |
| 2017 | 1595 | 15th St | E 133rd St | Highgrove Rd | 0.50 | Crack Seal | $2,500.00 | $1,255.00 |
| 2017 | 1595 | 15th St | Main St | Goode Ave | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2017 | 1595 | 15th St | Jones Ave | Thomas Ave | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2017 | 1595 | 15th St | Thomas Ave | Little Ave | 0.16 | Crack Seal | $2,500.00 | $390.00 |
| 2017 | 1595 | 15th St | Little Ave | Duck Rd | 0.19 | Crack Seal | $2,500.00 | $480.00 |
| 2017 | 1595 | 15th St | Skyline Dr | E 126th St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 1596 | Little Ave | Grandview Rd | 10th St | 0.12 | Sealcoat | $8,202.00 | $1,017.05 |
| 2017 | 1596 | Little Ave | 13th St | 15th St | 0.26 | Sealcoat | $8,202.00 | $2,099.71 |
| 2017 | 1596 | Little Ave | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2017 | 1598 | Rhodes Ave | 7th St | 8th St | 0.13 | Sealcoat | $8,202.00 | $1,033.45 |
| 2017 | 1598 | Rhodes Ave | 8th St | Grandview Rd | 0.13 | Sealcoat | $8,202.00 | $1,049.86 |
| 2017 | 1598 | Rhodes Ave | Grandview Rd | 10th St | 0.13 | Sealcoat | $8,202.00 | $1,066.26 |
| 2017 | 1600 | E 152nd Ter | Bellaire Ave | White Ave | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2017 | 1602 | Bellaire Ave | E 154th Ter | Fuller Ave | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2017 | 1602 | Bellaire Ave | Fuller Ave | E 153rd Ter | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2017 | 1602 | Bellaire Ave | E 153rd Ter | E 153rd St | 0.17 | Crack Seal | $2,500.00 | $415.00 |
| 2017 | 1602 | Bellaire Ave | E 153rd St | E 152nd Ter | 0.15 | Crack Seal | $2,500.00 | $380.00 |
| 2017 | 1602 | Bellaire Ave | E 152nd Ter | E 152nd St | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2017 | 1602 | Bellaire Ave | E 149th Ter | E 149th St | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 1602 | Bellaire Ave | E 149th St | Barat Ave | 0.05 | Sealcoat | $8,202.00 | $410.10 |
| 2017 | 1602 | Bellaire Ave | Barat Ave | E 148th Ter | 0.08 | Sealcoat | $8,202.00 | $623.35 |
| 2017 | 1602 | Bellaire Ave | E 148th Ter | Barat Ave | 0.03 | Crack Seal | $2,500.00 | $75.00 |
| 2017 | 1602 | Bellaire Ave | Barat Ave | E 148th St | 0.17 | Sealcoat | $8,202.00 | $1,361.53 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1609 | 5th St | E 133rd St | Dewey Ave | 0.16 | Crack Seal | $2,500.00 | $395.00 |
| 2017 | 1610 | Harry Truman Dr | E 125th Ter | 15th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2017 | 1610 | Harry Truman Dr | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.11 | Crack Seal | $2,500.00 | $262.50 |
| 2017 | 1610 | Harry Truman Dr | Us 71 Hwy N | Us 71 Hwy N | 0.02 | Crack Seal | $2,500.00 | $50.00 |
| 2017 | 1610 | Harry Truman Dr | Us 71 Hwy N | S Us 71 Hwy East Frontage Rd | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2017 | 1610 | Harry Truman Dr | S Us 71 Hwy East Frontage Rd | E 125th St | 0.41 | Crack Seal | $2,500.00 | $1,015.00 |
| 2017 | 1612 | Dewey St | Grandview Rd | 11th St | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2017 | 1618 | E 144th St | Laquinta Dr | Bristol Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 1620 | Martha Truman Rd | Grandview Rd | Drury Ave | 0.56 | Crack Seal | $2,500.00 | $1,400.00 |
| 2017 | 1620 | Martha Truman Rd | Drury Ave | Oakley Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 1620 | Martha Truman Rd | Oakley Ave | Lawndale Ave | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2017 | 1620 | Martha Truman Rd | Lawndale Ave | S Us 71 Hwy West Frontage Rd | 0.17 | Crack Seal | $2,500.00 | $420.00 |
| 2017 | 1622 | Park Ln | Dead-End | Sycamore Ave | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2017 | 1622 | Park Ln | Herrick Ave | Ashland Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 1622 | Park Ln | Ashland Ave | E 133rd St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2017 | 1623 | St Andrews Dr | Riverlawn Dr | Merrywood Ln | 0.40 | Crack Seal | $2,500.00 | $1,000.00 |
| 2017 | 1629 | El Rancho Rd | E 140th St | E 141st St | 0.29 | Crack Seal | $2,500.00 | $715.00 |
| 2017 | 1630 | Merritt Rd | Dr Greaves Rd | Dead-End | 0.58 | Crack Seal | $2,500.00 | $1,450.00 |
| 2017 | 1631 | E 144th Ct | Jurisdiction Line | Dead-End | 0.08 | Crack Seal | $2,500.00 | $205.00 |
| 2017 | 1636 | Cypress St | E 138th St | E 137th St | 0.32 | Crack Seal | $2,500.00 | $800.00 |
| 2017 | 1637 | Askew Dr | E 123rd Ter | Dead-End | 0.06 | Crack Seal | $2,500.00 | $160.00 |
| 2017 | 1644 | Ashland Ave | Park Hills Dr | Park Ln | 0.37 | Crack Seal | $2,500.00 | $930.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1644 | Ashland Ave | Park Ln | Highgrove Rd | 0.42 | Crack Seal | $2,500.00 | $1,050.00 |
| 2017 | 1647 | Wilshire Cir | Laquinta Dr | Laquinta Dr | 0.39 | Crack Seal | $2,500.00 | $965.00 |
| 2017 | 1649 | E 123rd St | Bennington Ave | Bristol Ave | 0.36 | Crack Seal | $2,500.00 | $900.00 |
| 2017 | 1649 | E 123rd St | Bristol Ave | Corrington Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 1652 | Lena Ave | Dead-End | 7th St | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2017 | 1652 | Lena Ave | 7th St | 8th St | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 1652 | Lena Ave | 8th St | Grandview Rd | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2017 | 1657 | E 150th Ter | White Ave | Fuller Ave | 0.21 | Crack Seal | $2,500.00 | $530.00 |
| 2017 | 1657 | E 150th Ter | Stonewood Dr | Pineview Dr | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 1658 | E 153rd Ter | E 154th Ter | Bellaire Ave | 0.43 | Crack Seal | $2,500.00 | $1,070.00 |
| 2017 | 1659 | Deweese Ave | 5th St | 7th St | 0.18 | Crack Seal | $2,500.00 | $450.00 |
| 2017 | 1659 | Deweese Ave | 7th St | Dead-End | 0.09 | Crack Seal | $2,500.00 | $235.00 |
| 2017 | 1663 | Bentley Cir | E 123rd Ter | Dead-End | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2017 | 1671 | Delmar Ave | Dead-End | E 119th St | 0.05 | Crack Seal | $2,500.00 | $130.00 |
| 2017 | 1675 | E 149th St | Bellaire Ave | White Ave | 0.42 | Crack Seal | $2,500.00 | $1,050.00 |
| 2017 | 1676 | E 143rd Ter | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2017 | 1676 | E 143rd Ter | Overhill Ave | Park Hills Dr | 0.73 | Crack Seal | $2,500.00 | $1,815.00 |
| 2017 | 1683 | Butcher Ave | 5th St | 7th St | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2017 | 1687 | Park Entrance | Donnelly Ave | Longview Lake Shelter 9 | 0.15 | Crack Seal | $2,500.00 | $380.00 |
| 2017 | 1694 | 14th St | Duck Rd | Dead-End | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 1695 | Berkshire Ct | Dead-End | Bennington Ave | 0.06 | Sealcoat | $8,202.00 | $508.52 |
| 2017 | 1696 | Oakley Ave | Dead-End | Martha Truman Rd | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2017 | 1699 | Booth Ln | E 129th St | Main St | 0.41 | Crack Seal | $2,500.00 | $1,015.00 |
| 2017 | 1706 | Norton Ave | Jackson Ave | E 123rd Ter | 0.26 | Crack Seal | $2,500.00 | $650.00 |
| 2017 | 1706 | Norton Ave | E 123rd Ter | Dr Greaves Rd | 0.06 | Crack Seal | $2,500.00 | $150.00 |
| 2017 | 1708 | Stonewood Dr | Dead-End | E 150th Ter | 0.05 | Crack Seal | $2,500.00 | $120.00 |

| | | | 2016–2020 List of Treatments | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1708 | Stonewood Dr | E 150th Ter | Pineview Dr | 0.33 | Crack Seal | $2,500.00 | $815.00 |
| 2017 | 1709 | E 148th St | Bellaire Ave | White Ave | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2017 | 1718 | Yorkshire Ct | Dead-End | Bennington Ave | 0.06 | Crack Seal | $2,500.00 | $160.00 |
| 2017 | 1721 | E 136th Pl | Norby Rd | Dead-End | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2017 | 1731 | E 133rd St | 5th St | End | 0.33 | Crack Seal | $2,500.00 | $825.00 |
| 2017 | 36 | Norby Rd | 0 | E 139th St | 0.42 | Crack Seal | $2,500.00 | $1,045.00 |
| 2017 | 157 | E 137th St | Spring St | Belmont Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 353 | Spruce St | E 136th St | E 135th St | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2017 | 365 | E 143rd St | Jurisdiction Line | Laquinta Dr | 0.19 | Crack Seal | $2,500.00 | $475.00 |
| 2017 | 438 | E 150th St | Jurisdiction Line | Fuller Ave | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2017 | 477 | E 150th St | White Ave | Jurisdiction Line | 0.32 | Crack Seal | $2,500.00 | $790.00 |
| 2017 | 477 | E 150th St | Jurisdiction Line | Fuller Ave | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2017 | 557 | Corrington Ave | Highgrove Rd | E 130th Ter | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2017 | 746 | E 130th St | Byars Rd | Jurisdiction Line | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2017 | 950 | E 130th Ter | Byars Rd | Jurisdiction Line | 0.27 | Crack Seal | $2,500.00 | $680.00 |
| 2017 | 963 | E 135th St | S Us 71 Hwy East Frontage Rd | Spring St | 0.15 | Crack Seal | $2,500.00 | $385.00 |
| 2017 | 963 | E 135th St | Spring St | Spring St | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 963 | E 135th St | Spring St | Parker Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2017 | 963 | E 135th St | Parker Ave | Applewood Dr | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2017 | 963 | E 135th St | Applewood Dr | Lowell Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 963 | E 135th St | Lowell Ave | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2017 | 963 | E 135th St | Belmead Ave | Bennington Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2017 | 1051 | 11th Ter | E 136th St | E 137th St | 0.34 | Crack Seal | $2,500.00 | $860.00 |
| 2017 | 1054 | E 127th St | Winchester Ave | Bristol Ave | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2017 | 1149 | Oakland Ave | Dead-End | E 126th St | 0.09 | Crack Seal | $2,500.00 | $225.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2017 | 1194 | Park Hills Dr | Sycamore Ave | Highgrove Rd | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2017 | 1209 | E 154th Ter | S Us 71 Hwy East Frontage Rd | E 153rd Ter | 0.31 | Crack Seal | $2,500.00 | $780.00 |
| 2017 | 1240 | 12th St | Main St | Highgrove Rd | 0.26 | Crack Seal | $2,500.00 | $645.00 |
| 2017 | 1297 | E 142nd St | Southern Rd | S Us 71 Hwy West Frontage Rd | 0.38 | Crack Seal | $2,500.00 | $960.00 |
| 2017 | 1343 | E 139th St | Unnamed Rd | S Us 71 Hwy West Frontage Rd | 0.19 | Crack Seal | $2,500.00 | $475.00 |
| 2017 | 1434 | 7th St | Lena Ave | Duck Rd | 0.41 | Crack Seal | $2,500.00 | $1,030.00 |
| 2017 | 1583 | Fountain Lake Dr | Blue Ridge Blvd | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2017 | 1583 | Fountain Lake Dr | Jurisdiction Line | Jurisdiction Line | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2017 | 1583 | Fountain Lake Dr | Jurisdiction Line | Oxford Pl | 0.05 | Crack Seal | $2,500.00 | $125.00 |
| 2017 | 1583 | Fountain Lake Dr | Oxford Pl | Bayview Dr | 0.10 | Crack Seal | $2,500.00 | $245.00 |
| 2017 | 1583 | Fountain Lake Dr | Bayview Dr | Dead-End | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2017 | 1591 | Main St | 7th St | 8th St | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2017 | 1601 | E 148th Ter | Bellaire Ave | White Ave | 0.35 | Crack Seal | $2,500.00 | $885.00 |
| 2017 | 1601 | E 148th Ter | White Ave | E 147th Ter | 0.32 | Crack Seal | $2,500.00 | $800.00 |
| 2017 | 1602 | Bellaire Ave | E 151st St | E 150th Ter | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2017 | 1602 | Bellaire Ave | E 150th St | E 149th Ter | 0.14 | Crack Seal | $2,500.00 | $350.00 |
| 2017 | 1605 | Kelley Rd | E 147th St | E M 150 Hwy E | 0.06 | Crack Seal | $2,500.00 | $155.00 |
| 2017 | 1609 | 5th St | Goode Ave | Jones Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2017 | 1621 | Jackson Ave | Blue Ridge Blvd | Askew Dr | 0.05 | Crack Seal | $2,500.00 | $115.00 |
| 2017 | 1621 | Jackson Ave | Askew Dr | Valley Brook Dr | 0.09 | Crack Seal | $2,500.00 | $212.50 |
| 2017 | 1622 | Park Ln | Sycamore Ave | Herrick Ave | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2017 | 1622 | Park Ln | E 133rd St | E 133rd Ter | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2017 | 1622 | Park Ln | E 133rd Ter | Donnelly Ave | 0.12 | Crack Seal | $2,500.00 | $300.00 |

| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
|---|---|---|---|---|---|---|---|---|
| 2017 | 1656 | E 140th Ter | Jurisdiction Line | Bennington Ave | 0.32 | Crack Seal | $2,500.00 | $805.00 |
| 2017 | 1656 | E 140th Ter | Bennington Ave | Winchester Ct | 0.44 | Crack Seal | $2,500.00 | $1,090.00 |
| 2017 | 1657 | E 150th Ter | Barat Ave | Bellaire Ave | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2017 | 1667 | E 147th Ter | E 148th Ter | E 149th St | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2017 | 1667 | E 147th Ter | E 149th St | Fuller Ave | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2017 | 1710 | Bayview Dr | Fountain Lake Dr | Dead-End | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2018 | 12 | Blue Ridge Blvd | Fountain Lake Dr | Jurisdiction Line | 0.77 | Crack Seal | $2,500.00 | $1,935.00 |
| 2018 | 12 | Blue Ridge Blvd | Jurisdiction Line | Duck Rd | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2018 | 12 | Blue Ridge Blvd | 3rd St | Grandview Rd | 0.68 | Crack Seal | $2,500.00 | $1,705.00 |
| 2018 | 12 | Blue Ridge Blvd | Grandview Rd | Harry Truman Dr | 0.42 | Crack Seal | $2,500.00 | $1,050.00 |
| 2018 | 12 | Blue Ridge Blvd | Harry Truman Dr | S Us 71 Hwy West Frontage Rd | 3.18 | Crack Seal | $2,500.00 | $7,950.00 |
| 2018 | 12 | Blue Ridge Blvd | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2018 | 12 | Blue Ridge Blvd | Us 71 Hwy N | Us 71 Hwy N | 0.07 | Crack Seal | $2,500.00 | $162.50 |
| 2018 | 12 | Blue Ridge Blvd | Us 71 Hwy N | S Us 71 Hwy Off Ramp N | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2018 | 12 | Blue Ridge Blvd | S Us 71 Hwy Off Ramp N | Dead-End | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2018 | 19 | E 139th St | Byars Rd | Dead-End | 0.72 | Crack Seal | $2,500.00 | $1,800.00 |
| 2018 | 53 | Fuller Ave | E 152nd St | E 150th Ter | 0.44 | Mill & Overlay | $28,090.00 | $12,359.60 |
| 2018 | 64 | White Ave | Jurisdiction Line | Jurisdiction Line | 0.13 | Mill & Overlay | $28,090.00 | $3,707.88 |
| 2018 | 145 | E 119th Ter | Dead-End | Beacon Ave | 0.05 | Mill & Overlay | $28,090.00 | $1,348.32 |
| 2018 | 261 | Access Rd | Newton Ave | Holiday Dr | 0.33 | Crack Seal | $2,500.00 | $820.00 |
| 2018 | 264 | E 139th St | E 140th St | E 138th St | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2018 | 264 | E 139th St | E 138th St | Norby Rd | 0.35 | Crack Seal | $2,500.00 | $870.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 264 | E 139th St | 10th Ter | 11th St | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2018 | 264 | E 139th St | 11th St | 12th St | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2018 | 264 | E 139th St | 12th St | 15th St | 0.37 | Crack Seal | $2,500.00 | $930.00 |
| 2018 | 266 | Botts Rd | Dead-End | E 142nd St | 0.59 | Crack Seal | $2,500.00 | $1,470.00 |
| 2018 | 266 | Botts Rd | E 142nd St | E 140th St | 0.66 | Crack Seal | $2,500.00 | $1,650.00 |
| 2018 | 266 | Botts Rd | E 137th Ter | E 136th St | 0.51 | Crack Seal | $2,500.00 | $1,267.50 |
| 2018 | 266 | Botts Rd | E 136th St | E 135th St | 0.38 | Crack Seal | $2,500.00 | $937.50 |
| 2018 | 290 | E 126th St | Private Dr | Dead-End | 0.16 | Mill & Overlay | $28,090.00 | $4,494.40 |
| 2018 | 295 | E 128th St | Manchester Ave | Palmer Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2018 | 299 | White Ave | E 129th St | E 127th St | 0.37 | Crack Seal | $2,500.00 | $930.00 |
| 2018 | 323 | Sycamore Ave | E 129th Ter | E 128th St | 0.45 | Crack Seal | $2,500.00 | $1,130.00 |
| 2018 | 323 | Sycamore Ave | E 127th Ter | E 125th St | 0.51 | Crack Seal | $2,500.00 | $1,265.00 |
| 2018 | 328 | Bristol Ave | E 128th St | E 127th St | 0.34 | Crack Seal | $2,500.00 | $850.00 |
| 2018 | 331 | Overhill Ave | E 128th St | E 127th Pl | 0.25 | Mill & Overlay | $28,090.00 | $6,966.32 |
| 2018 | 355 | E 143rd St | Jurisdiction Line | Dead-End | 0.08 | Mill & Overlay | $28,090.00 | $2,247.20 |
| 2018 | 365 | E 143rd St | Craig Ave | Jurisdiction Line | 0.36 | Crack Seal | $2,500.00 | $890.00 |
| 2018 | 402 | E 125th St | S Us 71 Hwy West Frontage Rd | 15th St | 0.22 | Crack Seal | $2,500.00 | $560.00 |
| 2018 | 409 | E 132nd St | Bristol Ave | Unnamed Rd | 0.02 | Crack Seal | $2,500.00 | $60.00 |
| 2018 | 409 | E 132nd St | Unnamed Rd | Corrington Ave | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2018 | 411 | E 125th St | Harry Truman Dr | Belmead Ave | 0.55 | Crack Seal | $2,500.00 | $1,375.00 |
| 2018 | 413 | Raytown Rd | Highgrove Rd | Longview Lake Access Rd | 1.06 | Crack Seal | $2,500.00 | $2,650.00 |
| 2018 | 416 | Palmer Ave | E 128th St | E 129th Ter | 0.38 | Crack Seal | $2,500.00 | $950.00 |
| 2018 | 424 | Bristol Ave | E 124th Ter | E 123rd St | 0.36 | Mill & Overlay | $28,090.00 | $10,056.22 |
| 2018 | 430 | Winchester Ave | Dead-End | E 140th Pl | 0.14 | Mill & Overlay | $28,090.00 | $3,820.24 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 430 | Winchester Ave | E 140th Pl | E 140th Ter | 0.13 | Mill & Overlay | $28,090.00 | $3,539.34 |
| 2018 | 430 | Winchester Ave | E 140th Ter | E 139th St | 0.07 | Mill & Overlay | $28,090.00 | $1,966.30 |
| 2018 | 467 | E 133rd St | Grandview Rd | 11th St | 0.25 | Mill & Overlay | $28,090.00 | $6,910.14 |
| 2018 | 467 | E 133rd St | 11th St | 11th St | 0.06 | Mill & Overlay | $28,090.00 | $1,685.40 |
| 2018 | 467 | E 133rd St | 11th St | 13th St | 0.19 | Mill & Overlay | $28,090.00 | $5,280.92 |
| 2018 | 474 | Parker Ave | Dead-End | E 137th Ter | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2018 | 474 | Parker Ave | E 137th Ter | E 137th St | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2018 | 503 | 8th St | Highgrove Rd | Rhodes Ave | 0.12 | Mill & Overlay | $28,090.00 | $3,483.16 |
| 2018 | 503 | 8th St | Dead-End | Highgrove Rd | 0.35 | Crack Seal | $2,500.00 | $875.00 |
| 2018 | 503 | 8th St | Goode Ave | Jones Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2018 | 503 | 8th St | Jones Ave | Lena Ave | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2018 | 518 | 11th Ter | E 137th St | 12th St | 0.45 | Crack Seal | $2,500.00 | $1,120.00 |
| 2018 | 539 | E 126th St | 13th St | 15th St | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2018 | 560 | E 147th St | Byars Rd | Kelley Rd | 1.97 | Crack Seal | $2,500.00 | $4,935.00 |
| 2018 | 605 | E 134th Ter | Bristol Ave | Byars Rd | 0.44 | Crack Seal | $2,500.00 | $1,105.00 |
| 2018 | 632 | Beacon Ave | Dead-End | Armitage Dr | 0.01 | Crack Seal | $2,500.00 | $20.00 |
| 2018 | 636 | 11th St | E 139th St | E 137th St | 0.49 | Mill & Overlay | $28,090.00 | $13,707.92 |
| 2018 | 644 | E 127th St | White Ave | Applewood Dr | 0.53 | Crack Seal | $2,500.00 | $1,325.00 |
| 2018 | 647 | Lowell Ave | Jurisdiction Line | E 137th Ter | 0.02 | Mill & Overlay | $28,090.00 | $449.44 |
| 2018 | 669 | 6th St | E 135th St | 7th St | 0.36 | Crack Seal | $2,500.00 | $895.00 |
| 2018 | 692 | Corrington Ave | E 128th St | E 127th St | 0.36 | Crack Seal | $2,500.00 | $890.00 |
| 2018 | 697 | E 141st St | El Rancho Rd | Drury Ct | 0.08 | Crack Seal | $2,500.00 | $205.00 |
| 2018 | 698 | E 135th St | Bennington Ave | Cambridge Ave | 0.44 | Crack Seal | $2,500.00 | $1,100.00 |
| 2018 | 755 | Manchester Ave | E 126th St | Dead-End | 0.38 | Crack Seal | $2,500.00 | $960.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 763 | Sycamore Ave | E 120th St | Jurisdiction Line | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2018 | 763 | Sycamore Ave | Jurisdiction Line | Jurisdiction Line | 0.14 | Crack Seal | $2,500.00 | $350.00 |
| 2018 | 763 | Sycamore Ave | Jurisdiction Line | Jurisdiction Line | 0.09 | Crack Seal | $2,500.00 | $235.00 |
| 2018 | 763 | Sycamore Ave | Jurisdiction Line | E 119th Ter | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2018 | 786 | Barat Ave | Jurisdiction Line | Bellaire Ave | 0.06 | Mill & Overlay | $28,090.00 | $1,797.76 |
| 2018 | 817 | Armitage Dr | E 120th Ter | Jurisdiction Line | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2018 | 817 | Armitage Dr | Jurisdiction Line | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $165.00 |
| 2018 | 817 | Armitage Dr | Jurisdiction Line | Fuller Ave | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2018 | 817 | Armitage Dr | Fuller Ave | Fremont Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2018 | 817 | Armitage Dr | Fremont Ave | Beacon Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2018 | 817 | Armitage Dr | Beacon Ave | Dead-End | 0.04 | Crack Seal | $2,500.00 | $95.00 |
| 2018 | 824 | 3rd St | 2nd St | Blue Ridge Blvd | 0.18 | Crack Seal | $2,500.00 | $460.00 |
| 2018 | 847 | Bennington Ave | E 139th St | E 137th St | 0.51 | Crack Seal | $2,500.00 | $1,280.00 |
| 2018 | 867 | E 119th Ter | Food Ln | Smalley Ave | 0.40 | Crack Seal | $2,500.00 | $995.00 |
| 2018 | 889 | Fuller Ave | White Ave | Bellaire Ave | 0.40 | Crack Seal | $2,500.00 | $995.00 |
| 2018 | 898 | E 133rd Ter | Break in road - cul de sac | Craig Ave | 0.16 | Mill & Overlay | $28,090.00 | $4,438.22 |
| 2018 | 898 | E 133rd Ter | Bennington Ave | Break in road - cul de sac | 0.16 | Crack Seal | $2,500.00 | $395.00 |
| 2018 | 911 | Beacon Ave | E 119th Ter | E 120th Ter | 0.40 | Crack Seal | $2,500.00 | $990.00 |
| 2018 | 913 | E 139th St | Winchester Ave | Byars Rd | 0.56 | Crack Seal | $2,500.00 | $1,410.00 |
| 2018 | 935 | Winchester Ave | E 134th St | E 133rd Ter | 0.11 | Mill & Overlay | $28,090.00 | $3,202.26 |
| 2018 | 935 | Winchester Ave | E 132nd St | Highgrove Rd | 0.32 | Mill & Overlay | $28,090.00 | $8,988.80 |
| 2018 | 986 | Applewood Dr | E 136th St | E 135th St | 0.25 | Mill & Overlay | $28,090.00 | $7,078.68 |
| 2018 | 1000 | 11th St | Pinkston Ave | Highgrove Rd | 0.17 | Mill & Overlay | $28,090.00 | $4,831.48 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1034 | E 137th Ter | Parker Ave | Applewood Dr | 0.12 | Mill & Overlay | $28,090.00 | $3,370.80 |
| 2018 | 1054 | E 127th St | Byars Rd | Manchester Ave | 0.48 | Crack Seal | $2,500.00 | $1,190.00 |
| 2018 | 1129 | Crystal Ave | E 128th St | E 127th St | 0.38 | Crack Seal | $2,500.00 | $955.00 |
| 2018 | 1140 | Raytown Rd | Highgrove Rd | Longview Lake Access Rd | 1.06 | Crack Seal | $2,500.00 | $2,655.00 |
| 2018 | 1175 | Pinkston Ave | 5th St | 6th St | 0.09 | Mill & Overlay | $28,090.00 | $2,415.74 |
| 2018 | 1202 | Parker Ave | E 133rd St | Highgrove Rd | 0.50 | Crack Seal | $2,500.00 | $1,255.00 |
| 2018 | 1267 | Barat Ave | Bellaire Ave | Jurisdiction Line | 0.11 | Mill & Overlay | $28,090.00 | $3,033.72 |
| 2018 | 1267 | Barat Ave | Jurisdiction Line | S Us 71 Hwy East Frontage Rd | 0.30 | Mill & Overlay | $28,090.00 | $8,370.82 |
| 2018 | 1301 | E 135th St | Botts Rd | Spruce St | 0.19 | Crack Seal | $2,500.00 | $480.00 |
| 2018 | 1301 | E 135th St | Spruce St | Cypress St | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2018 | 1321 | E 140th St | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.13 | Crack Seal | $2,500.00 | $312.50 |
| 2018 | 1321 | E 140th St | Us 71 Hwy N | Us 71 Hwy N | 0.05 | Crack Seal | $2,500.00 | $112.50 |
| 2018 | 1321 | E 140th St | Us 71 Hwy N | S Us 71 Hwy East Frontage Rd | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2018 | 1321 | E 140th St | S Us 71 Hwy East Frontage Rd | Dunbar Ct | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2018 | 1321 | E 140th St | Dunbar Ct | Dunbar Ct | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2018 | 1321 | E 140th St | Dunbar Ct | Dunoon St | 0.17 | Crack Seal | $2,500.00 | $420.00 |
| 2018 | 1321 | E 140th St | Dunoon St | Dundee Cir | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2018 | 1321 | E 140th St | Dundee Cir | Dunham St | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2018 | 1321 | E 140th St | Dunham St | Dundee Cir | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2018 | 1321 | E 140th St | Dundee Cir | Merrywood Ln | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2018 | 1321 | E 140th St | Merrywood Ln | Falkirk Cir | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2018 | 1321 | E 140th St | Falkirk Cir | Jurisdiction Line | 0.23 | Crack Seal | $2,500.00 | $580.00 |
| 2018 | 1321 | E 140th St | Jurisdiction Line | Falkirk Cir | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2018 | 1321 | E 140th St | Falkirk Cir | E 139th St | 0.20 | Crack Seal | $2,500.00 | $510.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1364 | E 140th St | Botts Rd | E 139th St | 0.49 | Crack Seal | $2,500.00 | $1,230.00 |
| 2018 | 1421 | E 141st St | Southern Rd | S Us 71 Hwy West Frontage Rd | 0.39 | Crack Seal | $2,500.00 | $965.00 |
| 2018 | 1428 | Smalley Ave | E 128th St | E 129th Ter | 0.42 | Crack Seal | $2,500.00 | $1,045.00 |
| 2018 | 1442 | Spring St | E 133rd St | Highgrove Rd | 0.50 | Crack Seal | $2,500.00 | $1,255.00 |
| 2018 | 1445 | E 130th St | Manchester Ave | Sycamore Ave | 0.40 | Crack Seal | $2,500.00 | $1,005.00 |
| 2018 | 1446 | E 147th St | White Ave | Fuller Ave | 0.40 | Crack Seal | $2,500.00 | $1,000.00 |
| 2018 | 1515 | White Ave | E 154th Ter | Jurisdiction Line | 0.09 | Mill & Overlay | $28,090.00 | $2,415.74 |
| 2018 | 1515 | White Ave | Jurisdiction Line | Jurisdiction Line | 0.03 | Mill & Overlay | $28,090.00 | $842.70 |
| 2018 | 1515 | White Ave | E 152nd St | E 150th Ter | 0.35 | Mill & Overlay | $28,090.00 | $9,887.68 |
| 2018 | 1515 | White Ave | E M 150 Hwy W | S Us 71 Hwy East Frontage Rd | 0.78 | Crack Seal | $2,500.00 | $1,957.50 |
| 2018 | 1545 | White Ave | E 136th St | Dead-End | 0.08 | Mill & Overlay | $28,090.00 | $2,247.20 |
| 2018 | 1561 | Park Hills Dr | E M 150 Hwy E | E M 150 Hwy W | 0.01 | Crack Seal | $2,500.00 | $35.00 |
| 2018 | 1582 | E 155th St | Dead-End | Us 71 Hwy N | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2018 | 1582 | E 155th St | S Us 71 Hwy Off Ramp N | S Us 71 Hwy East Frontage Rd | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2018 | 1582 | E 155th St | S Us 71 Hwy East Frontage Rd | E 153rd Ter | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2018 | 1582 | E 155th St | E 153rd Ter | Bellaire Ave | 0.54 | Crack Seal | $2,500.00 | $1,345.00 |
| 2018 | 1585 | Duck Rd | 3rd St | 7th St | 0.39 | Mill & Overlay | $28,090.00 | $10,842.74 |
| 2018 | 1587 | Arrington Rd | 1600' S of Robison PIke Rd | 3700' S of Robison PIke Rd | 0.60 | Mill & Overlay | $28,090.00 | $16,741.64 |
| 2018 | 1588 | 10th Ter | E 137th St | Dead-End | 0.05 | Mill & Overlay | $28,090.00 | $1,292.14 |
| 2018 | 1591 | Main St | Dead-End | 2nd St | 3.05 | Crack Seal | $2,500.00 | $7,627.50 |
| 2018 | 1591 | Main St | 2nd St | 3rd St | 0.38 | Crack Seal | $2,500.00 | $937.50 |
| 2018 | 1591 | Main St | 3rd St | 5th St | 0.18 | Crack Seal | $2,500.00 | $450.00 |
| 2018 | 1591 | Main St | 5th St | 6th St | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2018 | 1591 | Main St | 6th St | 7th St | 0.26 | Crack Seal | $2,500.00 | $660.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1591 | Main St | 7th St | 8th St | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2018 | 1591 | Main St | 8th St | Grandview Rd | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2018 | 1591 | Main St | Grandview Rd | 10th St | 0.19 | Crack Seal | $2,500.00 | $472.50 |
| 2018 | 1591 | Main St | 10th St | 12th St | 0.50 | Crack Seal | $2,500.00 | $1,260.00 |
| 2018 | 1591 | Main St | 12th St | 13th St | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2018 | 1591 | Main St | 13th St | 15th St | 0.50 | Crack Seal | $2,500.00 | $1,250.00 |
| 2018 | 1591 | Main St | 15th St | S Us 71 Hwy West Frontage Rd | 0.50 | Crack Seal | $2,500.00 | $1,240.00 |
| 2018 | 1591 | Main St | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.11 | Crack Seal | $2,500.00 | $262.50 |
| 2018 | 1591 | Main St | Fuller Ave | Bennington Ave | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2018 | 1592 | Byars Rd | E 147th St | E M 150 Hwy E | 0.06 | Crack Seal | $2,500.00 | $150.00 |
| 2018 | 1592 | Byars Rd | E M 150 Hwy W | Access Rd | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2018 | 1592 | Byars Rd | Access Rd | E 146th St | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2018 | 1592 | Byars Rd | E 146th St | Eastern Ct | 0.18 | Crack Seal | $2,500.00 | $455.00 |
| 2018 | 1592 | Byars Rd | Eastern Ct | Eastern Ct | 0.26 | Crack Seal | $2,500.00 | $660.00 |
| 2018 | 1592 | Byars Rd | Eastern Ct | E 143rd St | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2018 | 1592 | Byars Rd | E 143rd St | Laquinta Dr | 0.56 | Crack Seal | $2,500.00 | $1,400.00 |
| 2018 | 1592 | Byars Rd | Laquinta Dr | E 139th St | 0.61 | Crack Seal | $2,500.00 | $1,520.00 |
| 2018 | 1592 | Byars Rd | E 139th St | 0 | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2018 | 1592 | Byars Rd | E 139th St | E 134th Ter | 0.88 | Crack Seal | $2,500.00 | $2,200.00 |
| 2018 | 1592 | Byars Rd | E 134th Cir | E 133rd Cir | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2018 | 1592 | Byars Rd | E 133rd Cir | E 133rd Ter | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2018 | 1592 | Byars Rd | E 133rd Ter | E 133rd Ter | 0.10 | Crack Seal | $2,500.00 | $247.50 |
| 2018 | 1592 | Byars Rd | E 133rd Ter | E 133rd St | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2018 | 1592 | Byars Rd | E 133rd St | E 132nd Ter | 0.18 | Crack Seal | $2,500.00 | $450.00 |
| 2018 | 1592 | Byars Rd | E 132nd Ter | E 132nd St | 0.13 | Crack Seal | $2,500.00 | $322.50 |

| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
|---|---|---|---|---|---|---|---|---|
| 2018 | 1592 | Byars Rd | E 132nd St | Highgrove Rd | 0.49 | Crack Seal | $2,500.00 | $1,222.50 |
| 2018 | 1592 | Byars Rd | Highgrove Rd | E 130th Ter | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2018 | 1592 | Byars Rd | E 130th Ter | E 130th St | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2018 | 1592 | Byars Rd | E 130th St | E 129th St | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2018 | 1592 | Byars Rd | E 129th St | E 128th St | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2018 | 1592 | Byars Rd | E 128th St | E 127th Pl | 0.28 | Crack Seal | $2,500.00 | $690.00 |
| 2018 | 1592 | Byars Rd | E 127th Pl | E 127th St | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2018 | 1592 | Byars Rd | E 127th St | E 126th St | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2018 | 1592 | Byars Rd | E 126th St | Harry Truman Dr | 0.71 | Crack Seal | $2,500.00 | $1,785.00 |
| 2018 | 1592 | Byars Rd | 0 | E 139th St | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2018 | 1594 | 13th St | E 133rd St | Dewey St | 0.16 | Mill & Overlay | $28,090.00 | $4,382.04 |
| 2018 | 1594 | 13th St | Pinkston Ave | Highgrove Rd | 0.17 | Mill & Overlay | $28,090.00 | $4,887.66 |
| 2018 | 1600 | E 152nd Ter | Barat Ave | Bellaire Ave | 0.46 | Crack Seal | $2,500.00 | $1,155.00 |
| 2018 | 1603 | Grandview Rd | E 133rd Cir | Dewey St | 0.11 | Mill & Overlay | $28,090.00 | $3,202.26 |
| 2018 | 1603 | Grandview Rd | Pinkston Ave | Highgrove Rd | 0.17 | Mill & Overlay | $28,090.00 | $4,887.66 |
| 2018 | 1603 | Grandview Rd | E 133rd Ter | E 133rd St | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2018 | 1603 | Grandview Rd | Main St | Goode Ave | 0.26 | Crack Seal | $2,500.00 | $640.00 |
| 2018 | 1603 | Grandview Rd | Goode Ave | Jones Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2018 | 1603 | Grandview Rd | Jones Ave | Lena Ave | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2018 | 1603 | Grandview Rd | Lena Ave | Little Ave | 0.18 | Crack Seal | $2,500.00 | $455.00 |
| 2018 | 1603 | Grandview Rd | Little Ave | Duck Rd | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2018 | 1603 | Grandview Rd | Duck Rd | Zumwalt Ave | 0.16 | Crack Seal | $2,500.00 | $390.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1603 | Grandview Rd | Zumwalt Ave | Skyline Dr | 0.02 | Crack Seal | $2,500.00 | $55.00 |
| 2018 | 1603 | Grandview Rd | Skyline Dr | Blue Ridge Blvd | 0.33 | Crack Seal | $2,500.00 | $835.00 |
| 2018 | 1603 | Grandview Rd | 0 | Martha Truman Rd | 1.22 | Crack Seal | $2,500.00 | $3,055.00 |
| 2018 | 1604 | Winchester Ct | E 140th Ter | Dead-End | 0.10 | Crack Seal | $2,500.00 | $245.00 |
| 2018 | 1606 | Donnelly Ave | E 135th St | E 134th Ter | 0.14 | Mill & Overlay | $28,090.00 | $3,932.60 |
| 2018 | 1606 | Donnelly Ave | E 134th St | Park Ln | 0.14 | Mill & Overlay | $28,090.00 | $3,876.42 |
| 2018 | 1606 | Donnelly Ave | Park Ln | Park Entrance | 0.25 | Mill & Overlay | $28,090.00 | $7,078.68 |
| 2018 | 1606 | Donnelly Ave | Park Entrance | Highgrove Rd | 0.32 | Mill & Overlay | $28,090.00 | $8,988.80 |
| 2018 | 1609 | 5th St | E 135th St | Deweese Ave | 0.39 | Crack Seal | $2,500.00 | $975.00 |
| 2018 | 1610 | Harry Truman Dr | E 125th Ter | 15th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2018 | 1610 | Harry Truman Dr | 15th St | S Us 71 Hwy West Frontage Rd | 0.54 | Crack Seal | $2,500.00 | $1,337.50 |
| 2018 | 1610 | Harry Truman Dr | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.11 | Crack Seal | $2,500.00 | $262.50 |
| 2018 | 1610 | Harry Truman Dr | Us 71 Hwy N | Us 71 Hwy N | 0.02 | Crack Seal | $2,500.00 | $50.00 |
| 2018 | 1610 | Harry Truman Dr | Us 71 Hwy N | S Us 71 Hwy East Frontage Rd | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2018 | 1610 | Harry Truman Dr | S Us 71 Hwy East Frontage Rd | E 125th St | 0.41 | Crack Seal | $2,500.00 | $1,015.00 |
| 2018 | 1610 | Harry Truman Dr | E 125th St | Bennington Ave | 0.86 | Crack Seal | $2,500.00 | $2,140.00 |
| 2018 | 1610 | Harry Truman Dr | Bennington Ave | Crystal Ave | 0.65 | Crack Seal | $2,500.00 | $1,615.00 |
| 2018 | 1610 | Harry Truman Dr | Crystal Ave | Byars Rd | 0.24 | Crack Seal | $2,500.00 | $605.00 |
| 2018 | 1613 | E 140th Pl | Bennington Ave | Winchester Ave | 0.41 | Crack Seal | $2,500.00 | $1,025.00 |
| 2018 | 1615 | E 151st St | Bellaire Ave | Jurisdiction Line | 0.11 | Mill & Overlay | $28,090.00 | $3,033.72 |
| 2018 | 1616 | E 120th St | Smalley Ave | Manchester Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1616 | E 120th St | Manchester Ave | Sycamore Ave | 0.17 | Crack Seal | $2,500.00 | $420.00 |
| 2018 | 1616 | E 120th St | Sycamore Ave | Dead-End | 0.17 | Crack Seal | $2,500.00 | $415.00 |
| 2018 | 1617 | Merrywood Ln | St Andrews Dr | E 140th St | 0.35 | Crack Seal | $2,500.00 | $880.00 |
| 2018 | 1620 | Martha Truman Rd | Dead-End | Cartwright Ave | 0.39 | Crack Seal | $2,500.00 | $980.00 |
| 2018 | 1620 | Martha Truman Rd | Grandview Rd | Drury Ave | 0.56 | Crack Seal | $2,500.00 | $1,400.00 |
| 2018 | 1620 | Martha Truman Rd | Drury Ave | Oakley Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2018 | 1620 | Martha Truman Rd | Oakley Ave | Lawndale Ave | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2018 | 1620 | Martha Truman Rd | Lawndale Ave | S Us 71 Hwy West Frontage Rd | 0.17 | Crack Seal | $2,500.00 | $420.00 |
| 2018 | 1623 | St Andrews Dr | Craig Ave | E 143rd St | 0.85 | Mill & Overlay | $28,090.00 | $23,820.32 |
| 2018 | 1624 | Food Ln | E 122nd St | E 119th Ter | 0.62 | Crack Seal | $2,500.00 | $1,550.00 |
| 2018 | 1626 | Valley Brook Dr | Monroe St | Unnamed Rd | 0.34 | Crack Seal | $2,500.00 | $840.00 |
| 2018 | 1633 | E 146th St | Richmond Ave | Park Hills Dr | 0.75 | Crack Seal | $2,500.00 | $1,880.00 |
| 2018 | 1637 | Askew Dr | Jackson Ave | Monroe St | 0.12 | Mill & Overlay | $28,090.00 | $3,314.62 |
| 2018 | 1637 | Askew Dr | Monroe St | Valley Brook Dr | 0.69 | Crack Seal | $2,500.00 | $1,725.00 |
| 2018 | 1641 | Beacon St | Main St | Craig Ave | 0.10 | Crack Seal | $2,500.00 | $245.00 |
| 2018 | 1641 | Beacon St | Craig Ave | E 129th Pl | 0.15 | Crack Seal | $2,500.00 | $365.00 |
| 2018 | 1641 | Beacon St | E 129th Pl | E 129th St | 0.17 | Crack Seal | $2,500.00 | $430.00 |
| 2018 | 1645 | E 149th Ter | Bellaire Ave | White Ave | 0.44 | Mill & Overlay | $28,090.00 | $12,303.42 |
| 2018 | 1650 | E 124th Ter | Cambridge Ave | E 123rd Ter | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2018 | 1654 | 2nd St | Arrington Rd | Main St | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2018 | 1654 | 2nd St | Duck Rd | 3rd St | 0.41 | Crack Seal | $2,500.00 | $1,035.00 |
| 2018 | 1660 | Dunham St | E 140th St | Dornoch St | 0.11 | Mill & Overlay | $28,090.00 | $3,202.26 |
| 2018 | 1691 | E 129th Pl | Beacon St | Jurisdiction Line | 0.31 | Mill & Overlay | $28,090.00 | $8,820.26 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2018 | 1702 | Pineview Dr | Stonewood Dr | E 147th St | 0.40 | Crack Seal | $2,500.00 | $995.00 |
| 2018 | 1704 | E 124th St | Bennington Ave | Cambridge Ave | 0.41 | Crack Seal | $2,500.00 | $1,015.00 |
| 2018 | 1705 | Cartwright Ave | Dr Greaves Rd | 1300' South of Martha Truman Rd | 0.58 | Crack Seal | $2,500.00 | $1,455.00 |
| 2018 | 1705 | Cartwright Ave | 750' South of Martha Truman Rd | Martha Truman Rd | 0.29 | Crack Seal | $2,500.00 | $735.00 |
| 2018 | 1705 | Cartwright Ave | 750' South of Martha Truman Rd | 1300' South of Martha Truman Rd | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2019 | 264 | E 139th St | Norby Rd | Century Ln | 0.46 | Crack Seal | $2,500.00 | $1,150.00 |
| 2019 | 264 | E 139th St | Century Ln | 10th Ter | 0.60 | Crack Seal | $2,500.00 | $1,490.00 |
| 2019 | 324 | E 129th St | Winchester Ave | Bristol Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2019 | 324 | E 129th St | Bristol Ave | Corrington Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2019 | 324 | E 129th St | Corrington Ave | Crystal Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2019 | 324 | E 129th St | Crystal Ave | Crystal Ave | 0.03 | Crack Seal | $2,500.00 | $70.00 |
| 2019 | 324 | E 129th St | Crystal Ave | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 383 | Corrington Ave | E 130th Ter | E 130th St | 0.19 | Crack Seal | $2,500.00 | $480.00 |
| 2019 | 383 | Corrington Ave | E 130th St | Dead-End | 0.06 | Crack Seal | $2,500.00 | $155.00 |
| 2019 | 425 | E 132nd St | Dead-End | Jurisdiction Line | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2019 | 501 | Highgrove Rd | Jurisdiction Line | Raytown Rd | 0.26 | Crack Seal | $2,500.00 | $660.00 |
| 2019 | 503 | 8th St | Main St | Goode Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2019 | 542 | E 133rd Ter | Crystal Ave | Eastern Ave | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2019 | 542 | E 133rd Ter | Eastern Ave | Byars Rd | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2019 | 827 | E 129th St | Beacon St | Jurisdiction Line | 0.23 | Crack Seal | $2,500.00 | $580.00 |
| 2019 | 827 | E 129th St | Jurisdiction Line | Craig Ave | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2019 | 867 | E 119th Ter | Smalley Ave | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2019 | 867 | E 119th Ter | Jurisdiction Line | Manchester Ave | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2019 | 867 | E 119th Ter | Manchester Ave | Sycamore Ave | 0.28 | Crack Seal | $2,500.00 | $700.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 867 | E 119th Ter | Sycamore Ave | Dead-End | 0.09 | Crack Seal | $2,500.00 | $225.00 |
| 2019 | 930 | E 136th St | Bennington Ave | Craig Ave | 0.18 | Crack Seal | $2,500.00 | $440.00 |
| 2019 | 930 | E 136th St | Craig Ave | Winchester Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 930 | E 136th St | Winchester Ave | Cambridge Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 930 | E 136th St | Cambridge Ave | Dead-End | 0.08 | Crack Seal | $2,500.00 | $195.00 |
| 2019 | 1003 | Manchester Ave | Palmer Ave | Herrick Ave | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2019 | 1011 | Belmead Ave | E 136th St | E 135th St | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2019 | 1054 | E 127th St | Craig Ave | Cambridge Ave | 0.30 | Crack Seal | $2,500.00 | $750.00 |
| 2019 | 1140 | Raytown Rd | Longview Lake Access Rd | Harry Truman Dr | 0.93 | Crack Seal | $2,500.00 | $2,320.00 |
| 2019 | 1140 | Raytown Rd | Harry Truman Dr | Dead-End | 0.41 | Crack Seal | $2,500.00 | $1,020.00 |
| 2019 | 1192 | E 127th Ter | Manchester Ave | Sycamore Ave | 0.38 | Crack Seal | $2,500.00 | $950.00 |
| 2019 | 1316 | 127th Ter | Belmead Ave | Lowell Ave | 0.08 | Crack Seal | $2,500.00 | $205.00 |
| 2019 | 1335 | Belmead Ave | Dead-End | 127th Ter | 0.08 | Crack Seal | $2,500.00 | $190.00 |
| 2019 | 1335 | Belmead Ave | 127th Ter | E 127th St | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2019 | 1361 | Lowell Ave | Dead-End | 127th Ter | 0.15 | Crack Seal | $2,500.00 | $365.00 |
| 2019 | 1361 | Lowell Ave | 127th Ter | E 127th St | 0.17 | Crack Seal | $2,500.00 | $430.00 |
| 2019 | 1366 | E 126th St | Lowell Ln | Belmead Ave | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2019 | 1434 | 7th St | Goode Ave | Jones Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 1434 | 7th St | Jones Ave | Lena Ave | 0.10 | Crack Seal | $2,500.00 | $245.00 |
| 2019 | 1594 | 13th St | E 135th St | E 134th Ter | 0.14 | Crack Seal | $2,500.00 | $340.00 |
| 2019 | 1594 | 13th St | E 134th Ter | E 134th Ter | 0.08 | Crack Seal | $2,500.00 | $190.00 |
| 2019 | 1594 | 13th St | E 134th Ter | E 134th St | 0.05 | Crack Seal | $2,500.00 | $135.00 |
| 2019 | 1594 | 13th St | E 134th St | E 133rd St | 0.24 | Crack Seal | $2,500.00 | $610.00 |
| 2019 | 1602 | Bellaire Ave | E 152nd St | E 151st Ter | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2019 | 1614 | E 127th Pl | Byars Rd | Oakland Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 1614 | E 127th Pl | Oakland Ave | Richmond Ave | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2019 | 1614 | E 127th Pl | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2019 | 1614 | E 127th Pl | Overhill Ave | Manchester Ave | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2019 | 1626 | Valley Brook Dr | Askew Dr | Monroe St | 0.07 | Crack Seal | $2,500.00 | $167.50 |
| 2019 | 1650 | E 124th Ter | E 123rd Ter | Bristol Ave | 0.14 | Crack Seal | $2,500.00 | $360.00 |
| 2019 | 1650 | E 124th Ter | Bristol Ave | Dead-End | 0.05 | Crack Seal | $2,500.00 | $135.00 |
| 2019 | 1654 | 2nd St | Main St | Duck Rd | 0.75 | Crack Seal | $2,500.00 | $1,875.00 |
| 2019 | 1657 | E 150th Ter | Bellaire Ave | White Ave | 0.43 | Crack Seal | $2,500.00 | $1,070.00 |
| 2019 | 1666 | E 119th St | Food Ln | Delmar Ave | 0.27 | Crack Seal | $2,500.00 | $680.00 |
| 2019 | 1666 | E 119th St | Delmar Ave | Jurisdiction Line | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2019 | 1682 | E 152nd St | Bellaire Ave | White Ave | 0.31 | Crack Seal | $2,500.00 | $785.00 |
| 2019 | 1693 | E 120th Ter | Belmont Ave | Beacon Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2019 | 1693 | E 120th Ter | Beacon Ave | Armitage Dr | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2019 | 1693 | E 120th Ter | Armitage Dr | Bennington Ave | 0.09 | Crack Seal | $2,500.00 | $225.00 |
| 2019 | 1693 | E 120th Ter | Bennington Ave | Bennington Ave | 0.03 | Crack Seal | $2,500.00 | $75.00 |
| 2019 | 32 | Overhill Ave | E 134th Ter | E 134th St | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2019 | 32 | Overhill Ave | E 134th St | E 133rd Ter | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2019 | 32 | Overhill Ave | E 133rd Ter | E 133rd St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2019 | 36 | Norby Rd | E 142nd St | 0 | 0.20 | Crack Seal | $2,500.00 | $500.00 |
| 2019 | 36 | Norby Rd | E 139th St | E 138th Ter | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2019 | 36 | Norby Rd | E 138th Ter | E 138th St | 0.17 | Crack Seal | $2,500.00 | $415.00 |
| 2019 | 73 | 12th St | E 139th St | 11th Ter | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2019 | 73 | 12th St | 11th Ter | E 137th St | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2019 | 73 | 12th St | E 137th St | E 136th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2019 | 74 | Applewood Dr | E 138th St | E 137th Ter | 0.06 | Crack Seal | $2,500.00 | $145.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 74 | Applewood Dr | E 137th Ter | E 137th Ter | 0.04 | Crack Seal | $2,500.00 | $90.00 |
| 2019 | 89 | Winchester Ave | Highgrove Rd | E 130th Ter | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2019 | 89 | Winchester Ave | E 130th Ter | E 130th St | 0.21 | Crack Seal | $2,500.00 | $520.00 |
| 2019 | 89 | Winchester Ave | E 130th St | E 129th St | 0.14 | Crack Seal | $2,500.00 | $355.00 |
| 2019 | 89 | Winchester Ave | E 127th Ter | E 127th St | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2019 | 97 | Barat Ave | E 151st Ter | E 151st St | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2019 | 103 | Sunset Cir | Dead-End | Jurisdiction Line | 0.05 | Crack Seal | $2,500.00 | $130.00 |
| 2019 | 134 | Highgrove Rd | S Us 71 Hwy East Frontage Rd | Spring St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2019 | 134 | Highgrove Rd | Spring St | White Ave | 0.05 | Crack Seal | $2,500.00 | $125.00 |
| 2019 | 134 | Highgrove Rd | White Ave | Parker Ave | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2019 | 134 | Highgrove Rd | Lowell Ave | Fuller Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2019 | 157 | E 137th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2019 | 157 | E 137th St | White Ave | Spring St | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2019 | 157 | E 137th St | Belmont Ave | Parker Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2019 | 157 | E 137th St | Parker Ave | Parker Ave | 0.06 | Crack Seal | $2,500.00 | $155.00 |
| 2019 | 157 | E 137th St | Parker Ave | Applewood Dr | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2019 | 157 | E 137th St | Applewood Dr | Lowell Ave | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2019 | 157 | E 137th St | Lowell Ave | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 157 | E 137th St | Belmead Ave | Bennington Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 157 | E 137th St | Bennington Ave | Craig Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 157 | E 137th St | Craig Ave | Winchester Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 166 | E 138th St | Norby Rd | Dead-End | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2019 | 210 | 12th St | Jones Ave | Little Ave | 0.28 | Crack Seal | $2,500.00 | $705.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 210 | 12th St | Little Ave | Duck Rd | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2019 | 264 | E 139th St | Botts Rd | Spruce St | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2019 | 264 | E 139th St | Spruce St | E 140th St | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2019 | 266 | Botts Rd | E 140th St | E 139th St | 0.26 | Crack Seal | $2,500.00 | $645.00 |
| 2019 | 268 | Lowell Ave | Dead-End | Jurisdiction Line | 0.03 | Crack Seal | $2,500.00 | $85.00 |
| 2019 | 295 | E 128th St | Cambridge Ave | Winchester Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2019 | 295 | E 128th St | Winchester Ave | Bristol Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2019 | 295 | E 128th St | Bristol Ave | Corrington Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2019 | 295 | E 128th St | Corrington Ave | Crystal Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2019 | 295 | E 128th St | Crystal Ave | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 295 | E 128th St | Byars Rd | Oakland Ave | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2019 | 295 | E 128th St | Oakland Ave | Richmond Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 295 | E 128th St | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 295 | E 128th St | Overhill Ave | Manchester Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 295 | E 128th St | Palmer Ave | Smalley Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2019 | 295 | E 128th St | Smalley Ave | Sycamore Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2019 | 299 | White Ave | E 127th St | E 126th St | 0.06 | Crack Seal | $2,500.00 | $160.00 |
| 2019 | 324 | E 129th St | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 328 | Bristol Ave | E 129th St | E 128th St | 0.25 | Crack Seal | $2,500.00 | $615.00 |
| 2019 | 359 | Bennington Ave | E 125th St | E 124th St | 0.22 | Crack Seal | $2,500.00 | $555.00 |
| 2019 | 359 | Bennington Ave | E 124th St | E 123rd Ter | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2019 | 359 | Bennington Ave | E 123rd Ter | E 123rd St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2019 | 359 | Bennington Ave | E 123rd St | Harry Truman Dr | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2019 | 359 | Bennington Ave | Harry Truman Dr | E 122nd Ter | 0.05 | Crack Seal | $2,500.00 | $135.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 359 | Bennington Ave | E 122nd Ter | E 122nd St | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2019 | 365 | E 143rd St | St Andrews Dr | Craig Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2019 | 377 | E 122nd St | Food Ln | Richmond Ave | 0.30 | Crack Seal | $2,500.00 | $760.00 |
| 2019 | 403 | E 133rd St | 5th St | 6th St | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2019 | 403 | E 133rd St | 6th St | 7th St | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2019 | 409 | E 132nd St | Winchester Ave | Bristol Ave | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2019 | 409 | E 132nd St | Corrington Ave | Jurisdiction Line | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2019 | 409 | E 132nd St | Jurisdiction Line | Crystal Ave | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2019 | 409 | E 132nd St | Crystal Ave | E 131st St | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2019 | 409 | E 132nd St | E 131st St | Eastern Ave | 0.06 | Crack Seal | $2,500.00 | $150.00 |
| 2019 | 409 | E 132nd St | Eastern Ave | Byars Rd | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2019 | 847 | Bennington Ave | E 140th Pl | E 140th Ter | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2019 | 847 | Bennington Ave | E 140th Ter | E 139th St | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2019 | 847 | Bennington Ave | E 137th St | E 136th St | 0.29 | Crack Seal | $2,500.00 | $730.00 |
| 2019 | 847 | Bennington Ave | E 136th St | E 135th St | 0.17 | Crack Seal | $2,500.00 | $415.00 |
| 2019 | 847 | Bennington Ave | E 135th St | E 135th St | 0.06 | Crack Seal | $2,500.00 | $150.00 |
| 2019 | 847 | Bennington Ave | E 135th St | E 134th Ter | 0.07 | Crack Seal | $2,500.00 | $165.00 |
| 2019 | 847 | Bennington Ave | E 134th Ter | E 134th St | 0.10 | Crack Seal | $2,500.00 | $250.00 |
| 2019 | 847 | Bennington Ave | E 134th St | E 133rd Ter | 0.24 | Crack Seal | $2,500.00 | $590.00 |
| 2019 | 1490 | Craig Ave | E 129th St | E 127th Ter | 0.32 | Crack Seal | $2,500.00 | $800.00 |
| 2019 | 1490 | Craig Ave | E 127th St | E 126th St | 0.04 | Crack Seal | $2,500.00 | $100.00 |
| 2019 | 1490 | Craig Ave | E 126th St | E 125th Pl | 0.21 | Crack Seal | $2,500.00 | $515.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 1490 | Craig Ave | E 125th Pl | E 125th St | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2019 | 376 | Goode Ave | 7th St | 8th St | 0.13 | Mill & Overlay | $28,090.00 | $3,595.52 |
| 2019 | 493 | Highgrove Rd | 5th St | 6th St | 0.09 | Mill & Overlay | $28,090.00 | $2,415.74 |
| 2019 | 493 | Highgrove Rd | 6th St | 6th St | 0.02 | Mill & Overlay | $28,090.00 | $505.62 |
| 2019 | 493 | Highgrove Rd | 6th St | 7th St | 0.14 | Mill & Overlay | $28,090.00 | $3,932.60 |
| 2019 | 493 | Highgrove Rd | 7th St | 8th St | 0.12 | Mill & Overlay | $28,090.00 | $3,483.16 |
| 2019 | 493 | Highgrove Rd | 8th St | Grandview Rd | 0.13 | Mill & Overlay | $28,090.00 | $3,651.70 |
| 2019 | 503 | 8th St | Lena Ave | Duck Rd | 0.40 | Mill & Overlay | $28,090.00 | $11,292.18 |
| 2019 | 742 | Sycamore Ave | Park Hills Dr | Park Ln | 0.31 | Mill & Overlay | $28,090.00 | $8,820.26 |
| 2019 | 742 | Sycamore Ave | Park Ln | Highgrove Rd | 0.24 | Mill & Overlay | $28,090.00 | $6,853.96 |
| 2019 | 824 | 3rd St | Blue Ridge Blvd | Dr Greaves Rd | 0.50 | Mill & Overlay | $28,090.00 | $14,101.18 |
| 2019 | 847 | Bennington Ave | E 133rd Ter | Berkshire Ct | 0.24 | Mill & Overlay | $28,090.00 | $6,629.24 |
| 2019 | 847 | Bennington Ave | Berkshire Ct | Yorkshire Ct | 0.12 | Mill & Overlay | $28,090.00 | $3,258.44 |
| 2019 | 1070 | Crystal Ave | Corrington Ave | Harry Truman Dr | 0.25 | Mill & Overlay | $28,090.00 | $7,078.68 |
| 2019 | 1138 | Bristol Ave | E 144th St | Laquinta Dr | 0.63 | Mill & Overlay | $28,090.00 | $17,696.70 |
| 2019 | 1210 | Spring St | E 136th St | E 135th St | 0.25 | Mill & Overlay | $28,090.00 | $7,078.68 |
| 2019 | 1321 | E 140th St | Lawndale Ave | S Us 71 Hwy West Frontage Rd | 0.62 | Mill & Overlay | $28,090.00 | $17,303.44 |
| 2019 | 1387 | Laquinta Dr | Byars Rd | Crystal Pl | 0.21 | Mill & Overlay | $28,090.00 | $5,842.72 |
| 2019 | 1387 | Laquinta Dr | Crystal Pl | Bristol Ave | 0.04 | Mill & Overlay | $28,090.00 | $1,179.78 |
| 2019 | 1387 | Laquinta Dr | Wilshire Cir | Wilshire Cir | 0.19 | Mill & Overlay | $28,090.00 | $5,337.10 |
| 2019 | 1387 | Laquinta Dr | Wilshire Cir | E 144th St | 0.20 | Mill & Overlay | $28,090.00 | $5,618.00 |
| 2019 | 1387 | Laquinta Dr | E 144th St | E 143rd St | 0.25 | Mill & Overlay | $28,090.00 | $7,078.68 |
| 2019 | 1585 | Duck Rd | Blue Ridge Blvd | Jackson Ave | 0.30 | Mill & Overlay | $28,090.00 | $8,539.36 |
| 2019 | 1585 | Duck Rd | Jackson Ave | 2nd St | 0.13 | Mill & Overlay | $28,090.00 | $3,595.52 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2019 | 1585 | Duck Rd | 2nd St | 3rd St | 0.25 | Mill & Overlay | $28,090.00 | $7,022.50 |
| 2019 | 1585 | Duck Rd | 7th St | 8th St | 0.14 | Mill & Overlay | $28,090.00 | $3,820.24 |
| 2019 | 1585 | Duck Rd | 8th St | Grandview Rd | 0.15 | Mill & Overlay | $28,090.00 | $4,325.86 |
| 2019 | 1585 | Duck Rd | Grandview Rd | 10th St | 0.13 | Mill & Overlay | $28,090.00 | $3,539.34 |
| 2019 | 1587 | Arrington Rd | E 139th St | 3700' S of Robison PIke Rd | 1.40 | Mill & Overlay | $28,090.00 | $39,438.36 |
| 2019 | 1594 | 13th St | Dewey St | Pinkston Ave | 0.17 | Mill & Overlay | $28,090.00 | $4,887.66 |
| 2019 | 1603 | Grandview Rd | E 133rd St | E 133rd Cir | 0.04 | Mill & Overlay | $28,090.00 | $1,123.60 |
| 2019 | 1603 | Grandview Rd | Dewey St | Pinkston Ave | 0.17 | Mill & Overlay | $28,090.00 | $4,775.30 |
| 2019 | 1603 | Grandview Rd | Highgrove Rd | Rhodes Ave | 0.13 | Mill & Overlay | $28,090.00 | $3,595.52 |
| 2019 | 1624 | Food Ln | E 119th Ter | E 119th St | 0.11 | Mill & Overlay | $28,090.00 | $2,977.54 |
| 2019 | 1624 | Food Ln | E 119th St | Dead-End | 0.03 | Mill & Overlay | $28,090.00 | $955.06 |
| 2019 | 1653 | Merrywood Cir | Jurisdiction Line | Jurisdiction Line | 0.24 | Mill & Overlay | $28,090.00 | $6,685.42 |
| 2019 | 557 | Corrington Ave | Bristol Ave | E 132nd St | 0.54 | Reconstruction | $49,280.00 | $26,512.64 |
| 2019 | 557 | Corrington Ave | E 132nd St | E 131st St | 0.20 | Reconstruction | $49,280.00 | $9,658.88 |
| 2019 | 557 | Corrington Ave | E 131st St | Highgrove Rd | 0.08 | Reconstruction | $49,280.00 | $3,745.28 |
| 2019 | 1610 | Harry Truman Dr | Byars Rd | Richmond Ave | 0.31 | Reconstruction | $49,280.00 | $15,473.92 |
| 2019 | 1610 | Harry Truman Dr | Richmond Ave | Southview Dr | 0.55 | Reconstruction | $49,280.00 | $27,202.56 |
| 2019 | 1610 | Harry Truman Dr | Southview Dr | Raytown Rd | 0.81 | Reconstruction | $49,280.00 | $39,818.24 |
| 2020 | 53 | Fuller Ave | E 150th St | E 150th St | 0.08 | Reconstruction | $49,280.00 | $4,040.96 |
| 2020 | 53 | Fuller Ave | E 149th Ter | E 147th Ter | 0.04 | Reconstruction | $49,280.00 | $1,971.20 |
| 2020 | 53 | Fuller Ave | E 147th Ter | E 149th St | 0.15 | Reconstruction | $49,280.00 | $7,293.44 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2020 | 53 | Fuller Ave | E 149th St | E 147th St | 0.10 | Reconstruction | $49,280.00 | $4,928.00 |
| 2020 | 505 | E 134th St | Cambridge Ave | Winchester Ave | 0.26 | Reconstruction | $49,280.00 | $12,615.68 |
| 2020 | 1000 | 11th St | Dewey St | Pinkston Ave | 0.17 | Reconstruction | $49,280.00 | $8,476.16 |
| 2020 | 1640 | E 129th Ter | Palmer Ave | Smalley Ave | 0.11 | Reconstruction | $49,280.00 | $5,420.80 |
| 2020 | 1713 | Eastern Ave | E 132nd St | E 133rd Ter | 0.28 | Reconstruction | $49,280.00 | $13,798.40 |
| 2020 | 847 | Bennington Ave | Main St | Dead-End | 0.20 | Mill & Overlay | $28,090.00 | $5,505.64 |
| 2020 | 1241 | Jones Ave | 5th St | 6th St | 0.09 | Mill & Overlay | $28,090.00 | $2,528.10 |
| 2020 | 1490 | Craig Ave | Fuller Ave | E 129th St | 0.45 | Mill & Overlay | $28,090.00 | $12,640.50 |
| 2020 | 36 | Norby Rd | E 138th St | E 136th Ct | 0.30 | Mill & Overlay | $28,090.00 | $8,483.18 |
| 2020 | 67 | 6th St | Rhodes Ave | Main St | 0.13 | Mill & Overlay | $28,090.00 | $3,707.88 |
| 2020 | 136 | E 143rd St | S Us 71 Hwy East Frontage Rd | South Haven Rd | 0.23 | Mill & Overlay | $28,090.00 | $6,573.06 |
| 2020 | 470 | E 133rd St | Fuller Ave | Dead-End | 0.02 | Mill & Overlay | $28,090.00 | $505.62 |
| 2020 | 503 | 8th St | Rhodes Ave | Main St | 0.13 | Mill & Overlay | $28,090.00 | $3,764.06 |
| 2020 | 505 | E 134th St | Bennington Ave | Cambridge Ave | 0.26 | Mill & Overlay | $28,090.00 | $7,359.58 |
| 2020 | 573 | E 133rd Ter | Byars Rd | Overhill Ave | 0.40 | Mill & Overlay | $28,090.00 | $11,292.18 |
| 2020 | 803 | Applewood Dr | E 133rd St | E 133rd St | 0.04 | Mill & Overlay | $28,090.00 | $1,011.24 |
| 2020 | 831 | Bennington Ave | E 120th Ter | Dead-End | 0.06 | Mill & Overlay | $28,090.00 | $1,741.58 |
| 2020 | 835 | E 140th St | Dead-End | El Rancho Rd | 0.24 | Mill & Overlay | $28,090.00 | $6,797.78 |
| 2020 | 843 | Cambridge Ave | E 134th St | E 134th Ter | 0.14 | Mill & Overlay | $28,090.00 | $3,988.78 |
| 2020 | 968 | Oakland Ave | E 129th St | E 128th St | 0.23 | Mill & Overlay | $28,090.00 | $6,404.52 |
| 2020 | 1032 | Palmer Ave | E 134th Ter | E 134th Ct | 0.11 | Mill & Overlay | $28,090.00 | $2,977.54 |
| 2020 | 1032 | Palmer Ave | E 134th Ct | Manchester Ave | 0.30 | Mill & Overlay | $28,090.00 | $8,483.18 |
| 2020 | 1061 | Corrington Ave | Crystal Ave | E 123rd St | 0.19 | Mill & Overlay | $28,090.00 | $5,224.74 |
| 2020 | 1094 | E 137th Ter | Applewood Dr | Lowell Ave | 0.11 | Mill & Overlay | $28,090.00 | $2,977.54 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 1119 | Fuller Ave | Craig Ave | Dead-End | 0.09 | Mill & Overlay | $28,090.00 | $2,415.74 |
| 2020 | 1452 | 11th St | E 133rd St | E 134th St | 0.24 | Mill & Overlay | $28,090.00 | $6,853.96 |
| 2020 | 1470 | White Ave | Highgrove Rd | Main St | 0.26 | Mill & Overlay | $28,090.00 | $7,359.58 |
| 2020 | 1559 | E 125th St | Harry Truman Dr | Dead-End | 0.19 | Mill & Overlay | $28,090.00 | $5,224.74 |
| 2020 | 1587 | Arrington Rd | 1600' S of Robison PIke Rd | Robinson Pike Rd | 0.81 | Mill & Overlay | $28,090.00 | $22,752.90 |
| 2020 | 1595 | 15th St | Highgrove Rd | Main St | 0.26 | Mill & Overlay | $28,090.00 | $7,359.58 |
| 2020 | 1606 | Donnelly Ave | Park Hills Dr | E 135th St | 0.20 | Mill & Overlay | $28,090.00 | $5,561.82 |
| 2020 | 1608 | Southern Rd | E 142nd St | E 141st St | 0.16 | Mill & Overlay | $28,090.00 | $4,606.76 |
| 2020 | 1608 | Southern Rd | E 141st St | E 141st St | 0.09 | Mill & Overlay | $28,090.00 | $2,640.46 |
| 2020 | 1608 | Southern Rd | E 140th St | E 139th Ter | 0.13 | Mill & Overlay | $28,090.00 | $3,595.52 |
| 2020 | 1608 | Southern Rd | E 139th Ter | 15th St | 0.11 | Mill & Overlay | $28,090.00 | $3,146.08 |
| 2020 | 1621 | Jackson Ave | Duck Rd | Blue Ridge Blvd | 0.24 | Mill & Overlay | $28,090.00 | $6,797.78 |
| 2020 | 1624 | Food Ln | E 122nd Ter | E 122nd St | 0.11 | Mill & Overlay | $28,090.00 | $2,977.54 |
| 2020 | 1624 | Food Ln | Byars Rd | E 122nd Ter | 0.11 | Mill & Overlay | $28,090.00 | $3,089.90 |
| 2020 | 1640 | E 129th Ter | Overhill Ave | Palmer Ave | 0.13 | Mill & Overlay | $28,090.00 | $3,595.52 |
| 2020 | 1651 | South Haven Rd | E 141st St | E 143rd St | 0.34 | Mill & Overlay | $28,090.00 | $9,494.42 |
| 2020 | 1662 | E 151st Ter | Barat Ave | Bellaire Ave | 0.34 | Mill & Overlay | $28,090.00 | $9,662.96 |
| 2020 | 1662 | E 151st Ter | Bellaire Ave | Jurisdiction Line | 0.20 | Mill & Overlay | $28,090.00 | $5,618.00 |
| 2020 | 1668 | 4th St | Dead-End | Dewey Ave | 0.07 | Mill & Overlay | $28,090.00 | $2,022.48 |
| 2020 | 1675 | E 149th St | E 147th Ter | Fuller Ave | 0.07 | Mill & Overlay | $28,090.00 | $2,078.66 |
| 2020 | 1685 | Blue Ridge Cir | Jurisdiction Line | Dead-End | 0.28 | Mill & Overlay | $28,090.00 | $7,977.56 |
| 2020 | 1692 | Newton Ct | Dead-End | E 125th St | 0.12 | Mill & Overlay | $28,090.00 | $3,258.44 |
| 2020 | 1697 | E 132nd Ter | Byars Rd | E 133rd St | 0.48 | Mill & Overlay | $28,090.00 | $13,427.02 |
| 2020 | 1703 | E 134th Ct | Palmer Ave | Dead-End | 0.06 | Mill & Overlay | $28,090.00 | $1,573.04 |
| 2020 | 1668 | 4th St | Dewey Ave | Pinkston Ave | 0.15 | Mill & Overlay | $28,090.00 | $4,213.50 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 40 | E 130th St | Smalley Ave | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2020 | 40 | E 130th St | Jurisdiction Line | Sycamore Ave | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2020 | 50 | E 123rd Ter | Dead-End | Jurisdiction Line | 0.04 | Crack Seal | $2,500.00 | $100.00 |
| 2020 | 111 | E 136th St | Dead-End | 11th Ter | 0.05 | Crack Seal | $2,500.00 | $130.00 |
| 2020 | 111 | E 136th St | 11th Ter | 12th St | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2020 | 111 | E 136th St | 12th St | 12th St | 0.03 | Crack Seal | $2,500.00 | $65.00 |
| 2020 | 111 | E 136th St | 12th St | Dead-End | 0.05 | Crack Seal | $2,500.00 | $115.00 |
| 2020 | 139 | E 123rd Ter | Dead-End | Askew Dr | 0.16 | Crack Seal | $2,500.00 | $395.00 |
| 2020 | 139 | E 123rd Ter | Askew Dr | Bentley Cir | 0.41 | Crack Seal | $2,500.00 | $1,035.00 |
| 2020 | 139 | E 123rd Ter | Bentley Cir | Norton Ave | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2020 | 234 | Fountain Lake Cir | Jurisdiction Line | Jurisdiction Line | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 237 | 6th St | Pinkston Ave | Highgrove Rd | 0.16 | Crack Seal | $2,500.00 | $395.00 |
| 2020 | 266 | Botts Rd | E 138th St | E 137th Ter | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2020 | 313 | Goode Ave | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 313 | Goode Ave | 15th St | S Us 71 Hwy Off Ramp N | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 320 | Crystal Ave | E 130th St | E 129th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2020 | 323 | Sycamore Ave | Highgrove Rd | E 130th St | 0.12 | Crack Seal | $2,500.00 | $295.00 |
| 2020 | 323 | Sycamore Ave | E 130th St | E 130th St | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2020 | 323 | Sycamore Ave | E 130th St | E 129th Ter | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 323 | Sycamore Ave | E 128th St | E 127th Ter | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2020 | 324 | E 129th St | Byars Rd | Oakland Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2020 | 324 | E 129th St | Oakland Ave | Richmond Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 331 | Overhill Ave | E 129th Ter | E 129th St | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2020 | 331 | Overhill Ave | E 129th St | E 128th St | 0.18 | Crack Seal | $2,500.00 | $460.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 347 | E 126th St | Craig Ave | Ewing Ave | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2020 | 347 | E 126th St | Ewing Ave | Cambridge Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2020 | 354 | Southview Dr | Dead-End | Smalley Ave | 0.04 | Crack Seal | $2,500.00 | $110.00 |
| 2020 | 354 | Southview Dr | Smalley Ave | Sunset Cir | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2020 | 354 | Southview Dr | Sunset Cir | Jurisdiction Line | 0.14 | Crack Seal | $2,500.00 | $360.00 |
| 2020 | 354 | Southview Dr | Jurisdiction Line | Sunset Cir | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2020 | 354 | Southview Dr | Sunset Cir | Harry Truman Dr | 0.24 | Crack Seal | $2,500.00 | $600.00 |
| 2020 | 411 | E 125th St | Belmead Ave | Bennington Ave | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2020 | 411 | E 125th St | Ewing Ave | Ewing Ct | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2020 | 411 | E 125th St | Cambridge Ave | Winchester Ave | 0.08 | Crack Seal | $2,500.00 | $195.00 |
| 2020 | 412 | E 126th St | Byars Rd | Oakland Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 412 | E 126th St | Oakland Ave | Manchester Ave | 0.33 | Crack Seal | $2,500.00 | $815.00 |
| 2020 | 437 | E 133rd St | Spring St | Parker Ave | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2020 | 437 | E 133rd St | Parker Ave | Applewood Dr | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2020 | 469 | 12th St | E 135th St | E 136th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2020 | 486 | Sycamore Ave | Jurisdiction Line | Dead-End | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2020 | 487 | Craig Ave | E 136th St | E 137th St | 0.32 | Crack Seal | $2,500.00 | $790.00 |
| 2020 | 512 | E 133rd Ter | 8th St | Grandview Rd | 0.15 | Crack Seal | $2,500.00 | $365.00 |
| 2020 | 522 | Bristol Ave | E 134th Ter | Crystal Ave | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2020 | 522 | Bristol Ave | Crystal Ave | Corrington Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2020 | 522 | Bristol Ave | Corrington Ave | E 133rd Ter | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2020 | 522 | Bristol Ave | E 133rd Ter | E 132nd St | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2020 | 534 | 7th St | 6th St | E 135th St | 0.27 | Crack Seal | $2,500.00 | $680.00 |
| 2020 | 535 | E 130th Ct | Dead-End | Jurisdiction Line | 0.24 | Crack Seal | $2,500.00 | $595.00 |
| 2020 | 559 | E 147th St | Dead-End | Access Rd | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2020 | 559 | E 147th St | Access Rd | Dead-End | 0.27 | Crack Seal | $2,500.00 | $685.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 560 | E 147th St | Dead-End | E Outer Belt Rd | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2020 | 605 | E 134th Ter | Bennington Ave | Cambridge Ave | 0.32 | Crack Seal | $2,500.00 | $795.00 |
| 2020 | 605 | E 134th Ter | Cambridge Ave | Winchester Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 605 | E 134th Ter | Winchester Ave | Bristol Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2020 | 605 | E 134th Ter | Byars Rd | Jurisdiction Line | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 605 | E 134th Ter | Overhill Ave | Manchester Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 605 | E 134th Ter | Park Hills Dr | E 135th St | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2020 | 605 | E 134th Ter | E 135th St | Donnelly Ave | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2020 | 614 | E 137th St | 10th Ter | 11th Ter | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 615 | Craig Ave | E 132nd St | E 133rd Ter | 0.26 | Crack Seal | $2,500.00 | $655.00 |
| 2020 | 627 | E 138th St | Jurisdiction Line | Winchester Ave | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2020 | 633 | E 137th St | 11th Ter | Dead-End | 0.04 | Crack Seal | $2,500.00 | $110.00 |
| 2020 | 640 | E 138th Ter | Dead-End | Jurisdiction Line | 0.17 | Crack Seal | $2,500.00 | $425.00 |
| 2020 | 640 | E 138th Ter | Jurisdiction Line | Winchester Ave | 0.17 | Crack Seal | $2,500.00 | $415.00 |
| 2020 | 644 | E 127th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2020 | 644 | E 127th St | Applewood Dr | Lowell Ave | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2020 | 644 | E 127th St | Lowell Ave | Belmead Ave | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2020 | 644 | E 127th St | Belmead Ave | Craig Ave | 0.18 | Crack Seal | $2,500.00 | $445.00 |
| 2020 | 691 | E 133rd Cir | Dead-End | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2020 | 712 | E 143rd St | Oakland Ct | Richmond Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2020 | 712 | E 143rd St | Richmond Ave | Overhill Ave | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2020 | 712 | E 143rd St | Overhill Ave | Dead-End | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2020 | 714 | Cambridge Ave | E 136th St | E 135th St | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2020 | 714 | Cambridge Ave | E 135th St | E 134th Ter | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2020 | 737 | Sunset Cir | Southview Dr | Jurisdiction Line | 0.08 | Crack Seal | $2,500.00 | $210.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2020 | 737 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.02 | Crack Seal | $2,500.00 | $40.00 |
| 2020 | 737 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.21 | Crack Seal | $2,500.00 | $525.00 |
| 2020 | 737 | Sunset Cir | Jurisdiction Line | Southview Dr | 0.26 | Crack Seal | $2,500.00 | $645.00 |
| 2020 | 746 | E 130th St | Winchester Ave | Bristol Cir | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2020 | 746 | E 130th St | Corrington Ave | Crystal Ave | 0.14 | Crack Seal | $2,500.00 | $345.00 |
| 2020 | 746 | E 130th St | Crystal Ave | Byars Rd | 0.15 | Crack Seal | $2,500.00 | $375.00 |
| 2020 | 751 | E 138th Ter | Norby Rd | Dead-End | 0.27 | Crack Seal | $2,500.00 | $665.00 |
| 2020 | 755 | Manchester Ave | E 127th Ter | E 127th Pl | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2020 | 755 | Manchester Ave | E 127th Pl | E 127th St | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2020 | 756 | Fountain Lake Cir | Dead-End | Jurisdiction Line | 0.04 | Crack Seal | $2,500.00 | $100.00 |
| 2020 | 756 | Fountain Lake Cir | Jurisdiction Line | Jurisdiction Line | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2020 | 769 | Armitage Dr | Dead-End | Jurisdiction Line | 0.06 | Crack Seal | $2,500.00 | $140.00 |
| 2020 | 771 | E 122nd Ter | Ewing Ave | Craig Ave | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2020 | 771 | E 122nd Ter | Craig Ave | Cambridge Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2020 | 771 | E 122nd Ter | Cambridge Ave | Dead-End | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 793 | Spruce St | E 138th St | E 139th St | 0.29 | Crack Seal | $2,500.00 | $720.00 |
| 2020 | 795 | Ewing Ave | E 122nd St | E 122nd Ter | 0.16 | Crack Seal | $2,500.00 | $410.00 |
| 2020 | 801 | E 135th St | E 134th Ter | Donnelly Ave | 0.29 | Crack Seal | $2,500.00 | $725.00 |
| 2020 | 812 | E 122nd Ter | Food Ln | Richmond Ave | 0.31 | Crack Seal | $2,500.00 | $785.00 |
| 2020 | 822 | Fuller Ave | Bennington Ave | Armitage Dr | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2020 | 827 | E 129th St | S Us 71 Hwy East Frontage Rd | White Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 827 | E 129th St | White Ave | Booth Ln | 0.29 | Crack Seal | $2,500.00 | $735.00 |
| 2020 | 827 | E 129th St | Booth Ln | E 128th Ter | 0.06 | Crack Seal | $2,500.00 | $145.00 |
| 2020 | 827 | E 129th St | E 128th Ter | Beacon St | 0.08 | Crack Seal | $2,500.00 | $190.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2020 | 827 | E 129th St | Craig Ave | Ewing Ave | 0.15 | Crack Seal | $2,500.00 | $370.00 |
| 2020 | 827 | E 129th St | Ewing Ave | Bennington Ave | 0.04 | Crack Seal | $2,500.00 | $95.00 |
| 2020 | 827 | E 129th St | Bennington Ave | Cambridge Ave | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2020 | 827 | E 129th St | Cambridge Ave | Winchester Ave | 0.13 | Crack Seal | $2,500.00 | $330.00 |
| 2020 | 865 | Cambridge Ave | E 126th St | E 125th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2020 | 909 | E 122nd St | Bennington Ave | Ewing Ave | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2020 | 909 | E 122nd St | Ewing Ave | Craig Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2020 | 909 | E 122nd St | Craig Ave | Cambridge Ave | 0.15 | Crack Seal | $2,500.00 | $365.00 |
| 2020 | 909 | E 122nd St | Cambridge Ave | Dead-End | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2020 | 913 | E 139th St | E 140th St | Bennington Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 913 | E 139th St | Bennington Ave | Winchester Ave | 0.44 | Crack Seal | $2,500.00 | $1,095.00 |
| 2020 | 925 | Pinkston Ave | 11th St | 13th St | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2020 | 930 | E 136th St | Applewood Dr | Lowell Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2020 | 930 | E 136th St | Lowell Ave | Belmead Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 930 | E 136th St | Belmead Ave | Bennington Ave | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2020 | 935 | Winchester Ave | E 134th Ter | E 134th St | 0.24 | Crack Seal | $2,500.00 | $610.00 |
| 2020 | 935 | Winchester Ave | E 133rd Ter | E 132nd St | 0.26 | Crack Seal | $2,500.00 | $655.00 |
| 2020 | 956 | E 127th Ter | Craig Ave | Ewing Ave | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2020 | 956 | E 127th Ter | Ewing Ave | Cambridge Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 956 | E 127th Ter | Cambridge Ave | Winchester Ave | 0.20 | Crack Seal | $2,500.00 | $490.00 |
| 2020 | 968 | Oakland Ave | E 128th St | E 127th Pl | 0.27 | Crack Seal | $2,500.00 | $685.00 |
| 2020 | 1003 | Manchester Ave | E 134th Ter | Palmer Ave | 0.33 | Crack Seal | $2,500.00 | $830.00 |
| 2020 | 1006 | Sunset Cir | Jurisdiction Line | Jurisdiction Line | 0.09 | Crack Seal | $2,500.00 | $230.00 |
| 2020 | 1011 | Belmead Ave | E 135th St | E 134th St | 0.30 | Crack Seal | $2,500.00 | $755.00 |
| 2020 | 1039 | Fuller Ave | Highgrove Rd | Main St | 0.16 | Crack Seal | $2,500.00 | $390.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PRNo | Seg Name | From Desc | To Desc | Area (Ln. Miles) | Best Treatment | $/Ln. Mile | Cost of Project ($) |
| 2020 | 1049 | Southview Dr | Jurisdiction Line | Dead-End | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2020 | 1054 | E 127th St | Bristol Ave | Corrington Ave | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2020 | 1054 | E 127th St | Corrington Ave | Crystal Ave | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 1054 | E 127th St | Crystal Ave | Byars Rd | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2020 | 1077 | E 123rd Ter | Dead-End | Bennington Ave | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2020 | 1077 | E 123rd Ter | Bennington Ave | Jurisdiction Line | 0.31 | Crack Seal | $2,500.00 | $785.00 |
| 2020 | 1077 | E 123rd Ter | Jurisdiction Line | E 124th Ter | 0.26 | Crack Seal | $2,500.00 | $650.00 |
| 2020 | 1083 | E 140th St | Dead-End | Southern Rd | 0.26 | Crack Seal | $2,500.00 | $660.00 |
| 2020 | 1103 | Bristol Ave | E 130th Ter | E 130th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2020 | 1105 | E 133rd St | Park Ln | Park Entrance | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 1109 | Highgrove Rd | Main St | Winchester Ave | 0.56 | Crack Seal | $2,500.00 | $1,390.00 |
| 2020 | 1109 | Highgrove Rd | Winchester Ave | Winchester Ave | 0.10 | Crack Seal | $2,500.00 | $240.00 |
| 2020 | 1109 | Highgrove Rd | Winchester Ave | Corrington Ave | 0.35 | Crack Seal | $2,500.00 | $870.00 |
| 2020 | 1109 | Highgrove Rd | Corrington Ave | Crystal Ave | 0.36 | Crack Seal | $2,500.00 | $900.00 |
| 2020 | 1109 | Highgrove Rd | Crystal Ave | Byars Rd | 0.28 | Crack Seal | $2,500.00 | $710.00 |
| 2020 | 1109 | Highgrove Rd | Byars Rd | Manchester Ave | 0.94 | Crack Seal | $2,500.00 | $2,340.00 |
| 2020 | 1109 | Highgrove Rd | Manchester Ave | Smalley Ave | 0.43 | Crack Seal | $2,500.00 | $1,080.00 |
| 2020 | 1129 | Crystal Ave | E 129th St | E 128th St | 0.24 | Crack Seal | $2,500.00 | $610.00 |
| 2020 | 1133 | Sycamore Ave | Dead-End | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2020 | 1139 | Armitage Dr | Jurisdiction Line | Dead-End | 0.06 | Crack Seal | $2,500.00 | $145.00 |
| 2020 | 1171 | Smalley Ave | Highgrove Rd | E 130th Ct | 0.07 | Crack Seal | $2,500.00 | $165.00 |
| 2020 | 1171 | Smalley Ave | E 130th Ct | E 130th Ct | 0.07 | Crack Seal | $2,500.00 | $180.00 |
| 2020 | 1175 | Pinkston Ave | 6th St | Dead-End | 0.12 | Crack Seal | $2,500.00 | $300.00 |
| 2020 | 1194 | Park Hills Dr | Ashland Ave | Herrick Ave | 0.15 | Crack Seal | $2,500.00 | $385.00 |
| 2020 | 1265 | 3rd St | Main St | Robinson Pike Rd | 0.23 | Crack Seal | $2,500.00 | $570.00 |
| 2020 | 1301 | E 135th St | 12th St | 13th St | 0.09 | Crack Seal | $2,500.00 | $220.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 1301 | E 135th St | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $630.00 |
| 2020 | 1301 | E 135th St | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Crack Seal | $2,500.00 | $620.00 |
| 2020 | 1308 | Unnamed Rd | Dead-End | Lawndale Ave | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 1321 | E 140th St | S Us 71 Hwy West Frontage Rd | Us 71 Hwy N | 0.13 | Crack Seal | $2,500.00 | $312.50 |
| 2020 | 1321 | E 140th St | Us 71 Hwy N | Us 71 Hwy N | 0.05 | Crack Seal | $2,500.00 | $112.50 |
| 2020 | 1321 | E 140th St | Us 71 Hwy N | S Us 71 Hwy East Frontage Rd | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 1321 | E 140th St | Falkirk Cir | E 139th St | 0.20 | Crack Seal | $2,500.00 | $510.00 |
| 2020 | 1324 | Jones Ave | Grandview Rd | 10th St | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 1324 | Jones Ave | 10th St | 12th St | 0.19 | Crack Seal | $2,500.00 | $465.00 |
| 2020 | 1324 | Jones Ave | 13th St | 15th St | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 1340 | E 139th Ter | Southern Rd | Dead-End | 0.08 | Crack Seal | $2,500.00 | $205.00 |
| 2020 | 1348 | Applewood Dr | Lemontree Ln | Dead-End | 0.17 | Crack Seal | $2,500.00 | $435.00 |
| 2020 | 1446 | E 147th St | Dead-End | White Ave | 0.18 | Crack Seal | $2,500.00 | $440.00 |
| 2020 | 1446 | E 147th St | Fuller Ave | Pineview Dr | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 1446 | E 147th St | Pineview Dr | Grand Summit Blvd | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 1561 | Park Hills Dr | E M 150 Hwy W | E 146th St | 0.21 | Crack Seal | $2,500.00 | $535.00 |
| 2020 | 1561 | Park Hills Dr | E 146th St | E 143rd Ter | 0.25 | Crack Seal | $2,500.00 | $625.00 |
| 2020 | 1567 | 6th St | Dead-End | Zumwalt Ave | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 1575 | Unnamed Rd | Valley Brook Dr | Valley Brook Dr | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2020 | 1576 | Unnamed Rd | Valley Brook Dr | Dead-End | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2020 | 1577 | Unnamed Rd | E 132nd St | Dead-End | 0.04 | Crack Seal | $2,500.00 | $105.00 |
| 2020 | 1585 | Duck Rd | 13th St | 14th St | 0.13 | Crack Seal | $2,500.00 | $315.00 |
| 2020 | 1585 | Duck Rd | 14th St | 15th St | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2020 | 1586 | Dr Greaves Rd | Merritt Rd | Norton Ave | 1.19 | Crack Seal | $2,500.00 | $2,970.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 1586 | Dr Greaves Rd | Norton Ave | Jackson Ave | 0.11 | Crack Seal | $2,500.00 | $265.00 |
| 2020 | 1586 | Dr Greaves Rd | Jackson Ave | Cartwright Ave | 0.39 | Crack Seal | $2,500.00 | $970.00 |
| 2020 | 1591 | Main St | 10th St | 10th St | 0.01 | Crack Seal | $2,500.00 | $22.50 |
| 2020 | 1593 | Brentwood Ct | Dead-End | Bennington Ave | 0.07 | Crack Seal | $2,500.00 | $170.00 |
| 2020 | 1594 | 13th St | Jones Ave | Little Ave | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2020 | 1594 | 13th St | Little Ave | Duck Rd | 0.22 | Crack Seal | $2,500.00 | $550.00 |
| 2020 | 1595 | 15th St | Duck Rd | Skyline Dr | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2020 | 1595 | 15th St | E 126th St | Harry Truman Dr | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2020 | 1596 | Little Ave | 10th St | 12th St | 0.19 | Crack Seal | $2,500.00 | $470.00 |
| 2020 | 1597 | Crystal Pl | Laquinta Dr | Dead-End | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2020 | 1598 | Rhodes Ave | Dead-End | 5th St | 0.10 | Crack Seal | $2,500.00 | $255.00 |
| 2020 | 1598 | Rhodes Ave | 5th St | 6th St | 0.10 | Crack Seal | $2,500.00 | $260.00 |
| 2020 | 1602 | Bellaire Ave | E 155th St | E 154th Ter | 0.12 | Crack Seal | $2,500.00 | $310.00 |
| 2020 | 1602 | Bellaire Ave | E 151st Ter | E 151st St | 0.11 | Crack Seal | $2,500.00 | $285.00 |
| 2020 | 1602 | Bellaire Ave | E 150th Ter | E 150th St | 0.11 | Crack Seal | $2,500.00 | $275.00 |
| 2020 | 1603 | Grandview Rd | Blue Ridge Blvd | 0 | 0.27 | Crack Seal | $2,500.00 | $685.00 |
| 2020 | 1606 | Donnelly Ave | E 134th Ter | E 134th St | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2020 | 1609 | 5th St | Deweese Ave | Butcher Ave | 0.07 | Crack Seal | $2,500.00 | $165.00 |
| 2020 | 1609 | 5th St | Butcher Ave | E 133rd St | 0.08 | Crack Seal | $2,500.00 | $195.00 |
| 2020 | 1609 | 5th St | Dewey Ave | Pinkston Ave | 0.15 | Crack Seal | $2,500.00 | $380.00 |
| 2020 | 1609 | 5th St | Pinkston Ave | Highgrove Rd | 0.16 | Crack Seal | $2,500.00 | $400.00 |
| 2020 | 1609 | 5th St | Highgrove Rd | Rhodes Ave | 0.12 | Crack Seal | $2,500.00 | $305.00 |
| 2020 | 1609 | 5th St | Rhodes Ave | Main St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2020 | 1609 | 5th St | Main St | Goode Ave | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2020 | 1615 | E 151st St | Barat Ave | Bellaire Ave | 0.29 | Crack Seal | $2,500.00 | $735.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 1618 | E 144th St | Craig Ave | Jurisdiction Line | 0.17 | Crack Seal | $2,500.00 | $420.00 |
| 2020 | 1618 | E 144th St | Jurisdiction Line | Jurisdiction Line | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2020 | 1618 | E 144th St | Jurisdiction Line | Laquinta Dr | 0.18 | Crack Seal | $2,500.00 | $460.00 |
| 2020 | 1621 | Jackson Ave | Norton Ave | Dr Greaves Rd | 0.23 | Crack Seal | $2,500.00 | $585.00 |
| 2020 | 1623 | St Andrews Dr | Riverlawn Ct | Riverlawn Dr | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2020 | 1626 | Valley Brook Dr | Unnamed Rd | Unnamed Rd | 0.02 | Crack Seal | $2,500.00 | $55.00 |
| 2020 | 1626 | Valley Brook Dr | Unnamed Rd | Unnamed Rd | 0.11 | Crack Seal | $2,500.00 | $280.00 |
| 2020 | 1626 | Valley Brook Dr | Unnamed Rd | Jackson Ave | 0.13 | Crack Seal | $2,500.00 | $320.00 |
| 2020 | 1628 | Oakland Ct | Dead-End | E 143rd St | 0.08 | Crack Seal | $2,500.00 | $200.00 |
| 2020 | 1633 | E 146th St | Byars Rd | Richmond Ave | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2020 | 1635 | Riverlawn Dr | St Andrews Dr | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $175.00 |
| 2020 | 1635 | Riverlawn Dr | Jurisdiction Line | Dead-End | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2020 | 1637 | Askew Dr | Valley Brook Dr | E 123rd Ter | 0.20 | Crack Seal | $2,500.00 | $510.00 |
| 2020 | 1643 | Zumwalt Ave | Dead-End | 6th St | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2020 | 1643 | Zumwalt Ave | 6th St | Grandview Rd | 0.30 | Crack Seal | $2,500.00 | $750.00 |
| 2020 | 1646 | Oxford Pl | Fountain Lake Dr | Dead-End | 0.09 | Crack Seal | $2,500.00 | $225.00 |
| 2020 | 1648 | Dewey Ave | Dead-End | 4th St | 0.05 | Crack Seal | $2,500.00 | $125.00 |
| 2020 | 1648 | Dewey Ave | 4th St | 5th St | 0.13 | Crack Seal | $2,500.00 | $335.00 |
| 2020 | 1648 | Dewey Ave | 5th St | 6th St | 0.09 | Crack Seal | $2,500.00 | $220.00 |
| 2020 | 1665 | Riverlawn Ct | Jurisdiction Line | St Andrews Dr | 0.13 | Crack Seal | $2,500.00 | $325.00 |
| 2020 | 1667 | E 147th Ter | Bellaire Ave | E 148th Ter | 0.28 | Crack Seal | $2,500.00 | $700.00 |
| 2020 | 1675 | E 149th St | S Us 71 Hwy East Frontage Rd | Bellaire Ave | 0.21 | Crack Seal | $2,500.00 | $515.00 |
| 2020 | 1678 | E 136th Ct | Norby Rd | Dead-End | 0.11 | Crack Seal | $2,500.00 | $270.00 |
| 2020 | 1679 | E 134th Cir | Dead-End | Byars Rd | 0.17 | Crack Seal | $2,500.00 | $425.00 |

| 2016–2020 List of Treatments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **PRNo** | **Seg Name** | **From Desc** | **To Desc** | **Area (Ln. Miles)** | **Best Treatment** | **$/Ln. Mile** | **Cost of Project ($)** |
| 2020 | 1680 | Holiday Dr | Access Rd | Dead-End | 0.22 | Crack Seal | $2,500.00 | $540.00 |
| 2020 | 1684 | Private Dr | Dead-End | E 126th St | 0.27 | Crack Seal | $2,500.00 | $670.00 |
| 2020 | 1686 | E 135th Ct | Norby Rd | Dead-End | 0.12 | Crack Seal | $2,500.00 | $290.00 |
| 2020 | 1688 | Bristol Cir | E 130th St | Dead-End | 0.09 | Crack Seal | $2,500.00 | $215.00 |
| 2020 | 1702 | Pineview Dr | E 150th Ter | Stonewood Dr | 0.31 | Crack Seal | $2,500.00 | $770.00 |
| 2020 | 1707 | Ewing Ct | Dead-End | E 125th St | 0.08 | Crack Seal | $2,500.00 | $210.00 |
| 2020 | 1712 | E 138th Ter | Jurisdiction Line | Jurisdiction Line | 0.07 | Crack Seal | $2,500.00 | $185.00 |
| 2020 | 1714 | Thomas Ave | 15th St | S Us 71 Hwy West Frontage Rd | 0.25 | Crack Seal | $2,500.00 | $635.00 |
| 2020 | 1716 | E 148th Cir | White Ave | Dead-End | 0.06 | Crack Seal | $2,500.00 | $145.00 |
| 2020 | 1592 | Byars Rd | 0 | E 139th St | 0.07 | Crack Seal | $2,500.00 | $170.00 |