

# Shorewood Pavement Management Plan



Prepared by Bolton & Menk and the City of Shorewood  
Public Works Department  
February 19, 2025

# Certification

## City of Shorewood Pavement Management Plan

February 19, 2025

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

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Date: February 19, 2025

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## I. INTRODUCTION

### A. IMPETUS

This Pavement Management Plan (PMP) covers the proposed pavement improvements and maintenance for the City of Shorewood over the next several years. The plan was authorized to provide an organized and efficient means of managing the city's pavements in a fiscally responsible manner. The ultimate goal is to develop a "living" document, which can be updated on a regular basis, and maintain a safe and usable local transportation system for the traveling public for the preceding 10-year capital improvement plan. This document is intended to serve as a guide to improve the efficiency of the decision-making process and ensure consistency of the decisions pertaining to the project scope and the funding approach for future infrastructure improvement projects.

### B. REPORT ORGANIZATION

To address the various projects in an orderly manner, the report is organized into 6 sections as follows:

- Section 1: Introduction
- Section 2: Existing Conditions
- Section 3: Improvement Methods
- Section 4: Improvement Plan 2025 & 2027
- Section 5: Financing & Funding
- Section 6: Next Steps

### C. SCOPE

The scope and content of this report is the result of many factors and items, including but not limited to the following:

- Meetings and discussions with city staff & council
- Pavement evaluations utilizing Vaisala RoadAI
- Record drawing and as-built information
- Existing identified maintenance concerns
- Strategic buildout of future watermain or other underling utility needs

City roads are often considered to be the highest priority due to their visible and daily use by the travelling public. Therefore, the goal of the plan is to upgrade structurally deficient roads and maintain them in a serviceable and reliable condition. The municipal utilities (sanitary sewer, watermain, and storm sewer) were not televised or evaluated as part of the scope of work of this project, however they can be major factors in determining pavement management priorities and should be

considered on an annual basis. The report objectives can be summarized by the following:

- Outline existing pavement status and needs.
- Fully fund pavement maintenance projects throughout the program period and distinguish fund allocation between the use of local road maintenance funds and Municipal State Aid (MSA) funds.
- Develop a pavement maintenance program for all the city's roads.

## II. EXISTING CONDITIONS

### A. BACKGROUND

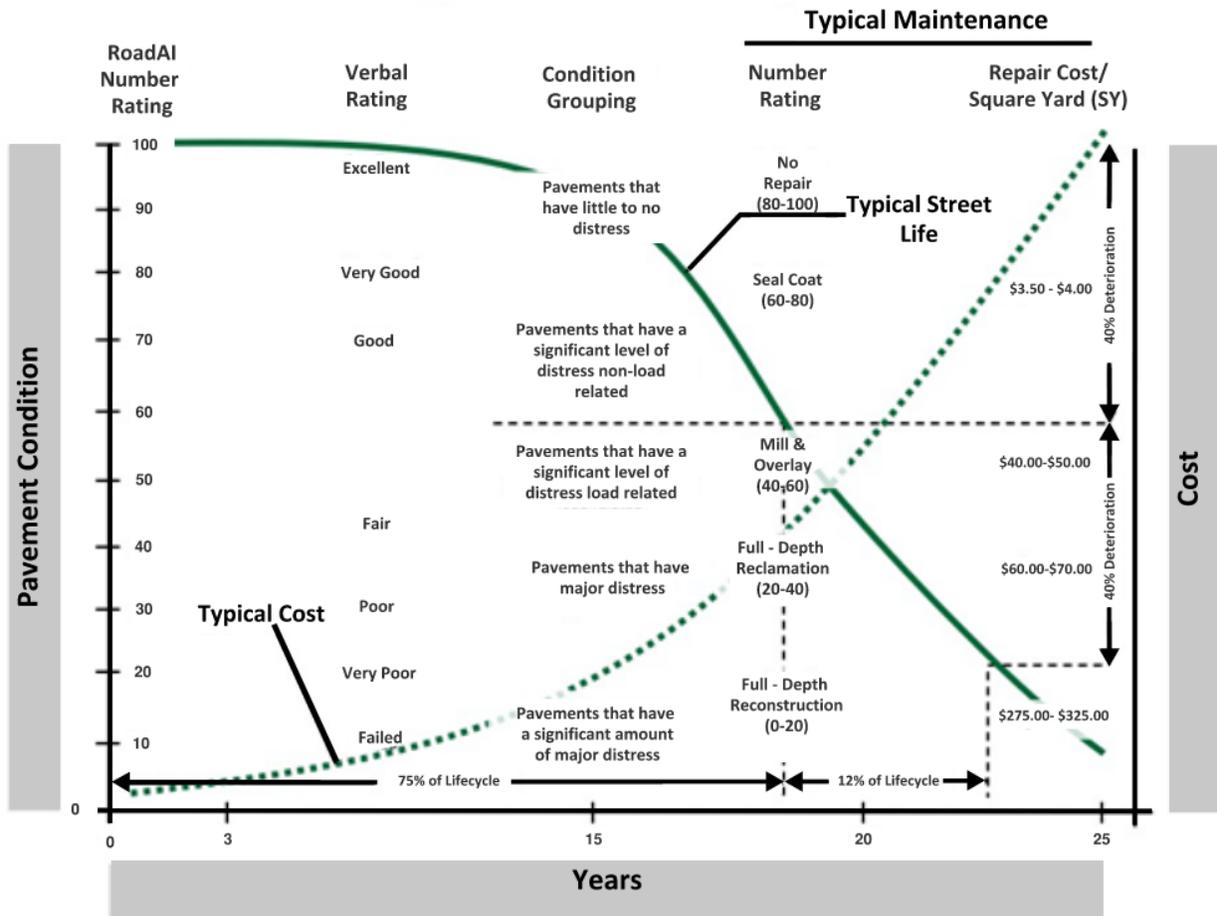
Shorewood maintains approximately 50 miles of roadway and 15+ parking lots of various sizes. Shorewood last completed a Pavement Management Plan in 2009. The document provided a 20-year outlook that included recommendations for roadway improvement projects and ongoing maintenance schedules. It appears that the document was generally followed in the short term but over time diverged the city away from the plan recommendations and was not updated accordingly. Diverging away from a static 20-year plan is typical of most cities due to changes in staff, council, finances, priorities, and other factors. As the plan diverged, road data and pavement conditions were tracked in a spreadsheet that utilized the PASER system.

### B. PAVEMENT LIFECYCLE

Newly constructed bituminous roads can be expected to last 20 to 30 years if the City is performing little to no maintenance. Selecting the proper pavement maintenance practice at the appropriate time can increase this life expectancy to beyond 40 years. Figure 1 shows a graphical representation of the bituminous pavement life cycle. The figure shows the condition of the pavement will decrease over time as repeated freeze and thaw cycles, traffic loading, water, sun, etc. begin to wear on the pavement structure. It is important to note that the older the pavement becomes the more costly the appropriate maintenance becomes.

Figure 1:

### Typical Pavement Lifecycle



C. ROAD AGE

Shorewood’s road network has developed over a long period with several roadways existing prior to 1937. The city grew in a segmented pattern with an initial focus on access to lake frontage and agricultural uses. Over time the agricultural areas developed into rural residential lots and single-family residential generally outward from Excelsior, County Road 19, and Smithtown Road. In the early 1970’s sanitary sewers were added to the area and most roads were reconstructed in that process. Most recently the city developed Minnetonka Country Club into single family neighborhoods and there are smaller developments that continue to develop remaining large parcels. Figure A in Appendix A shows the approximate road ages.

D. ROAD CLASSIFICATIONS

The City of Shorewood contains several different classifications of roads within or bordering its city limits. This includes a makeup of private, local, local Municipal State Aid, one county highway, and one state highway. Maintenance of private

roads, county highways, and state highways are not Shorewood's responsibility and are not part of this plan. Figure B in Appendix A shows the Road Usage map of city owned and maintained roads.

#### E. PAVEMENT RATINGS

This plan utilizes three factors in determining a pavement rating and includes: pavement condition, maintenance effort, and road usage.

##### a. Pavement Condition

Every local road section in the city was evaluated using Vaisala RoadAI. The data is collected by mounting a cellphone camera on the hood of a vehicle and recording a video. The Vaisala RoadAI program is an automated intelligence software that analyzes video images of the roadway surface and applies a rating based on defects such as distress, cracks, potholes, edge deterioration, raveling, bleeding, and accounts for maintenance improvements such as pothole and crack repairs. The software analyzes every frame therefore reduces human error and subjectivity.

The City has utilized the RoadAI Software over the past two years to analyze pavement conditions. Factors that affect what is captured through the camera include but are not limited to:

- Speed of the vehicle recording the video footage
- Angle of the camera facing the roadway corridor
- Lighting conditions
- Debris, leaves, obstructions on the roadway corridor
- Location of the camera mount

Due to the aforementioned factors, pavement ratings can vary due to the aforementioned factors, but staff have been improving data results as we continue to use the system.

RoadAI formulates a pavement condition based on the deficiencies observed and can report the information in a variety of ways. Staff can review the videos and variables that created the pavement condition to verify the information. The RoadAI data used in this plan was captured by City the Public Works Department in the fall of 2024. Staff plans to capture video in the spring and the fall of each year to track both the deterioration and improvements to the pavement over time. This data will be utilized to update this plan as needed. The pavement surface condition is based on a ranking of 0-100 with 0 being the worst condition pavement and 100 being the best. For example, a RoadAI rating of 10 for a pavement has completely failed and requires the complete removal and replacement of the entire roadway section. Conversely, a rating of 100 is a newly

constructed or reconstructed pavement that requires little to no maintenance in the near term other than pavement sealing.

**Table E.1 (Rating from RoadAI Data)**

<b>Pavement Condition (RoadAI Data Collected)</b>	<b>Maintenance or Construction Method to be Utilized</b>
0-20	Complete reconstruction or reclamation including adjacent curb and gutter.
20-40	Deeper mill & overlay, reclamation, and spot full depth repairs. Benefits from added pavement strength.
40-60	Mill and Overlay
60-70	Seal coat (fog or clear) and crack seal as needed.
80-100	Seal coat (fog or clear) and crack seal as needed.

Pavement conditions calculated by Vaisala RoadAI are shown in Appendix A; Table E.2: Pavement Condition-Alphabetical Order and Table E.3: Pavement Condition- Ranking Order or average pavement condition. The average pavement condition rating for all the streets in 2025 is 75-80. Future evaluations will incorporate a weighted average to account for street length and further break out roadways into shorter more manageable segments.

**b. Maintenance Effort**

The second factor in determining a road rating is the maintenance effort. This is the amount of maintenance effort that public works staff or its contractors are putting towards maintaining individual roadways in recent years. Maintenance efforts are considered short-term fixes but tend to take a lot of staff time to complete. Maintenance efforts include pothole patching, crack filling, skim patching and material, or other operations necessary to maintain safe and functioning roadways. The maintenance effort scale follows a 1-3 rating system where 1 would represent high or recurring maintenance efforts, and 3 would represent a low or very minimal maintenance effort. Maintenance Effort is geographically shown on Figure C: - City Maintenance efforts and is identified in Table E.4 (Pavement Condition – Weighted Ranking Order).

c. Road Usage

The third factor in determining road rating is road usage. This factor puts a priority on roads that are more heavily used and more visible by the traveling public. Road usage is obtained through several variables such as the number of vehicles using a roadway or average annual daily traffic (AADT) when available, its connecting roadways, and the number of parcels that the roadway serves. The scale uses a 1-3 ranking system where 1 represents high road use and includes roadways with higher AADT, Municipal State Aid (MSA) Roadways, frontage roads, and roadways with direct connection to county and state highways. A ranking of 2 represents roadways that are thru roadways, large loops, and longer dead-end roadways that provide serviced to 25 parcels or more. A ranking of 3 represents roadways which are commonly classified as dead-end roads or cul-de-sacs serving less than 25 parcels. Road usage is graphically shown on Figure B: Road Usage and is identified in Table E.4 (Pavement Condition – Weighted Ranking Order).

d. Weighted Rankings

Applying all 3 factors: pavement condition, maintenance effort, and road usage creates a weighted ranking system. The ranking is classified on a scale of 80 -200. The higher the rating, the better overall condition the roadway is in. The weighted ranking system currently applies a factor of 30 to road maintenance and a factor of 10 to road usage and utilizes the equation:  $\text{Weighted Ranking} = (\text{Pavement Condition} + (\text{Maintenance Effort} \times 30) + (\text{Roadway Usage} \times 10))$ . This weighted ranking system is a major contributor to selecting roadways in need of surface improvements.

### III. IMPROVEMENT METHODS

#### A. PROCESS OF DETERMINATION: IMPROVEMENT METHODS

Staff utilizes a step-by-step procedure to analyze and provide a pavement condition rating and its respective improvement method on an annual or biannual basis. The Public Works Department collects video footage using Vaisala RoadAI camera software to generate a pavement condition.

The data collected helps pinpoint roadways in neighborhoods that are in need of maintenance or repair. Staff reviews the roadways and their adjacent neighborhoods for drainage concerns, existing utility issues and ages if known, and reviews feasibility of incorporating new public utilities in the roadways to serve residents. Utility reviews are taken into consideration for implementing pavement reclamation projects or reconstruction projects.

If the roadway becomes a candidate for reclamation or reconstruction in the near future, the roadway data yields deteriorating pavement conditions at a high rate and utility as-built reviews portray a need for utility and drainage repairs or installation. If the severity of the pavement condition is manageable, the roadway is further analyzed to determine if it is a candidate for a mill & overlay, seal coat, or a crack fill project. A description of each improvement method is explained further below.

#### B. ROAD RECONSTRUCTION

Road reconstruction is the full replacement of the existing bituminous, aggregate base, and associated drainage systems. In this plan, road reconstruction is intended to be considered when there are major repairs needed to underlying sanitary sewer, watermain and storm sewer or where watermain would be expanded into areas not currently served. If major repairs are needed to sanitary, watermain and storm sewer, less invasive repair methods will be explored to minimize overall project costs and disruptions to residents. Typically, most maintenance efforts on a roadway slated for full reconstruction are deferred except for maintenance that ensures safety and reduces liability for the city. In general, road segments with a pavement condition of 0 to 20 are reconstruction project candidates. These reconstruction projects are typically designed to be performed every 50-60 years with regular pavement maintenance practices occurring through the life of the pavement. The average cost for a road reconstruction project can vary between the range of \$275 to \$325 per square yard of roadway pavement.

#### C. RECLAMATION

Full depth reclamation is a pavement rehabilitation technique in which the full pavement section and a portion of the underlying aggregate materials are uniformly pulverized and blended to produce a homogeneous stabilized based material similar

to Aggregate Base Class 5. This material is then modified to the correct thickness and elevation, compacted, and paved over with new bituminous asphalt. Reclamation is commonly used when

- The pavement failure is not related to subgrade deficiencies
- There are minimal utility replacement needs
- No significant drainage concerns are present
- An adequate thickness of bituminous and aggregate base materials exist and underlying subgrade materials have not migrating into the base materials.

In general, road segments with a pavement condition of 40 or lower are reclamation project candidates. Pavement coring can help determine the underlying condition of the roadway if reclamation is in question for best management practice. Reclamation projects are typically designed to be done every 20 years with regular pavement maintenance practices occurring through the life of the pavement. The average cost for a reclamation project can range from \$60 to \$70 per square yard of roadway pavement.

#### D. MILL & OVERLAY

The typical construction method consists of milling, or grinding off a uniform thickness, typically 1.5 inches or 2 inches for residential roads, and then overlaying the roadway with the same amount of bituminous pavement. Milling & overlaying does not increase the overall pavement strength. However, additional overlay thickness can be added in some areas to increase the strength of the roadway. Another method for urban roadways with curb & gutter, is to mill along the curbs at 1.5 inches thick and taper to 0.5 inches near the center of the roadway to remove surface irregularities and previous surface treatments such as seal coats & crack seals. Next, spot curb repairs and installation of leveling course to restore the crown of the road before the final lift of pavement is placed. In general, road segments with a rating of 60 or lower were deemed in need of a mill and overlay. Mill and overlay projects are typically designed to be done every 10-15 years with regular pavement maintenance practices occurring through the life of the pavement. The average cost for a mill and overlay can range from \$40 to \$50 per square yard of roadway pavement.

#### E. PAVEMENT MAINTENANCE

The below items are considered pavement maintenance that are completed on a routine basis and are typically lower cost items that extend the life of pavements.

##### a. Seal Coat

A seal coat consists of the application of emulsified asphalt and loose aggregate to the existing surface. After the specified “curing” time of a few days, the

excess aggregate is swept up and removed. Seal coating is typically used throughout the life of a pavement. Seal coats are most effective when used on new pavements in those in relatively good condition. This method is used to provide a new driving surface and to re-seal the pavement surface which provides protection from weathering. The useful life of a sealcoat is generally 5 to 7 years depending on the type of materials used and the condition of the pavement to which it is applied. Seal coating can help fill minor surface voids and is a surface treatment that should not be used to correct surface potholes and irregularities. The average cost for a seal coating project can range from \$3 to \$4 per square yard of roadway pavement.

b. Clear Pavement Sealers

Clear pavement sealers are an emerging maintenance practice that penetrates the asphalt and protects the surface from oxidation and becoming brittle. Most clear sealers on the market are propriety with variable costs and benefits. The current best practice is to apply a clear sealer over pavements that are only 0-2 years old and can be reapplied in 5-8 years. An additional benefit to these products is that they can be applied over existing pavement striping which makes them ideal for parking lots and higher use city roads that have pavement markings. This eliminates additional costs of re-striping the pavement and is about 25-30% of the cost of a mill and overlay project. This does not help fill minor surface voids in the same way that seal coating does. Clear pavement sealers are slightly more expensive than chip seals. However, convenience of these products to the traveling public justifies the added cost and the performance. The average cost for clear pavement sealers can range from \$3.50 to \$4.50 per square yard of roadway pavement.

c. Fog Sealer

Fog seals are similar to clear pavement sealers in that they seal and protect the surface of pavements from oxidizing, however they do not penetrate the asphalt and slowly wear off over time. Fog seals are typically applied on pavements showing signs of surface aging and create a “like new” visual appearance. If fog seals are used in parking lots or roads that have pavement markings they will need to be re-striped. This practice cost is comparable to a seal coat operation but does not help fill minor surface voids in the same way that seal coating does.

d. Crack Seal

Cracking is the first and most common type of deterioration in pavements. Maintenance neglect of cracks leads to accelerated cracking, alligator cracking, potholing and a reduced pavement life. Crack sealing involves cleaning cracks with high pressure air and placing liquid asphalt material into and above the cracks. The goal of crack sealing is to prevent water intrusion into the pavement. Cracks may be routed prior to cleaning to create a larger, more uniform cracks to allow the liquid asphalt material to expand and contract with weather. Crack

sealing is recommended to occur on an annual basis to all roads with an emphasis on newly paved roads and roads prior to pavement sealing.

e. Recommendations

To maximize the life of the city's pavements, it is recommended that the city roads are crack sealed on an annual basis and the pavement sealers applied within the first year or two of paving. These sealant methods help eliminate additional cracks and spaces to form, preventing water from penetrating the pavement section. Pavement sealers can be reapplied in a 5 to 7-year cycle. Care and records should be kept for all pavement sealer applications as many of the products and applications may not function as intended if other types of pavement sealers have been applied previously.

## IV. IMPROVEMENT PLAN

This improvement plan is intended to be updated on an annual or bi-annual basis to account for updated data, changing technologies, best maintenance practices, and change in city priorities. The data obtained by updating the report for a 5 to 10-year outlook is critical in establishing an accurate and consistent capital improvement plan (CIP). Currently, most of Shorewood's roadways are in a mill & overlay cycle improvement. Mill and overlay is the most economical method to extend the pavement's life and provide an opportunity to address minor drainage issues. The city has allocated \$700,000 plus 5% inflation per year for a biannual mill & overlay project in its CIP. An additional \$50,000 per year is proposed in the general budget for road maintenance that is performed by public works staff. This additional funding is proposed to cover costs of typical short-term corrections such as skim patching, pothole filling and other miscellaneous maintenance activities until the roadway is due for pavement rehabilitation. Road improvements occurring over the next few years are detailed below and in Figure D.

### A. 2025 MILL & OVERLAY PROJECT

The 2025 project is the first year to implement the proposed recommendations from the pavement management plan. Roadways to be included in the 2025 mill & overlay project are:

- |                       |                     |                    |
|-----------------------|---------------------|--------------------|
| -Boulder Bridge Drive | - Eureka Rd (North) | -Shorewood Oaks Dr |
| -Boulder Bridge Lane  | - Maple Leaf Circle | - Smithtown Circle |
| -Burlwood Court       | - Oak Leaf Trail    | -Sylvan Lane       |
| -Country Club Rd      | -Orchard Circle     | -Wild Rose Ln      |
|                       |                     | -Yellowstone Trail |

\*See Appendix A: Figure D for map

Eureka Road north of Smithtown Road has been planned for improvements in the CIP for the year 2025 and has a CIP budget of \$630,000.

### B. 2027 MILL & OVERLAY PROJECT

The 2027 project includes the milling and overlaying of loop roads, some thru roads and local roads. The complete list of 2027 Mill & Overlay candidates are listed below, and are subject to change:

- Anthony Terrace
- Brentridge Drive
- Brynmawr Place
- Chartwell Hill
- Covington Ct.
- Muirfield Circle
- Pine Bend
- Vine Ridge Rd
- Vine Street
- Waterford Circle
- Waterford Court
- West Lane
- State HWY 7 Service Rd  
(Covington Rd Area)

\*See Appendix A: Figure D for map

## V. FINANCING & FUNDING

### A. FINANCING

Based on discussions to date, it is anticipated that the city will utilize funds from the general tax levy or roadway reconstruction bonds to fund projects listed in the CIP. An additional funding option is to use Municipal State Aid (MSA) funds on eligible roadways. As of December 31, 2024 Shorewood has an MSA fund balance of \$1,993,188.00.

### B. FUNDING AND THE RELATION TO CITY WIDE PAVEMENT CONDITION INDEX

In order to maintain a targeted average pavement condition index of 75% to 80%, funding for the roadway improvements and maintenance is proposed to be utilized from the following sources:

- General Tax Levee
- Road Reconstruction Bonds
- Municipal State Aid
- Sewer Fund
- Water Fund
- Stormwater Fund

The average pavement condition for all roads is projected to decrease by 2.5% per year with ongoing routine pavement maintenance practices such as pavement seals, crack seals, and pothole patching. To maintain a pavement condition rating between 75% to 80%, the city will need to mill & overlay 1.9 miles of roadway per year on average. With the 50 miles of roads in the city, it will take 26 years to mill & overlay all of its roads. It is anticipated that within this mill & overlay cycle there will be streets that will be fully reconstructed or reclaimed due to underlying utility needs that will remove them from the mill & overlay cycle, therefore shortening that time frame in which all streets are completed. The cost to mill & overlay one mile of road at 1.5-inch thickness, in 2025 dollars, is approximately \$500,000. The city should be budgeting \$750,000 to \$1.0 million every year or \$1.5 million to \$2.0 million dollars every other year for mill & overlay projects.

### C. OTHER FUNDS

The availability for grant funds or other non-city funding sources for the proposed projects will be evaluated for each project. Depending on project location, project scope, future legislation, project partners, etc., these potential funding sources include, but are not limited to:

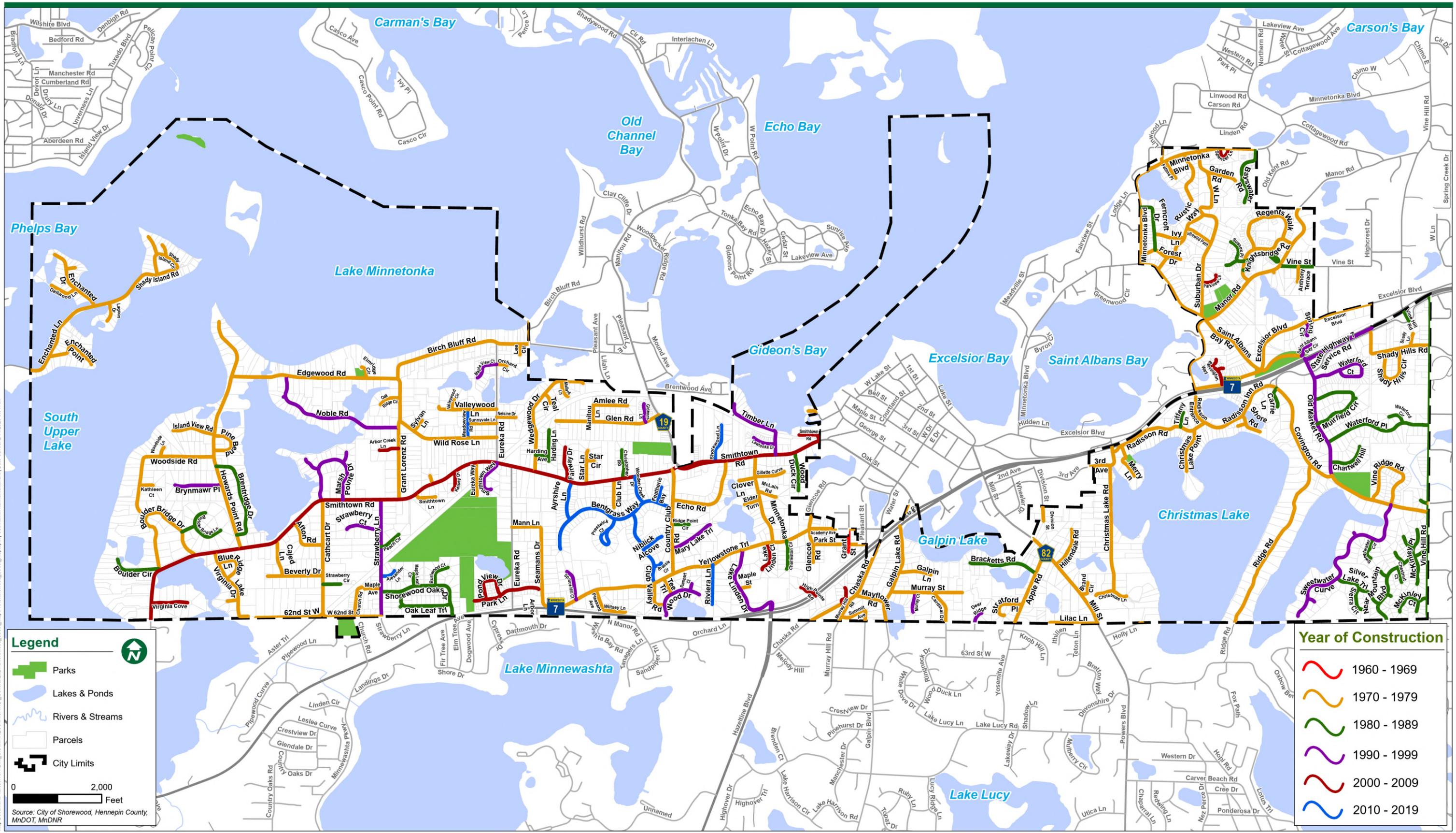
- Riley Purgatory Bluff Creek Watershed District
- Minnehaha Creek Watershed District
- MN Department of Transportation
- Hennepin County Highway Department

## VI. NEXT STEPS

The following next steps are recommended to be completed by the City Council and City Staff:

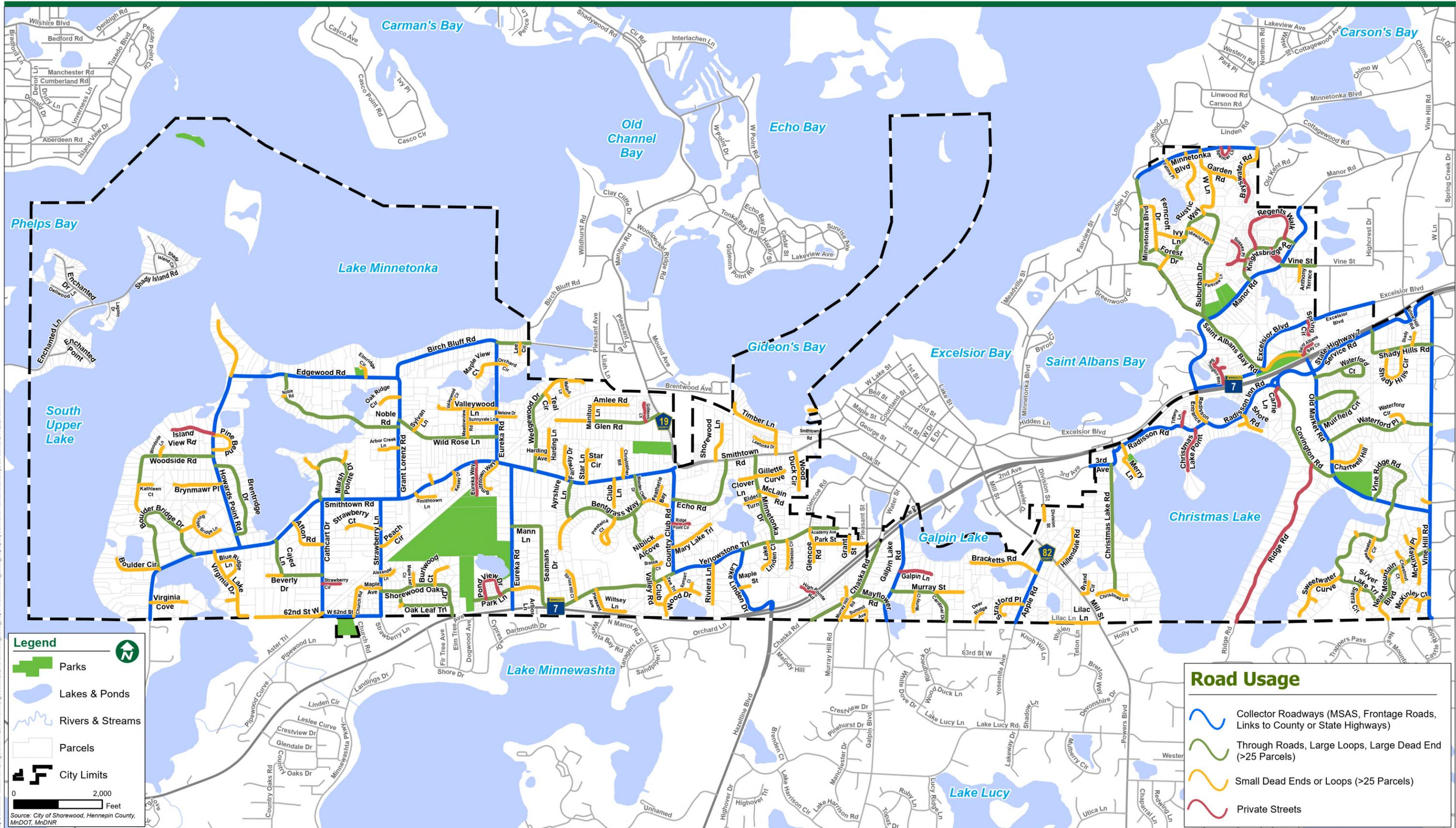
1. Adopt the Pavement Management Plan.
2. Implement the plan and proceed with projects in 2025.
3. Reevaluate upcoming priority roads annually or biannually and update the Pavement Management Plan as needed. Review estimated costs and update the Capital Improvement Plan (CIP) accordingly.
4. Continue with pavement maintenance and monitor the underlying utilities (ongoing).

# Appendix A: Figures

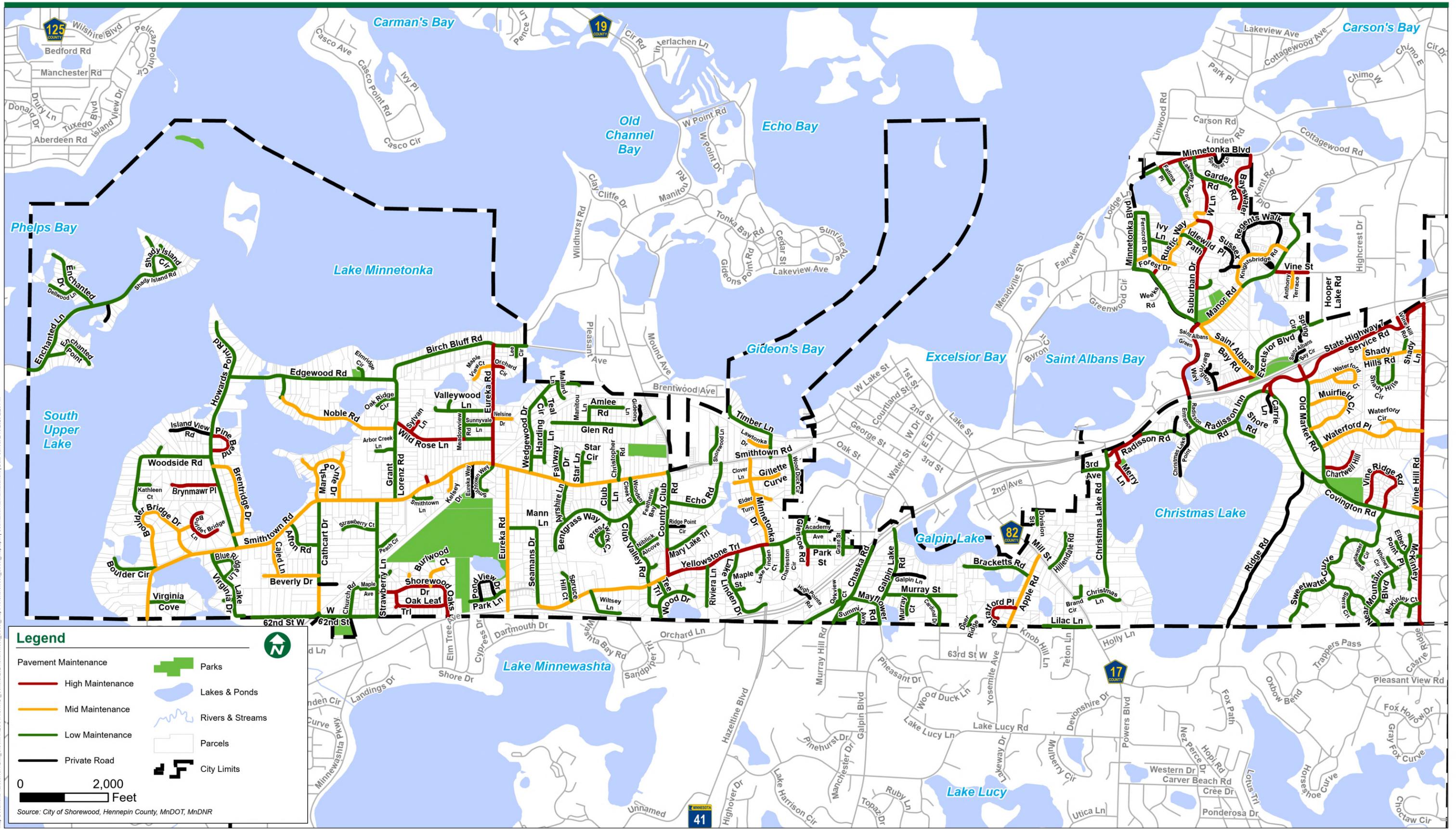


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Source: City of Shorewood, Hennepin County, MnDOT, MnDNR



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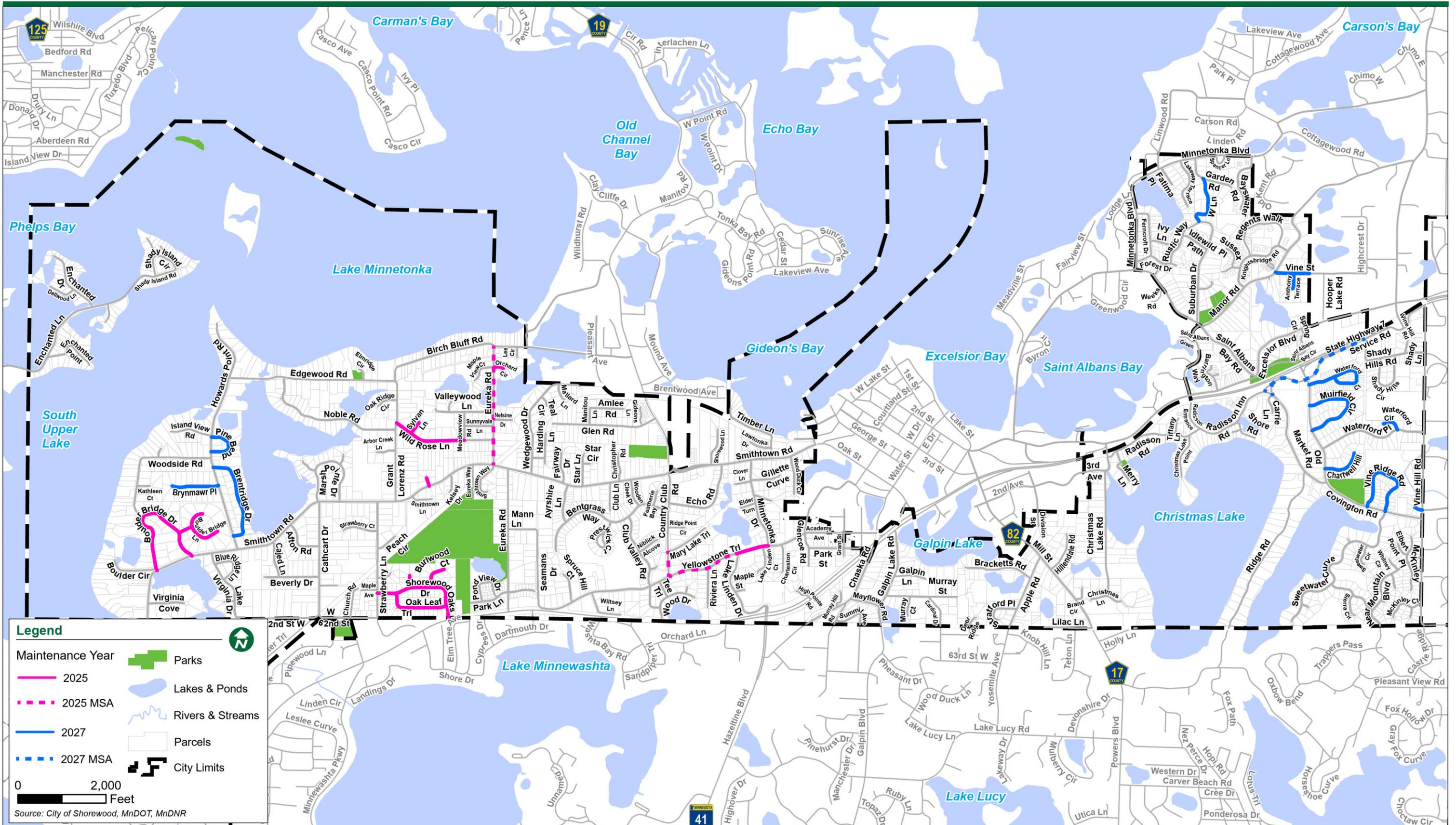
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**Legend**

High Maintenance	Parks
Mid Maintenance	Lakes & Ponds
Low Maintenance	Rivers & Streams
Private Road	Parcels
	City Limits

0 2,000 Feet

Source: City of Shorewood, Hennepin County, MnDOT, MnDNR



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**Legend**

Maintenance Year		Parks
		Lakes & Ponds
		Rivers & Streams
		Parcels
		City Limits

0 2,000 Feet

Source: City of Shorewood, MnDOT, MnDNR

# Appendix B: Tables

**Table E.2 (Pavement Condition - Alphabetical Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
3rd Avenue	475	96.94%	
62nd Street West	2879	93.37%	
Academy Avenue	629	95.67%	
Afton Road	987	51.08%	
Alexander Lane	355	97.40%	
Amlee Road	773	95.62%	
Anthony Terrace	348	49.10%	
Apple Road	1754	84.26%	MSA
Arbor Creek Lane	442	66.32%	
Ayrshire Lane	876	94.16%	
Bayswater Road	1423	49.15%	PRIVATE
Bentgrass Way	3250	86.63%	
Beverly Drive	1253	67.60%	
Birch Bluff Road	3042	97.13%	MSA
Blue Ridge Lane	897	76.45%	
Boulder Bridge Drive	3008	76.48%	
Boulder Bridge Lane	1498	35.62%	
Boulder Circle	1125	93.72%	
Bracketts Road	1564	95.03%	
Brand Circle	387	90.35%	
Brassie Circle	186	85.18%	
Brentridge Drive	2108	55.19%	
Brynmawr Place	1059	40.08%	
Burlwood Court	599	82.92%	
Cajed Lane	815	75.43%	
Cardinal Drive	750	94.54%	
Cathcart Drive	2556	76.85%	
Charleston Circle	646	86.43%	
Chartwell Hill	885	44.27%	
Chaska Road	2444	94.74%	
Chestnut Court	348	54.17%	
Chestnut Terrace	197	75.03%	
Christmas Lake Road	3330	94.72%	
Christmas Lane	749	88.46%	
Christopher Road	649	75.71%	
Church Road	731	89.53%	
Clover Lane	367	62.85%	
Club Lane	633	64.29%	
Club Valley Road	2405	89.61%	
Country Club Road	2356	84.87%	MSA
Covington Court	188	42.07%	
Covington Road	4951	95.77%	MSA
Deer Ridge	277	68.26%	
Dellwood Lane	621	89.61%	
Division Street	327	43.41%	
Echo Road	1957	96.88%	

**Table E.2 (Pavement Condition - Alphabetical Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Edgewood Road	3781	79.51%	MSA
Elbert Point	365	52.62%	
Elder Turn	361	83.41%	
Elmridge Circle	299	27.46%	
Enchanted Cove	208	85.48%	
Enchanted Drive	1561	90.32%	
Enchanted Lane	3273	96.93%	
Enchanted Point	1293	59.49%	
Eureka Road	5960	65.71%	MSA
Excelsior Boulevard	4809	94.63%	
Fairway Drive	763	77.54%	
Fatima Place	449	67.91%	
Featherie Bay	364	64.65%	
Ferncroft Drive	1219	56.21%	
Forest Drive	997	60.69%	
Galpin Lake Road	1841	96.37%	MSA
Garden Road	1220	88.71%	
Gideons Lane	433	97.22%	PRIVATE
Gillette Curve	680	82.74%	
Glen Road	2378	97.38%	
Glencoe Road	1101	73.52%	
Grant Lorenz Road	3028	93.16%	
Grant Street	522	44.44%	
Harding Avenue	288	71.85%	
Harding Lane	707	74.62%	
High Pointe Road	331	28.85%	PRIVATE
Hillendale Road	926	45.13%	
Howards Point Road	5440	82.81%	MSA
Idlewild Path	648	93.19%	
Ivy Lane	688	56.80%	
Kathleen Court	308	69.62%	
Kelsey Drive	419	74.95%	
Knightsbridge Road	1875	84.98%	
Lake Linden Court	688	83.64%	
Lake Linden Drive	2342	85.48%	MSA
Lake Virginia Drive	1665	67.47%	
Lakeway Terrace	1191	76.60%	
Lawtonka Drive	522	71.68%	
Lee Circle	242	97.08%	
Lilac Lane	1086	88.04%	
Mallard Lane	397	93.29%	
Manitou Lane	378	96.47%	
Mann Lane	644	90.71%	
Manor Road	4267	90.87%	
Maple Leaf Circle	279	67.99%	
Maple Ridge Lane	248	26.00%	

**Table E.2 (Pavement Condition - Alphabetical Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Maple Street	225	86.08%	
Maple View Court	611	79.57%	
Marsh Pointe Circle	255	48.06%	
Marsh Pointe Court	388	67.35%	
Marsh Pointe Drive	2280	87.83%	
Mary Lake Trail	1018	73.67%	
Mayflower Road	1096	90.44%	
McKinley Circle	242	58.46%	
McKinley Court	869	65.50%	
McKinley Place	1291	81.68%	
McLain Road	425	80.03%	
Meadowview Road	643	89.26%	
Merry Lane	840	56.50%	
Mill Street	2452	97.86%	
Minnetonka Boulevard	2675	44.43%	
Minnetonka Drive	1991	84.73%	
Muirfield Circle	2117	68.56%	
Murray Court	453	92.07%	
Murray Hill Road	446	88.48%	
Murray Street	1611	94.77%	
Near Mountain Boulevard	2349	91.38%	
Nelsine Drive	433	91.72%	
Niblick Alcove	507	81.71%	
Noble Road	3332	59.40%	
Oak Leaf Trail	1482	51.83%	
Oak Ridge Circle	494	86.80%	
Oakview Court	422	96.55%	
Old Market Road	2722	85.31%	MSA
Orchard Circle	240	23.23%	
Park Lane	919	72.94%	
Park Street	1181	94.75%	
Parkview Lane	422	86.46%	
Peach Circle	502	98.24%	
Pine Bend	974	56.82%	
Pleasant Avenue	481	79.86%	
Prestwick Court	1203	96.13%	
Radisson Entrance	678	70.36%	
Radisson Road	4435	95.96%	
Ramp	265	92.54%	
Rampart Court	164	44.04%	
Ridge Point Circle	386	56.44%	PRIVATE
Riviera Lane	896	93.97%	
Rustic Way	1625	68.32%	
Saint Albans Bay Circle	370	57.08%	PRIVATE
Saint Albans Bay Road	4377	75.99%	
Seamans Drive	1748	96.56%	

**Table E.2 (Pavement Condition - Alphabetical Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Shady Hills Circle	1526	92.05%	
Shady Hills Road	1847	59.00%	
Shady Island Circle	1084	96.69%	
Shady Island Point	449	72.38%	
Shady Island Road	1150	91.05%	
Shady Island Trail	282	81.45%	
Shady Lane	290	46.89%	
Shore Road	598	42.82%	
Shorewood Lane	863	96.71%	
Shorewood Oaks Drive	2212	61.89%	
Sierra Circle	548	88.72%	
Silver Lake Trail	1181	93.64%	
Smithtown Circle	195	40.76%	
Smithtown Lane	491	61.65%	
Smithtown Road	16656	92.25%	MSA
Smithtown Way	854	76.40%	
Spruce Hill Court	705	95.37%	
Star Circle	179	65.48%	
Star Lane	753	93.39%	
State Highway 7 Service Road	4797	65.15%	
Stratford Place	811	76.16%	
Strawberry Court	810	98.69%	
Strawberry Lane	2636	98.90%	
Suburban Drive	2583	76.49%	
Summit Avenue	825	88.24%	
Sunnyvale Lane	658	66.60%	
Sweetwater Circle	512	87.69%	
Sweetwater Court	175	76.98%	
Sweetwater Curve	4224	86.57%	
Teal Circle	256	86.12%	
Tee Trail	396	87.14%	
Timber Lane	1744	71.54%	
Valleywood Circle	240	60.35%	
Valleywood Lane	1352	79.17%	
Vine Hill Road	7520	62.92%	MSA
Vine Ridge Road	2145	74.71%	
Vine Street	775	60.39%	
Virginia Cove	825	78.13%	
Waterford Circle	420	36.17%	
Waterford Court	1934	45.41%	
Waterford Place	2489	76.49%	
Wedgewood Drive	2855	89.28%	
West Lane	848	40.84%	
Whitney Circle	322	53.27%	
Wild Rose Lane	2326	89.68%	
Wiltsey Lane	502	72.99%	

**Table E.2 (Pavement Condition - Alphabetical Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Wood Drive	1221	80.82%	
Wood Duck Circle	870	84.85%	
Wooden Cleek Drive	643	75.67%	
Woodend Place	350	71.16%	
Woodside Lane	223	94.38%	
Woodside Road	2835	94.98%	
Yellowstone Trail	6399	88.15%	MSA
<b>Grand Total</b>	<b>272424</b>	<b>79.77%</b>	

**Table E.3 (Pavement Condition - Ranking Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Orchard Circle	240	23.23%	2025 M&O
Maple Ridge Lane	248	26.00%	
Elmridge Circle	299	27.46%	
High Pointe Road	331	28.85%	PRIVATE
Boulder Bridge Lane	1498	35.62%	2025 M&O
Waterford Circle	420	36.17%	2027 M&O
Brynmawr Place	1059	40.08%	2027 M&O
Smithtown Circle	195	40.76%	2025 M&O
West Lane	848	40.84%	2027 M&O
Covington Court	188	42.07%	2027 M&O
Shore Road	598	42.82%	
Division Street	327	43.41%	
Rampart Court	164	44.04%	
Chartwell Hill	885	44.27%	2027 M&O
Minnetonka Boulevard	2675	44.43%	
Grant Street	522	44.44%	
Hillendale Road	926	45.13%	
Waterford Court	1934	45.41%	2027 M&O
Shady Lane	290	46.89%	
Marsh Pointe Circle	255	48.06%	
Anthony Terrace	348	49.10%	2027 M&O
Bayswater Road	1423	49.15%	PRIVATE
Afton Road	987	51.08%	
Oak Leaf Trail	1482	51.83%	2025 M&O
Elbert Point	365	52.62%	
Whitney Circle	322	53.27%	
Chestnut Court	348	54.17%	
Brentridge Drive	2108	55.19%	2027 M&O
Ferncroft Drive	1219	56.21%	
Ridge Point Circle	386	56.44%	PRIVATE
Merry Lane	840	56.50%	
Ivy Lane	688	56.80%	
Pine Bend	974	56.82%	2027 M&O
Saint Albans Bay Circle	370	57.08%	PRIVATE
McKinley Circle	242	58.46%	
Shady Hills Road	1847	59.00%	
Noble Road	3332	59.40%	
Enchanted Point	1293	59.49%	
Valleywood Circle	240	60.35%	
Vine Street	775	60.39%	2027 M&O
Forest Drive	997	60.69%	
Smithtown Lane	491	61.65%	
Shorewood Oaks Drive	2212	61.89%	2025 M&O
Clover Lane	367	62.85%	
Vine Hill Road	7520	62.92%	MSA
Club Lane	633	64.29%	

**Table E.3 (Pavement Condition - Ranking Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Featherie Bay	364	64.65%	
State Highway 7 Service Road	4797	65.15%	2027 M&O
Star Circle	179	65.48%	
McKinley Court	869	65.50%	
Eureka Road	5960	65.71%	2025 M&O (MSA)
Arbor Creek Lane	442	66.32%	
Sunnyvale Lane	658	66.60%	
Marsh Pointe Court	388	67.35%	
Lake Virginia Drive	1665	67.47%	
Beverly Drive	1253	67.60%	
Fatima Place	449	67.91%	
Maple Leaf Circle	279	67.99%	2025 M&O
Deer Ridge	277	68.26%	
Rustic Way	1625	68.32%	
Muirfield Circle	2117	68.56%	2027 M&O
Kathleen Court	308	69.62%	
Radisson Entrance	678	70.36%	
Woodend Place	350	71.16%	
Timber Lane	1744	71.54%	
Lawtonka Drive	522	71.68%	
Harding Avenue	288	71.85%	
Shady Island Point	449	72.38%	
Park Lane	919	72.94%	
Wiltsey Lane	502	72.99%	
Glencoe Road	1101	73.52%	
Mary Lake Trail	1018	73.67%	
Harding Lane	707	74.62%	
Vine Ridge Road	2145	74.71%	2027 M&O
Kelsey Drive	419	74.95%	
Chestnut Terrace	197	75.03%	
Cajed Lane	815	75.43%	
Wooden Cleek Drive	643	75.67%	
Christopher Road	649	75.71%	
Saint Albans Bay Road	4377	75.99%	
Stratford Place	811	76.16%	
Smithtown Way	854	76.40%	
Blue Ridge Lane	897	76.45%	
Boulder Bridge Drive	3008	76.48%	2025 M&O
Waterford Place	2489	76.49%	
Suburban Drive	2583	76.49%	
Lakeway Terrace	1191	76.60%	
Cathcart Drive	2556	76.85%	
Sweetwater Court	175	76.98%	
Fairway Drive	763	77.54%	
Virginia Cove	825	78.13%	
Valleywood Lane	1352	79.17%	

**Table E.3 (Pavement Condition - Ranking Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Edgewood Road	3781	79.51%	MSA
Maple View Court	611	79.57%	
Pleasant Avenue	481	79.86%	
McLain Road	425	80.03%	
Wood Drive	1221	80.82%	
Shady Island Trail	282	81.45%	
McKinley Place	1291	81.68%	
Niblick Alcove	507	81.71%	
Gillette Curve	680	82.74%	
Howards Point Road	5440	82.81%	MSA
Burlwood Court	599	82.92%	2025 M&O
Elder Turn	361	83.41%	
Lake Linden Court	688	83.64%	
Apple Road	1754	84.26%	MSA
Minnetonka Drive	1991	84.73%	
Wood Duck Circle	870	84.85%	
Country Club Road	2356	84.87%	2025 M&O (MSA)
Knightsbridge Road	1875	84.98%	
Brassie Circle	186	85.18%	
Old Market Road	2722	85.31%	MSA
Lake Linden Drive	2342	85.48%	MSA
Enchanted Cove	208	85.48%	
Maple Street	225	86.08%	
Teal Circle	256	86.12%	
Charleston Circle	646	86.43%	
Parkview Lane	422	86.46%	
Sweetwater Curve	4224	86.57%	
Bentgrass Way	3250	86.63%	
Oak Ridge Circle	494	86.80%	
Tee Trail	396	87.14%	
Sweetwater Circle	512	87.69%	
Marsh Pointe Drive	2280	87.83%	
Lilac Lane	1086	88.04%	
Yellowstone Trail	6399	88.15%	2025 M&O (MSA)
Summit Avenue	825	88.24%	
Christmas Lane	749	88.46%	
Murray Hill Road	446	88.48%	
Garden Road	1220	88.71%	
Sierra Circle	548	88.72%	
Meadowview Road	643	89.26%	
Wedgewood Drive	2855	89.28%	
Church Road	731	89.53%	
Club Valley Road	2405	89.61%	
Dellwood Lane	621	89.61%	
Wild Rose Lane	2326	89.68%	2025 M&O
Enchanted Drive	1561	90.32%	

**Table E.3 (Pavement Condition - Ranking Order)**

Road Name	Length (feet)	Pavement Condition Score (Vaisala)	Notes
Brand Circle	387	90.35%	
Mayflower Road	1096	90.44%	
Mann Lane	644	90.71%	
Manor Road	4267	90.87%	
Shady Island Road	1150	91.05%	
Near Mountain Boulevard	2349	91.38%	
Nelsine Drive	433	91.72%	
Shady Hills Circle	1526	92.05%	
Murray Court	453	92.07%	
Smithtown Road	16656	92.25%	MSA
Ramp	265	92.54%	
Grant Lorenz Road	3028	93.16%	
Idlewild Path	648	93.19%	
Mallard Lane	397	93.29%	
62nd Street West	2879	93.37%	
Star Lane	753	93.39%	
Silver Lake Trail	1181	93.64%	
Boulder Circle	1125	93.72%	
Riviera Lane	896	93.97%	
Ayrshire Lane	876	94.16%	
Woodside Lane	223	94.38%	
Cardinal Drive	750	94.54%	
Excelsior Boulevard	4809	94.63%	
Christmas Lake Road	3330	94.72%	
Chaska Road	2444	94.74%	
Park Street	1181	94.75%	
Murray Street	1611	94.77%	
Woodside Road	2835	94.98%	
Bracketts Road	1564	95.03%	
Spruce Hill Court	705	95.37%	
Amlee Road	773	95.62%	
Academy Avenue	629	95.67%	
Covington Road	4951	95.77%	MSA
Radisson Road	4435	95.96%	
Prestwick Court	1203	96.13%	
Galpin Lake Road	1841	96.37%	MSA
Manitou Lane	378	96.47%	
Oakview Court	422	96.55%	
Seamans Drive	1748	96.56%	
Shady Island Circle	1084	96.69%	
Shorewood Lane	863	96.71%	
Echo Road	1957	96.88%	
Enchanted Lane	3273	96.93%	
3rd Avenue	475	96.94%	
Lee Circle	242	97.08%	

**Table E.3 (Pavement Condition - Ranking Order)**

<b>Road Name</b>	<b>Length (feet)</b>	<b>Pavement Condition Score (Vaisala)</b>	<b>Notes</b>
Birch Bluff Road	3042	97.13%	MSA
Gideons Lane	433	97.22%	PRIVATE
Glen Road	2378	97.38%	
Alexander Lane	355	97.40%	
Mill Street	2452	97.86%	
Peach Circle	502	98.24%	
Strawberry Court	810	98.69%	
Strawberry Lane	2636	98.90%	
<b>Grand Total</b>	<b>272424</b>	<b>79.77%</b>	

**Table E.4 (Pavement Condition - Weighted Ranking Order)**

Road Name	Pavement Condition (Vaisala)	Maintenance Effort (3=Low, 1=High)	Road Use (3=Low, 1=High)	Ranking (PC+(30*ME)+(10*RU))=	Notes
Orchard Circle	23%	1	3	83	
Minnetonka Boulevard	44%	1	1	84	
Boulder Bridge Lane	36%	1	3	96	
Brynmawr Place	40%	1	3	100	
Smithtown Circle	41%	1	3	101	
West Lane	41%	1	3	101	
Vine Hill Road	63%	1	1	103	MSA
Chartwell Hill	44%	1	3	104	
State Highway 7 Service Road	65%	1	1	105	
Eureka Road	66%	1	1	106	MSA
Bayswater Road	49%	1	3	109	PRIVATE
Vine Street	60%	1	2	110	
Oak Leaf Trail	52%	1	3	112	
Shorewood Oaks Drive	62%	1	2	112	
Merry Lane	57%	1	3	117	
Pine Bend	57%	1	3	117	
Muirfield Circle	69%	1	2	119	
Vine Ridge Road	75%	1	2	125	
Waterford Court	45%	2	2	125	
Waterford Circle	36%	2	3	126	
Suburban Drive	76%	1	2	126	
Yellowstone Trail	88%	1	1	128	
Manor Road	91%	1	1	131	
Woodend Place	71%	1	3	131	
Covington Court	42%	2	3	132	
Glencoe Road	74%	1	3	134	
Brentridge Drive	55%	2	2	135	
Radisson Road	96%	1	1	136	
Stratford Place	76%	1	3	136	
Marsh Pointe Circle	48%	2	3	138	
Shady Hills Road	59%	2	2	139	
Anthony Terrace	49%	2	3	139	
Noble Road	59%	2	2	139	
Wild Rose Lane	90%	1	2	140	
Forest Drive	61%	2	2	141	
Maple Ridge Lane	26%	3	3	146	
Cathcart Drive	77%	2	1	147	
Elmridge Circle	27%	3	3	147	
Rustic Way	68%	2	2	148	
High Pointe Road	29%	3	3	149	PRIVATE

**Table E.4 (Pavement Condition - Weighted Ranking Order)**

Road Name	Pavement Condition (Vaisala)	Maintenance Effort (3=Low, 1=High)	Road Use (3=Low, 1=High)	Ranking (PC+(30*ME)+(10*RU))=	Notes
Clover Lane	63%	2	3	153	
Apple Road	84%	2	1	154	MSA
Cajed Lane	75%	2	2	155	
Saint Albans Bay Road	76%	2	2	156	
Boulder Bridge Drive	76%	2	2	156	
Waterford Place	76%	2	2	156	
Shady Lane	47%	3	2	157	
Marsh Pointe Court	67%	2	3	157	
Beverly Drive	68%	2	3	158	
Maple Leaf Circle	68%	2	3	158	
Lawtonka Drive	72%	2	3	162	
Smithtown Road	92%	2	1	162	MSA
Shore Road	43%	3	3	163	
Division Street	43%	3	3	163	
Rampart Court	44%	3	3	164	
Grant Street	44%	3	3	164	
Minnetonka Drive	85%	2	2	165	
Knightsbridge Road	85%	2	2	165	
Hillendale Road	45%	3	3	165	
Marsh Pointe Drive	88%	2	2	168	
Maple View Court	80%	2	3	170	
McLain Road	80%	2	3	170	
Afton Road	51%	3	3	171	
Elbert Point	53%	3	3	173	
Gillette Curve	83%	2	3	173	
Burlwood Court	83%	2	3	173	
Whitney Circle	53%	3	3	173	
Elder Turn	83%	2	3	173	
Chestnut Court	54%	3	3	174	
Featherie Bay	65%	3	2	175	
Ferncroft Drive	56%	3	3	176	
Ridge Point Circle	56%	3	3	176	PRIVATE
Ivy Lane	57%	3	3	177	
Saint Albans Bay Circle	57%	3	3	177	PRIVATE
McKinley Circle	58%	3	3	178	
Enchanted Point	59%	3	3	179	
Edgewood Road	80%	3	1	180	MSA
Valleywood Circle	60%	3	3	180	
Smithtown Lane	62%	3	3	182	
Nelsine Drive	92%	2	3	182	

**Table E.4 (Pavement Condition - Weighted Ranking Order)**

Road Name	Pavement Condition (Vaisala)	Maintenance Effort (3=Low, 1=High)	Road Use (3=Low, 1=High)	Ranking (PC+(30*ME)+(10*RU))=	Notes
Howards Point Road	83%	3	1	183	MSA
Park Lane	73%	3	2	183	
Club Lane	64%	3	3	184	
Country Club Road	85%	3	1	185	MSA
Old Market Road	85%	3	1	185	MSA
Lake Linden Drive	85%	3	1	185	MSA
Star Circle	65%	3	3	185	
McKinley Court	65%	3	3	185	
Wooden Cleek Drive	76%	3	2	186	
Arbor Creek Lane	66%	3	3	186	
Sunnyvale Lane	67%	3	3	187	
Lake Virginia Drive	67%	3	3	187	
Fatima Place	68%	3	3	188	
Deer Ridge	68%	3	3	188	
Kathleen Court	70%	3	3	190	
Radisson Entrance	70%	3	3	190	
Timber Lane	72%	3	3	192	
Harding Avenue	72%	3	3	192	
Shady Island Point	72%	3	3	192	
Wiltsey Lane	73%	3	3	193	
Grant Lorenz Road	93%	3	1	193	
62nd Street West	93%	3	1	193	
Mary Lake Trail	74%	3	3	194	
Harding Lane	75%	3	3	195	
Excelsior Boulevard	95%	3	1	195	
Kelsey Drive	75%	3	3	195	
Chestnut Terrace	75%	3	3	195	
Christopher Road	76%	3	3	196	
Covington Road	96%	3	1	196	MSA
Galpin Lake Road	96%	3	1	196	MSA
Smithtown Way	76%	3	3	196	
Blue Ridge Lane	76%	3	3	196	
Sweetwater Curve	87%	3	2	197	
Lakeway Terrace	77%	3	3	197	
3rd Avenue	97%	3	1	197	
Sweetwater Court	77%	3	3	197	
Birch Bluff Road	97%	3	1	197	MSA
Fairway Drive	78%	3	3	198	
Mill Street	98%	3	1	198	
Virginia Cove	78%	3	3	198	

**Table E.4 (Pavement Condition - Weighted Ranking Order)**

Road Name	Pavement Condition (Vaisala)	Maintenance Effort (3=Low, 1=High)	Road Use (3=Low, 1=High)	Ranking (PC+(30*ME)+(10*RU))=	Notes
Strawberry Lane	99%	3	1	199	
Valleywood Lane	79%	3	3	199	
Wedgewood Drive	89%	3	2	199	
Club Valley Road	90%	3	2	200	
Pleasant Avenue	80%	3	3	200	
Mayflower Road	90%	3	2	200	
Mann Lane	91%	3	2	201	
Wood Drive	81%	3	3	201	
Near Mountain Boulevard	91%	3	2	201	
Shady Island Trail	81%	3	3	201	
McKinley Place	82%	3	3	202	
Niblick Alcove	82%	3	3	202	
Silver Lake Trail	94%	3	2	204	
Lake Linden Court	84%	3	3	204	
Ayrshire Lane	94%	3	2	204	
Cardinal Drive	95%	3	2	205	
Chaska Road	95%	3	2	205	
Murray Street	95%	3	2	205	
Wood Duck Circle	85%	3	3	205	
Woodside Road	95%	3	2	205	
Brassie Circle	85%	3	3	205	
Enchanted Cove	85%	3	3	205	
Academy Avenue	96%	3	2	206	
Maple Street	86%	3	3	206	
Teal Circle	86%	3	3	206	
Charleston Circle	86%	3	3	206	
Parkview Lane	86%	3	3	206	
Seamans Drive	97%	3	2	207	
Bentgrass Way	87%	3	3	207	
Oak Ridge Circle	87%	3	3	207	
Echo Road	97%	3	2	207	
Tee Trail	87%	3	3	207	
Glen Road	97%	3	2	207	
Sweetwater Circle	88%	3	3	208	
Lilac Lane	88%	3	3	208	
Summit Avenue	88%	3	3	208	
Christmas Lane	88%	3	3	208	
Murray Hill Road	88%	3	3	208	
Garden Road	89%	3	3	209	
Sierra Circle	89%	3	3	209	

**Table E.4 (Pavement Condition - Weighted Ranking Order)**

Road Name	Pavement Condition (Vaisala)	Maintenance Effort (3=Low, 1=High)	Road Use (3=Low, 1=High)	Ranking (PC+(30*ME)+(10*RU))=	Notes
Meadowview Road	89%	3	3	209	
Church Road	90%	3	3	210	
Dellwood Lane	90%	3	3	210	
Enchanted Drive	90%	3	3	210	
Brand Circle	90%	3	3	210	
Shady Island Road	91%	3	3	211	
Shady Hills Circle	92%	3	3	212	
Murray Court	92%	3	3	212	
Idlewild Path	93%	3	3	213	
Mallard Lane	93%	3	3	213	
Star Lane	93%	3	3	213	
Boulder Circle	94%	3	3	214	
Riviera Lane	94%	3	3	214	
Woodside Lane	94%	3	3	214	
Christmas Lake Road	95%	3	3	215	
Park Street	95%	3	3	215	
Bracketts Road	95%	3	3	215	
Spruce Hill Court	95%	3	3	215	
Amlee Road	96%	3	3	216	
Prestwick Court	96%	3	3	216	
Manitou Lane	96%	3	3	216	
Oakview Court	97%	3	3	217	
Shady Island Circle	97%	3	3	217	
Shorewood Lane	97%	3	3	217	
Enchanted Lane	97%	3	3	217	
Lee Circle	97%	3	3	217	
Gideons Lane	97%	3	3	217	PRIVATE
Alexander Lane	97%	3	3	217	
Peach Circle	98%	3	3	218	
Strawberry Court	99%	3	3	219	