

NOACA will STRENGTHEN regional cohesion, PRESERVE existing infrastructure and BUILD a sustainable multimodal transportation system to SUPPORT economic development and ENHANCE the quality of life in Northeast Ohio



ROADWAY PAVEMENT MAINTENANCE REPORT



2020



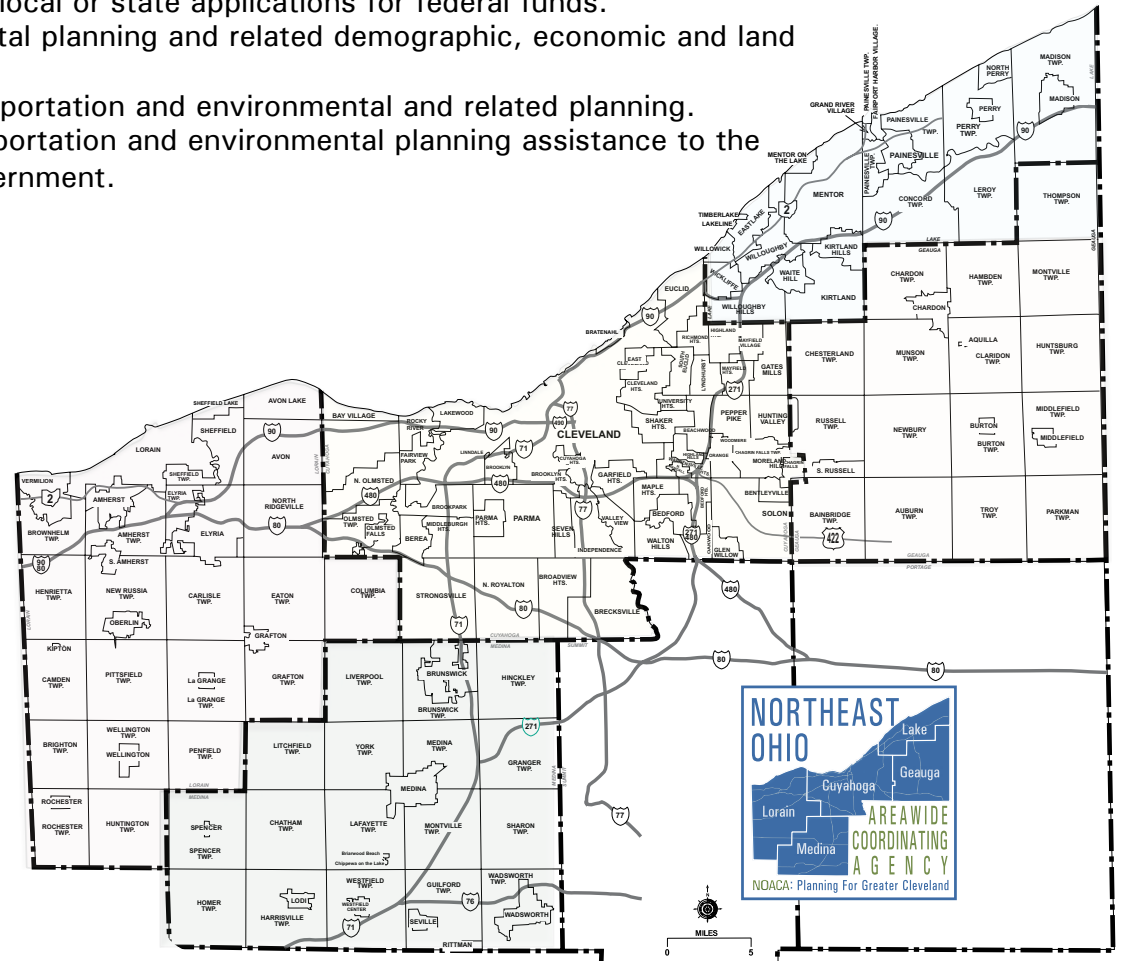
CITY OF NORTH RIDGEVILLE

The **Northeast Ohio Areawide Coordinating Agency (NOACA)** is a public organization serving the counties of and municipalities and townships within Cuyahoga, Geauga, Lake, Lorain and Medina (covering an area with 2.1 million people). NOACA is the agency designated or recognized to perform the following functions:

- Serve as the Metropolitan Planning Organization (MPO), with responsibility for comprehensive, cooperative and continuous planning for highways, public transit, and bikeways, as defined in the current transportation law.
- Perform continuous water quality, transportation-related air quality and other environmental planning functions.
- Administer the area clearinghouse function, which includes providing local government with the opportunity to review a wide variety of local or state applications for federal funds.
- Conduct transportation and environmental planning and related demographic, economic and land use research.
- Serve as an information center for transportation and environmental and related planning.
- As directed by the Board, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.

The NOACA Board of Directors is composed of 46 local public officials. The Board convenes quarterly to provide a forum for members to present, discuss and develop solutions to local and areawide issues and make recommendations regarding implementation strategies. As the area clearinghouse for the region, the Board makes comments and recommendations on applications for state and federal grants, with the purpose of enhancing the region's social, physical, environmental and land use/transportation fabric. NOACA invites you to take part in its planning process. Feel free to participate, to ask questions and to learn more about areawide planning.

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TABLE OF CONTENTS

1. Executive Summary	2
2. Background	3
3. Definitions for Pavement Maintenance Terminology.....	5
4. PART I: 2020 Pavement Condition	10
5. PART II: 2020 Current Backlog.....	16
6. PART III: Maintenance & Rehabilitation (M&R) Program.....	17
7. PART IV: Comparative Analysis.....	20
8. Appendix	24

MAPS

1: City of North Ridgeville Location in the NOACA Region	4
2: 2020 City of North Ridgeville Pavement Condition	12

FIGURES

1: Components of Pavement Preservation	5
2: A General Schematic for Timing of Pavement Preservation Components	6
3: 2020 North Ridgeville Pavement Network Condition Chart by Lane-Miles.....	11
4: The PCR Acceptable Level and “Need Year” Relation	17
5: A Typical Decision Tree Applied for Pavement Maintenance	19
6: Average PCR Comparison by the Constraint Scenarios and by Year.....	22

TABLES

1: Selected Pavement Treatments and their Planning Level Costs	8
2: 2020 North Ridgeville Pavement Network Condition	10
3: 2020 City of North Ridgeville Pavement Condition Listing.....	13
4: Performance Comparison of the Constraint Scenarios.....	21

APPENDIX

The “2020 Current Backlog” Pavement Treatment List.....	24
The “Maintain 15% Deficiency” Pavement Treatment List	25
The “Maintain an Average Network PCR of 80” Pavement Treatment List	29
The “M&R” Program Pavement Treatment List	32
The “Maintain Lowest Standard PCR” Pavement Treatment List	36

EXECUTIVE SUMMARY

The current Ohio Department of Transportation (ODOT) pavement database has 3,659 segment records for the Northeast Ohio Areawide Coordinating Agency (NOACA) region. The NOACA region has a total of 3,344 centerline miles of roadways including freeways and federal-aid highways which is equivalent to 8,240 lane-miles. The 2020 all road types network average Pavement Condition Rating (PCR) is about 75.

In the City of North Ridgeville there are 37.93 centerline miles of federal-aid roads, which are equivalent to 80.60 lane-miles within the city boundary that include the US Route 20 (US 20)/State Route 113 (SR 113), State Route 83 (SR 83), and State Route 10 (SR 10). The current ODOT pavement database has 49 segment records for the City of North Ridgeville roadway system. Each record comprises of several fields of various information and measures such as street name, length (miles), lane-miles length, number of lanes, function class, PCR, etc.

According to the PCR measure, 43 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition. About 27 percent of pavements are in the “Poor” to “Fair to Poor” status and demand some kind of immediate preventive maintenance and/or rehabilitation treatments.

This pavement study includes four parts:

- Part I: The 2020 Pavement Network Condition
- Part II: The 2020 Backlog
- Part III: The Maintenance and Rehabilitation (M&R) Program
- Part IV: The Comparative Analysis

Considering the five-year study period of 2020 - 2024, this pavement study focuses on the required preventive maintenance treatments and some rehabilitation techniques rather than reconstruction.

Part I of this study analyzes the 2020 pavement network condition and tabulates the important information of all the 49 road segments in the City of North Ridgeville.

In Part II, the Backlog is defined as the cost of pavement rehabilitation of all roads within one year (2020) and bringing the average network PCR to 80. Backlog is a “snapshot” or relative measure of outstanding rehabilitation work.

Part III introduces the optimal preventive maintenance and rehabilitation strategy for each segment and its recommended implementation year based on the NOACA maintenance decision tree.

Finally, Part IV compares the Backlog and the “M&R” program with the NOACA transportation asset management strategies. All these strategies were compared regarding their costs, the average network PCR and percent of the lane-miles below the acceptable level.

BACKGROUND

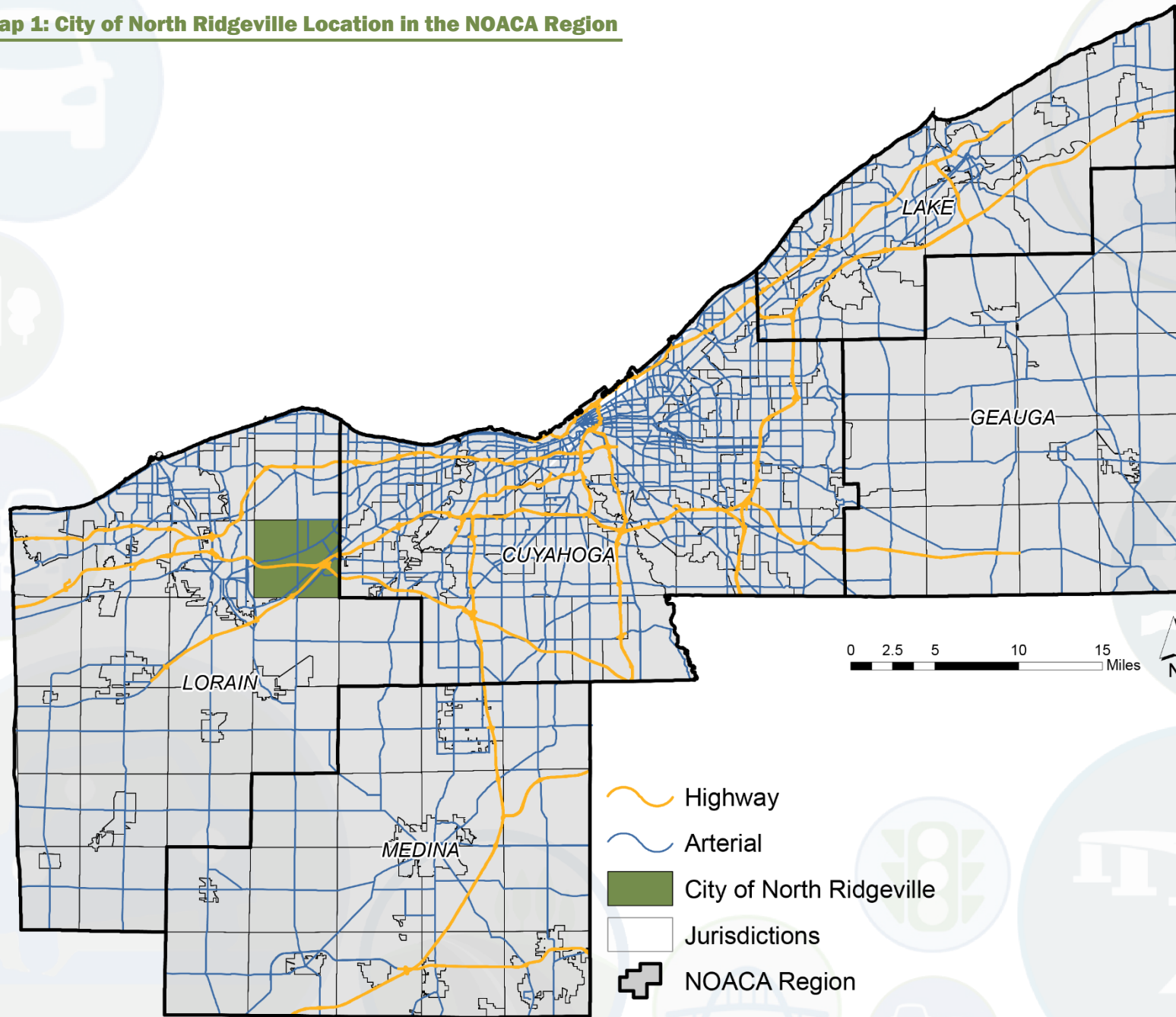
North Ridgeville is a city located along the eastern border of Lorain County, Ohio. The first settlement of what is now North Ridgeville was made in 1810. The village was named for a ridge near the original town site.

According to 2020 Northeast Ohio Areawide Coordinating Agency (NOACA) estimates, the population of city is 35,040 and there are 13,597 households. The 2020 estimated employment number is 10,474.

The City of North Ridgeville includes the Ohio Turnpike (I 80), Interstate 480 (I 480), US Route 20 (US 20)/State Route 113 (SR 113), State Route 83 (SR 83), and State Route 10 (SR 10). Cleveland-Hopkins International Airport is the nearest airport.

Map 1 illustrates the City of North Ridgeville location in the NOACA region.

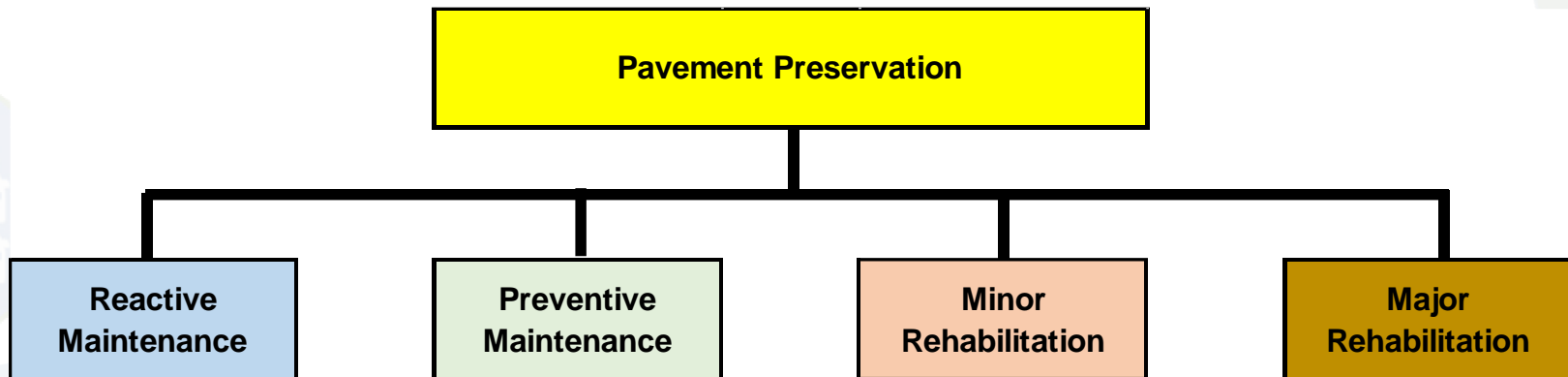
Map 1: City of North Ridgeville Location in the NOACA Region



DEFINITIONS FOR PAVEMENT MAINTENANCE TERMINOLOGY

Pavement Preservation is "a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations. A pavement preservation program consists primarily of four components: Reactive Maintenance, Preventive Maintenance, Minor Rehabilitation, and Major Rehabilitation/ Reconstruction as shown in Figure 1.

Figure 1: Components of Pavement Preservation



Reactive Maintenance is also known as routine or corrective maintenance consists of work that is performed to respond to specific conditions and deficiencies on pavements that are distressed and possibly unsafe. These activities are not planned in advance and seldom improve the pavement system performance in a long term.

Preventive Maintenance is considered as cost effective treatments to an existing roadway system and its appurtenances that preserves the system, delays future deterioration, and maintains or improves the functionality condition of the system without increasing structural capacity.

Pavement Rehabilitation is defined as resurfacing, restoration, and rehabilitation (3R) work consisting of structural enhancements that extend the service life of an existing pavement and/or improve its structural capacity. Rehabilitation techniques include restoration treatments and/or structural overlays. This may include partial recycling of the existing pavement, placement of additional surface materials, and/or other work necessary to return an existing pavement to a condition of structural or functional adequacy.

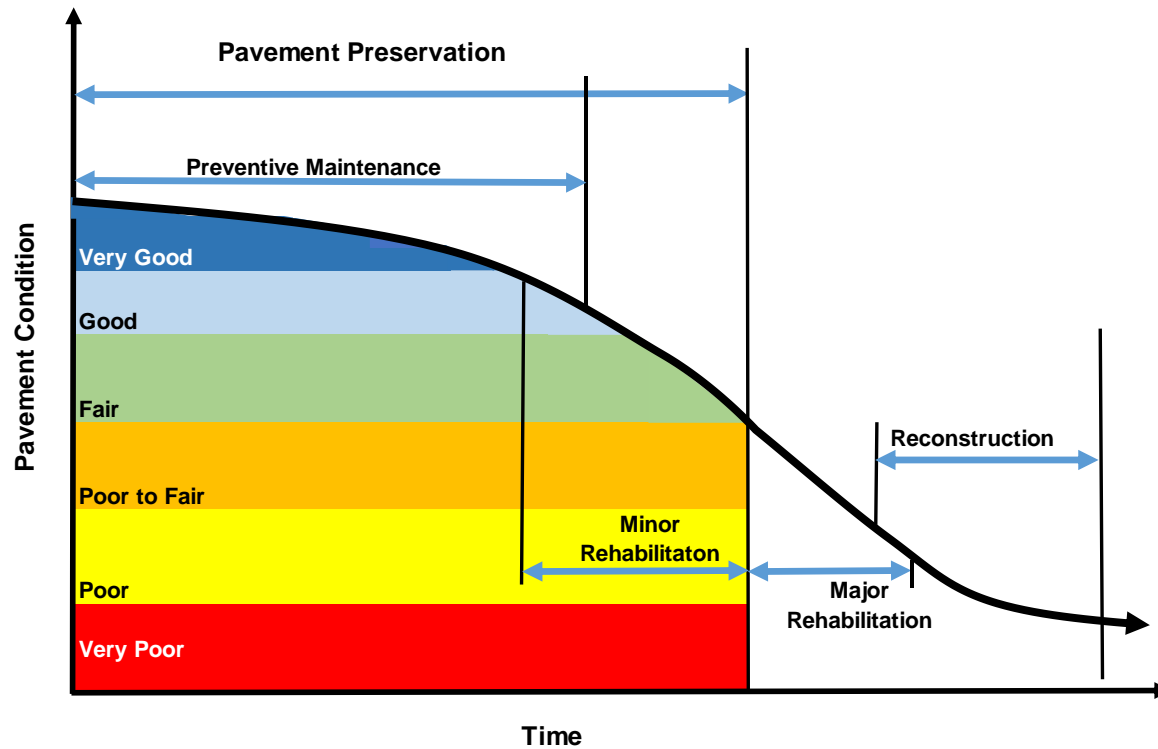
Minor Rehabilitation consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develop in flexible pavements due to environmental exposure. Because of the non-structural nature of minor rehabilitation techniques, these types of rehabilitation techniques are placed in the category of pavement preservation.

Major Rehabilitation consists of structural enhancements that both extend the service life of an existing pavement and/or improve its load-carrying capability.

Pavement Reconstruction is defined as the replacement or reestablishment of the original pavement structural capacity by the placement of the equivalent or increased pavement structure. Reconstruction may utilize either new or recycle materials for the reconstruction of the complete pavement structure.

Figure 2 illustrates a general schematic for the timing of the pavement preservation Components.

Figure 2: A General Schematic for Timing of Pavement Preservation Components



Selected Pavement Treatments

Chip Seals is a two-step process which includes first an application of asphalt emulsion and then a layer of crushed rock to an existing asphalt pavement surface. A chip seal gets its name from the “chips” or small crushed rock placed on the surface.

Microsurfacing is similar to slurry seal. It consists of the application of a mixture of water, asphalt emulsion, aggregate (very small crushed rock), and chemical additives to an existing asphalt concrete pavement surface. Polymer is commonly added to the asphalt emulsion to provide better mixture properties. The major difference between slurry seal and microsurfacing is in how they “break” or harden. Slurry relies on evaporation of the water in the asphalt emulsion. The asphalt emulsion used in microsurfacing contains chemical additives which allow it to break without relying on the sun or heat for evaporation to occur. Thus, microsurfacing is an application that hardens quicker than slurry seals and can be used when conditions would not allow slurry seal to be successfully placed. Streets that have a lot of shade and streets that have a lot of traffic are good candidates for microsurfacing.

Thin Overlays (1” – 1½” of asphalt) and ultra thin overlays (less than 1”) offer an economical resurfacing, preservation and renewal paving solution for roads requiring safety and smoothness improvements. Thin asphalt overlays not only provide a new pavement surface for a fraction of the cost of rebuilding a roadway, but they are the only preventive maintenance technique that adds structural value while helping to extend a pavement’s service life.

Patching is the process of filling potholes or excavated areas in the asphalt pavement. Quick repair of potholes or other pavement disintegration helps control further deterioration and expensive repair of the pavement.

Pavement Milling consists of removing the existing surface layer with a milling machine and then transporting the material to a storage facility. New asphalt plant mix, often containing some recycled asphalt pavement (RAP), is installed to replace the milled out material. Milling can also remove distresses from the surface, providing a better driving experience and/or longer roadway life.

Full-Depth Reclamation is an in-place recycling method for reconstruction of existing flexible pavements using the existing pavement section material as the base for the new roadway-wearing surface. This process can include adding chemicals to the base layer in order to increase its strength capacity. The treatment of the base layer and recycled asphalt provides a stronger foundation for present and future traffic. This process effectively produces a cost-effective solution that maximizes limited budgets.

Joint Sealing is to minimize infiltration of surface water and in compressible material into the joint system. Sealants can also reduce dowel bar corrosion potential by reducing entrance of de-icing chemicals.

Load Transfer Retrofit involves the installation of dowel bars into existing concrete pavement to provide load transfer across transverse cracks or joints. Dowel bars are short steel bars that provide a mechanical connection between slabs without restricting horizontal joint movement. They increase load transfer efficiency by allowing the leave slab to assume some of the load before the load is actually over it. This reduces joint deflection and stress in the approach and leave slabs.

Partial-Depth Repairs are defined as the removal and replacement of small areas of deteriorated (or spalled) concrete, typically in joints or cracks. The depth of deterioration can vary from a few millimeters to the full depth of the pavement.

Full-Depth Repair is a concrete pavement restoration (CPR) technique that can be used to restore the structural integrity and ride ability to concrete pavements having certain types of distresses. It involves making lane-width, full-depth saw cuts to remove the deteriorated concrete down to the base, repairing the disturbed base, installing load-transfer devices, and refilling the excavated area with new concrete. It is an effective, permanent treatment to repair pavement distresses particularly those that occur at or near joints and cracks. By removing and replacing isolated areas of deterioration, full-depth repairs may delay or stop further deterioration and restore the pavement close to its original condition. The distresses that can be addressed using full-depth repairs include transverse cracking, corner breaks, longitudinal cracking, deteriorated joints, D-Cracking, blowups, and punch outs.

Table 1 illustrates the typical planning level costs of the above selected treatments.

Table 1: Selected Pavement Treatments and their Planning Level Costs

Treatments for Asphalt Pavements	Typical Cost per SQ FT (2020\$)	Estimated Cost per 12- FT Lane-Mile (2020\$)	Preservation Component
Crack Sealing, Rejuvenators, Chip Sealing	0.09	5,700	Preventive Maintenance
Microsurfacing, Slurry Seal	0.26	16,500	
Partial Depth Patching, Chip & Seal / Micro-Surface with Partial Depth Patch, Full Depth Patching	0.43	27,200	
Thin Hot Mix Asphalt Overlays without Milling	0.54	34,200	
Pavement Milling	0.78	49,400	Minor Rehabilitation
Full-Depth Reclamation	1.77	112,100	Major Rehabilitation

Table 1: Selected Pavement Treatments and their Planning Level Costs (Continued)

Treatments for Concrete Pavements	Typical Cost per SQ FT (2020\$)	Estimated Cost per 12- FT Lane-Mile (2020\$)	Preservation Component
Cleaning and Sealing of Joint and Cracks	0.11	7,000	Preventive Maintenance
Load Transfer Retrofit	0.40	25,300	
Partial Depth Repair	1.50	95,000	Minor Rehabilitation
Full-Depth Repair	2.07	131,100	Major Rehabilitation

Maintaining the roadways in a state of good repair is essential and experience has shown that, over time it is less expensive to invest in preventive maintenance and/or rehabilitation in an ongoing basis rather than in a high cost reconstruction of pavement that has deteriorated to a poor condition.

This pavement preservation study analyzes the current status of the North Ridgeville pavement network condition and considers the five-year study period of 2020-2024. It mainly focuses on the required roadway pavement preventive maintenance treatments and some rehabilitation techniques rather than reconstruction. The current Ohio Department of Transportation (ODOT) pavement database was used as the input data and RoadMatrix software was utilized as the NOACA Pavement Management platform.

This report includes the following four parts:

- I. The 2020 status of the North Ridgeville pavement network condition,
- II. The 2020 “Backlog” treatment list,
- III. The optimal preventive maintenance and rehabilitation strategies, and
- IV. The comparative analysis.

PART I: 2020 PAVEMENT CONDITION

In order to provide an accurate assessment of the current status and further pavement analyses, the pavement network is required to be divided into homogeneous discrete sections in terms of surface distress, traffic volumes, pavement structure, etc. The current ODOT pavement database has 49 segment records for the City of North Ridgeville roadway system. Each record comprises of several fields of various information and measures such as street name, length (miles), lane-miles length, number of lanes, function class, Pavement Condition Rating (PCR), etc.

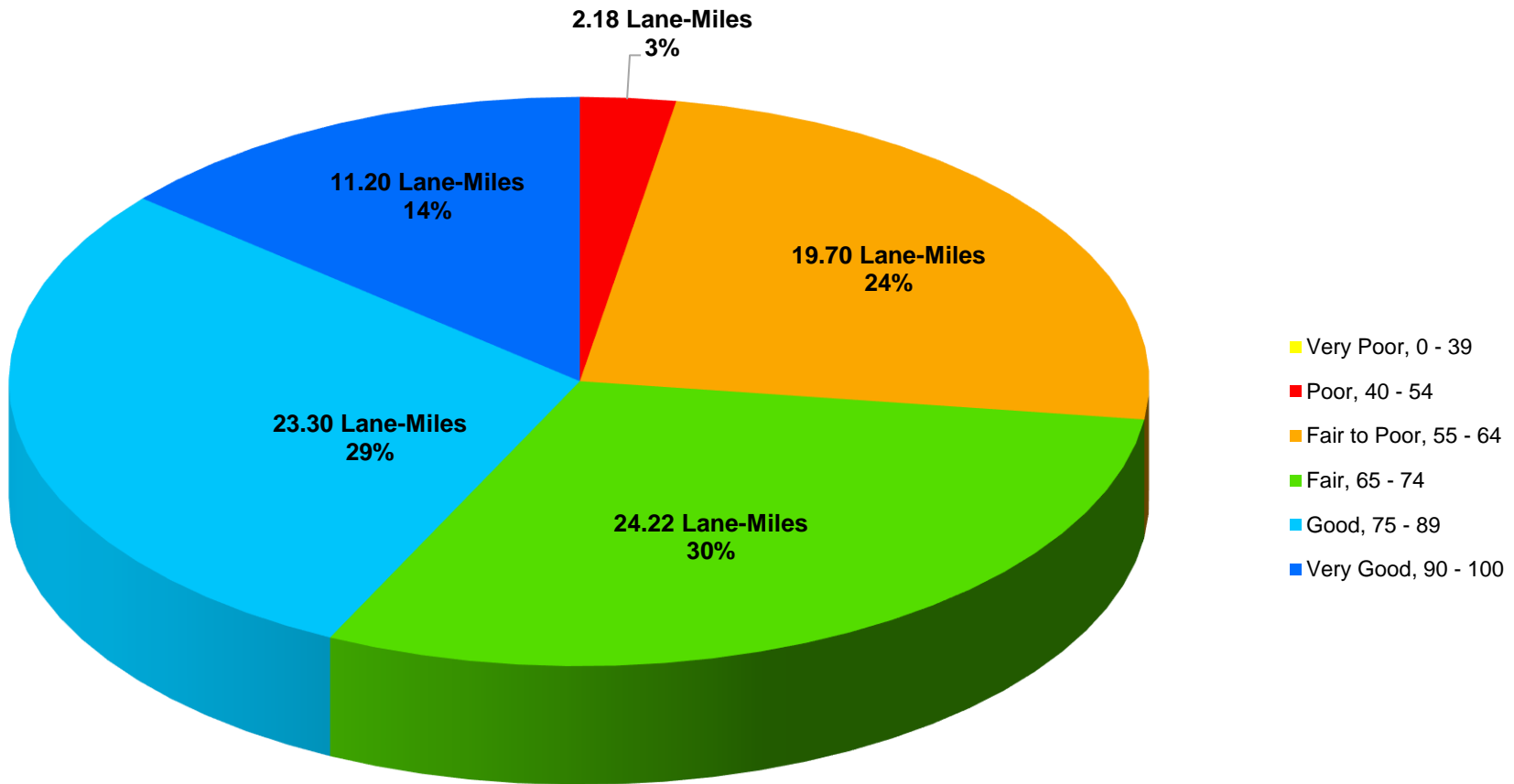
Based on the utilized ODOT database, there are 37.93 centerline miles of federal-aid eligible roads which are equivalent to 80.60 lane-miles in the City of North Ridgeville. The total area of roadway is 5,370,075 Sq. Ft.

The PCR measure is a qualitative description of the structural state of the pavement. The PCR values span a spectrum of descriptive narrative ranging from “Very Good” to “Very Poor”. Each roadway segment is scored from 0 to 100 with 0 representing completely distressed pavement and 100 indicating perfect pavement condition. The lane-miles weighted average of the City of North Ridgeville segments PCRs is about 74. Table 2 and Figure 3 summarize the 2020 North Ridgeville pavement network condition by percentages of roadway lane-miles length.

Table 2: 2020 North Ridgeville Pavement Network Condition

Pavement Condition	PCR Range	Lane-Miles	Percent of Lane-Miles
Very Poor	0 - 39	0.00	0%
Poor	40 - 54	2.18	3%
Fair to Poor	55 - 64	19.70	24%
Fair	65 - 74	24.22	30%
Good	75 - 89	23.30	29%
Very Good	90 - 100	11.20	14%

Figure 3: 2020 North Ridgeville Pavement Network Condition Chart by Lane-Miles



As indicated, 43 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition” condition and the lane-miles weighted average PCR also represents a “Fair” condition. About 27 percent of pavements are in the “Poor” to “Fair to Poor” status and demand some kind of immediate maintenance and rehabilitation treatments.

Map 2 illustrates the 2020 North Ridgeville roadway pavement condition for each segment record and Table 3 tabulates the 2020 North Ridgeville pavement condition listing.

Map 2: 2020 City of North Ridgeville Pavement Condition



Table 3: 2020 City of North Ridgeville Pavement Condition Listing

ROAD NAME	FROM	TO	FUNC CLASS	LANE-MILES	PCR
BAGLEY RD	LORAIN RD	OHIO TURNPIKE (I-80)	MINOR ARTERIAL	1.94	77
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	MINOR ARTERIAL	0.44	72
BAINBRIDGE RD	AVON BELDEN RD (SR-83)	CHESTNUT RIDGE RD	MAJOR COLLECTOR	3.38	76
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	MAJOR COLLECTOR	4.66	72
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN COUNTY ECL	MAJOR COLLECTOR	2.40	72
CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80) OVERPASS	BAINBRIDGE RD	MAJOR COLLECTOR	1.24	83
CHESTNUT RIDGE RD	ROOT RD	OHIO TURNPIKE (I-80) OVERPASS	MAJOR COLLECTOR	1.08	82
COOK RD	LORAIN COUNTY ECL	LORAIN RD (SR-10)	MAJOR COLLECTOR	0.70	79
LEAR NAGLE RD	0.1 MI S OF CENTER RIDGE RD (US-20)	CENTER RIDGE RD (US-20)	MAJOR COLLECTOR	0.20	98
LEAR NAGLE RD	ADELE ST	MILLS RD	MINOR ARTERIAL	0.56	79
LEAR NAGLE RD	CENTER RIDGE RD (US-20)	N LEAR NAGLE RD	MINOR ARTERIAL	0.34	84
LEAR NAGLE RD	N LEAR NAGLE RD	ADELE ST	MINOR ARTERIAL	1.60	88
LEAR NAGLE RD	SR-10 (LORAIN RD)	US-20 (CENTER RIDGE RD)	MAJOR COLLECTOR	2.40	97
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	MINOR ARTERIAL	1.80	60
LORAIN RD	BAGLEY RD	S OF OHIO TURNPIKE (I-80)	MINOR ARTERIAL	1.36	77
LORAIN RD	ISLAND RD	BAGLEY RD	MINOR ARTERIAL	2.24	77
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	MINOR ARTERIAL	0.50	68
LORAIN RD	S OF OHIO TURNPIKE (I-80)	OHIO TURNPIKE (I-80) NORTH RAMPS	MINOR ARTERIAL	0.50	68
MILLS RD	AVON BELDEN RD (SR-83)	JAYCOX RD	MAJOR COLLECTOR	1.28	89

Table 3: 2020 City of North Ridgeville Pavement Condition Listing (Continued)

ROAD NAME	FROM	TO	FUNC CLASS	LANE-MILES	PCR
MILLS RD	JAYCOX RD	LEAR NAGLE RD	MAJOR COLLECTOR	1.76	77
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	MAJOR COLLECTOR	2.44	56
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	MAJOR COLLECTOR	0.18	55
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	MINOR ARTERIAL	1.22	60
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	MINOR ARTERIAL	0.72	70
ROOT RD	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	MINOR ARTERIAL	1.56	55
ROOT RD	REED RD	LORAIN RD	MINOR ARTERIAL	1.32	64
ROOT RD	SPRAGUE RD	REED RD	MINOR ARTERIAL	2.04	63
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	MAJOR COLLECTOR	0.88	59
SPRAGUE RD	ROOT RD	LORAIN COUNTY ECL	MINOR ARTERIAL	0.68	75
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	MINOR ARTERIAL	0.76	60
SR 10	0.15 MI N OF OHIO TURNPIKE (I-80)	0.14 MI S OF VICTORY LN	MINOR ARTERIAL	0.80	98
SR 10	I-480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	PRINCIPAL ARTERIAL-OTHER	0.48	63
SR 10	LEAR NAGLE RD / COOK RD	I-480 SOUTH RAMPS	MINOR ARTERIAL	0.52	97
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	PRINCIPAL ARTERIAL-OTHER	0.48	66
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	MINOR ARTERIAL	1.00	93
SR 83	BUTTERNUT RIDGE RD	CHESTNUT RIDGE RD	MINOR ARTERIAL	0.94	90
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	MINOR ARTERIAL	3.96	57
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	MINOR ARTERIAL	1.58	57

Table 3: 2020 City of North Ridgeville Pavement Condition Listing (Continued)

ROAD NAME	FROM	TO	FUNC CLASS	LANE-MILES	PCR
SR 83	LORAIN RD	HEDGEROW PARK DR	MINOR ARTERIAL	0.72	76
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	MINOR ARTERIAL	1.48	60
SR 83	PATRICIA AVE	AVON BELDEN RD (SR-83)	MINOR ARTERIAL	0.30	96
SR 83	SUGAR RIDGE RD	OHIO TURNPIKE (I-80)	MINOR ARTERIAL	1.48	72
STONE RIDGE RD	CENTER RIDGE RD (US-20)	STONE CREEK DR	MAJOR COLLECTOR	1.96	85
STONE RIDGE RD	STONE CREEK DR	MILLS RD	MAJOR COLLECTOR	2.70	68
SUGAR RIDGE RD	0.3 MI SOUTHWEST OF RACE RD	SR-83 (AVON BELDEN RD)	MINOR ARTERIAL	3.52	72
SUGAR RIDGE RD	EAST BROAD ST	0.30 MI W OF RACE RD	MINOR ARTERIAL	2.18	52
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	PRINCIPAL ARTERIAL-OTHER	2.46	76
US 20	ELYRIA ECL	JAYCOX RD	PRINCIPAL ARTERIAL-OTHER	6.82	74
US 20	JAYCOX RD	E OF BROAD BLVD	PRINCIPAL ARTERIAL-OTHER	5.04	99

PART II: 2020 CURRENT BACKLOG

The Backlog is defined as the cost of pavement rehabilitation of all roads within the current year (2020) and bringing the average network PCR to 80. Backlog is a “snapshot” or relative measure of outstanding rehabilitation work. The Backlog not only represents how far behind the pavement network is in terms of its present physical condition, but also its cost value serves as a benchmark to measure the impact of various funding strategies. Additionally, the current Backlog offers a basis for comparison to future and/or past year’s Backlogs.

The Backlog strategy does not utilize any reconstruction treatment, but instead considers pavement preventive maintenance and rehabilitation treatments. This strategy achieves the average network PCR 80, and also maintains all the pavement conditions above the minimum acceptable level. In this study, the minimum acceptable PCR for the arterial roadway function class is 55 and for the major and minor collector is 50.

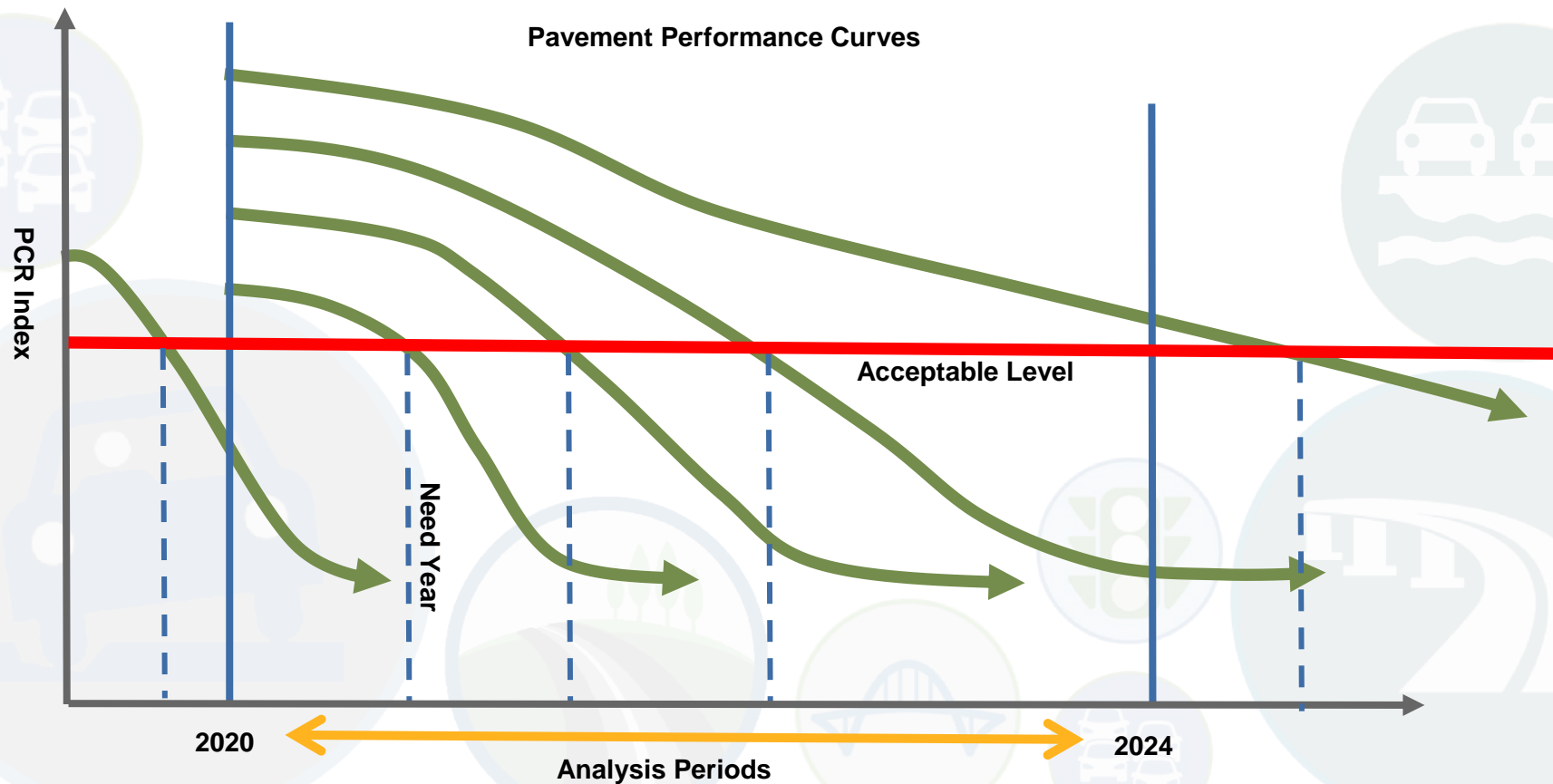
The Appendix includes all the recommended Backlog pavement treatments. As illustrated, the 2020 Backlog treatment list includes segments which their 2020 PCRs are below the minimum acceptable level and are recommended with various rehabilitation treatments. There are 13 segments in the 2020 Backlog list with the total of 21.40 lane-miles. The 2020 Backlog cost of the recommended treatments is about two million dollars.

PART III: MAINTENANCE & REHABILITATION (M&R) PROGRAM

In order to estimate the preventive maintenance and rehabilitation requirements of a pavement network over a period of time, the first step is to determine the “Need Year” or when a pavement segment requires rehabilitation. The “Need Year” of a pavement is defined as the year in which the pavement condition falls below a critical level. Pavement condition of a road segment deteriorates under traffic, climate, etc. and consequently its PCR value is reduced. Without any treatments and depending on the deteriorating factors, pavements perform differently and Figure 4 depicts the typical acceptable level and “Need Year” relation for several road segments. As shown, the definition of the acceptable level is a critical factor in determining the “Need Year” for any road segment.

In this study, the critical level is set by the minimum acceptable PCR. As mentioned earlier, In the NOACA region, the minimum acceptable PCR for the arterial roadway function class is 55 and for the major and minor collector is 50.

Figure 4: The PCR Acceptable Level and “Need Year” Relation



The second step is to determine any feasible preventive maintenance and/or rehabilitation strategies based on a decision tree approach. The “M&R” program determines the optimal preventive maintenance and rehabilitation strategy for each segment and its recommended implementation year based on the considered decision tree. The Appendix includes all the “M&R” treatments for the identified segments with the implementation year in the period of 2020 to 2024 and the “M&R” program cost includes all the deferred maintenance cost. Figure 5 shows a snapshot of a typical decision tree applied for maintenance of flexible pavements along major collectors.

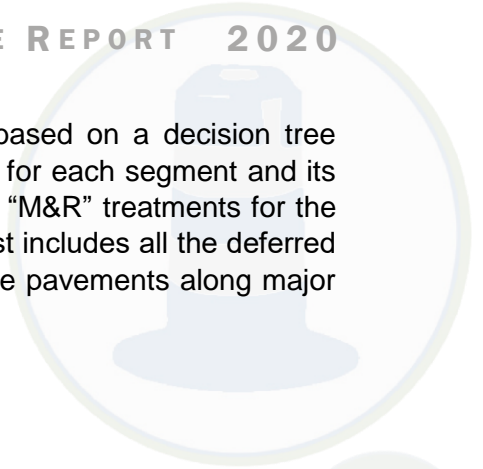
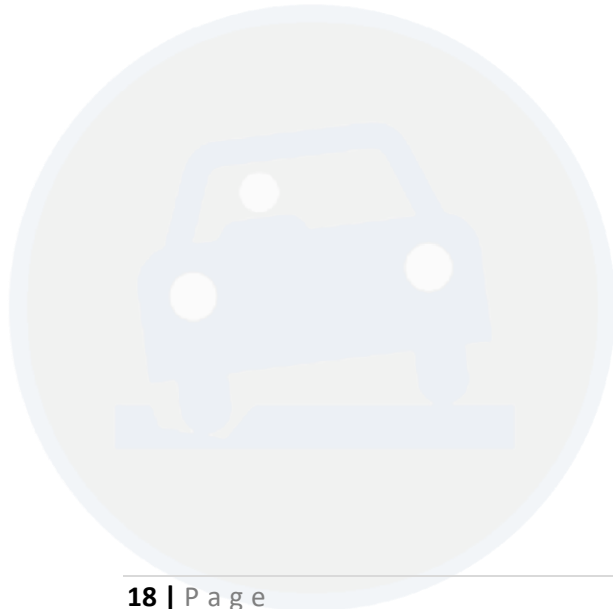
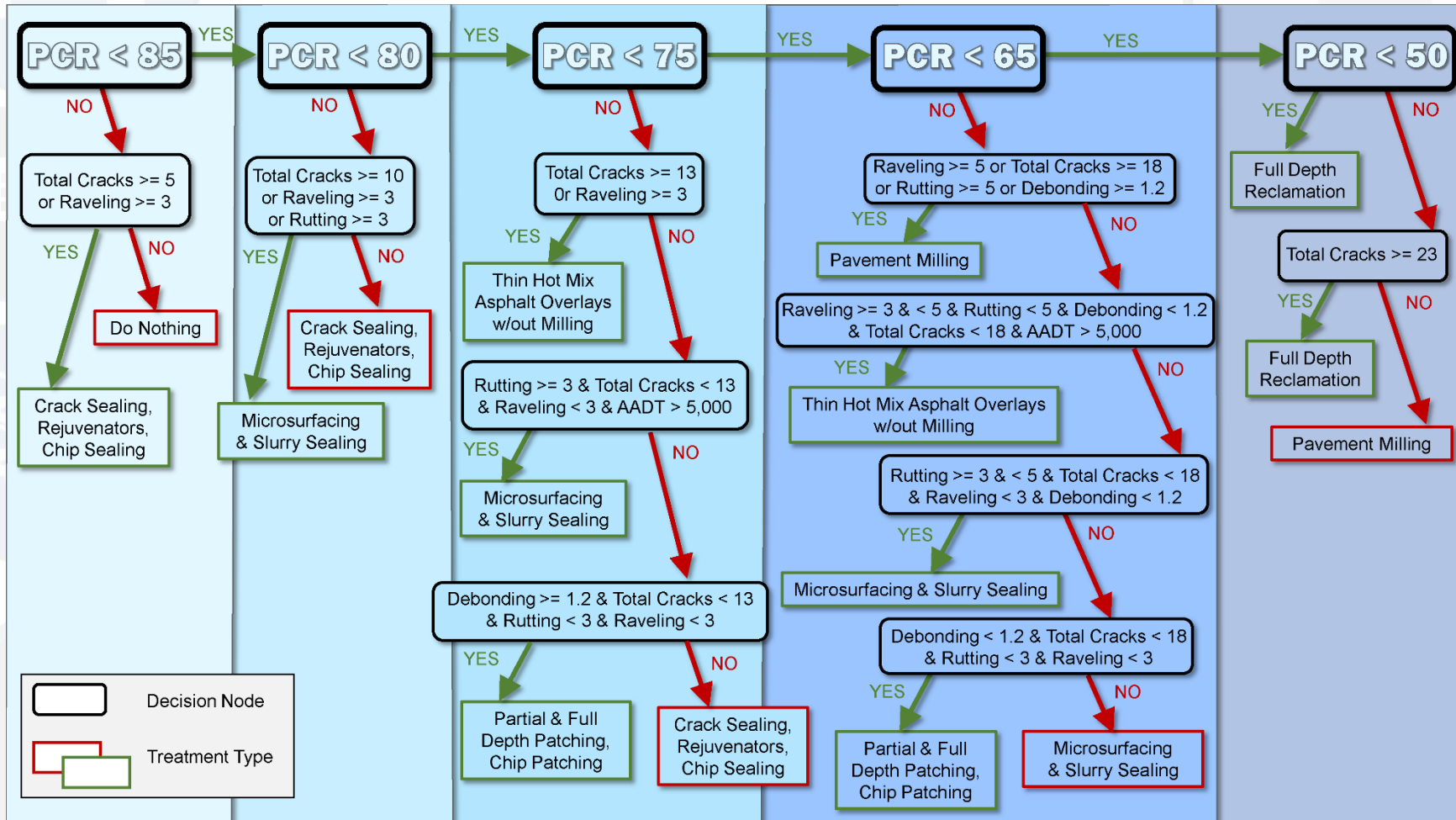


Figure 5: A Typical Decision Tree Applied for Pavement Maintenance



PART IV: COMPARATIVE ANALYSIS

The current NOACA transportation asset management policy includes two strategies

- Maintain 15% Deficiency: this strategy attempts to maintain the total lane-miles with PCR below the acceptable level no more than 15 percent.
- Maintain an Average Network PCR of 80: applies a set of maintenance treatments in order to keep the roadway network average PCR more than, or equal to 80 over the study period.

This section compares the discussed Backlog and the “M&R” program treatments with the NOACA transportation asset management strategies.

In addition to the above strategies, this comparative analysis considers another scenario as the minimum benchmark. The “Maintain Lowest Standard PCR” treatment strategy is based on the minimum PCR thresholds of 55 for arterials and 50 for collectors and a set of annual budget constraints. The annual budget constraints are calculated in three steps: First, the segments with the “M&R” recommended implementation in each specific analysis year are selected. Second, a subset of the selected segments which their “Need Years” are in the analysis period are identified. It should be noted that the selected segments with the “Need Year” beyond the analysis period are excluded from the budget constraint calculation. Third, the “M&R” treatment costs for the identified segments in the second step, are added together to provide an annual budget constraint for this scenario.

As discussed, all the above scenarios apply a decision tree approach to determine technically feasible maintenance and rehabilitation strategies for each segment requiring rehabilitation during the five-year period.

Table 4 summarizes the comparison results of all the above scenarios over the five-year period for the City of North Ridgeville. In this table, the “5-Year Total Required Dollars” column shows the accumulation of the annual costs over five years calculated based on inflation-adjusted dollars for each strategy. Also, the network average PCR is the lane-miles weighted average.

Table 4: Performance Comparison of the Constraint Scenarios

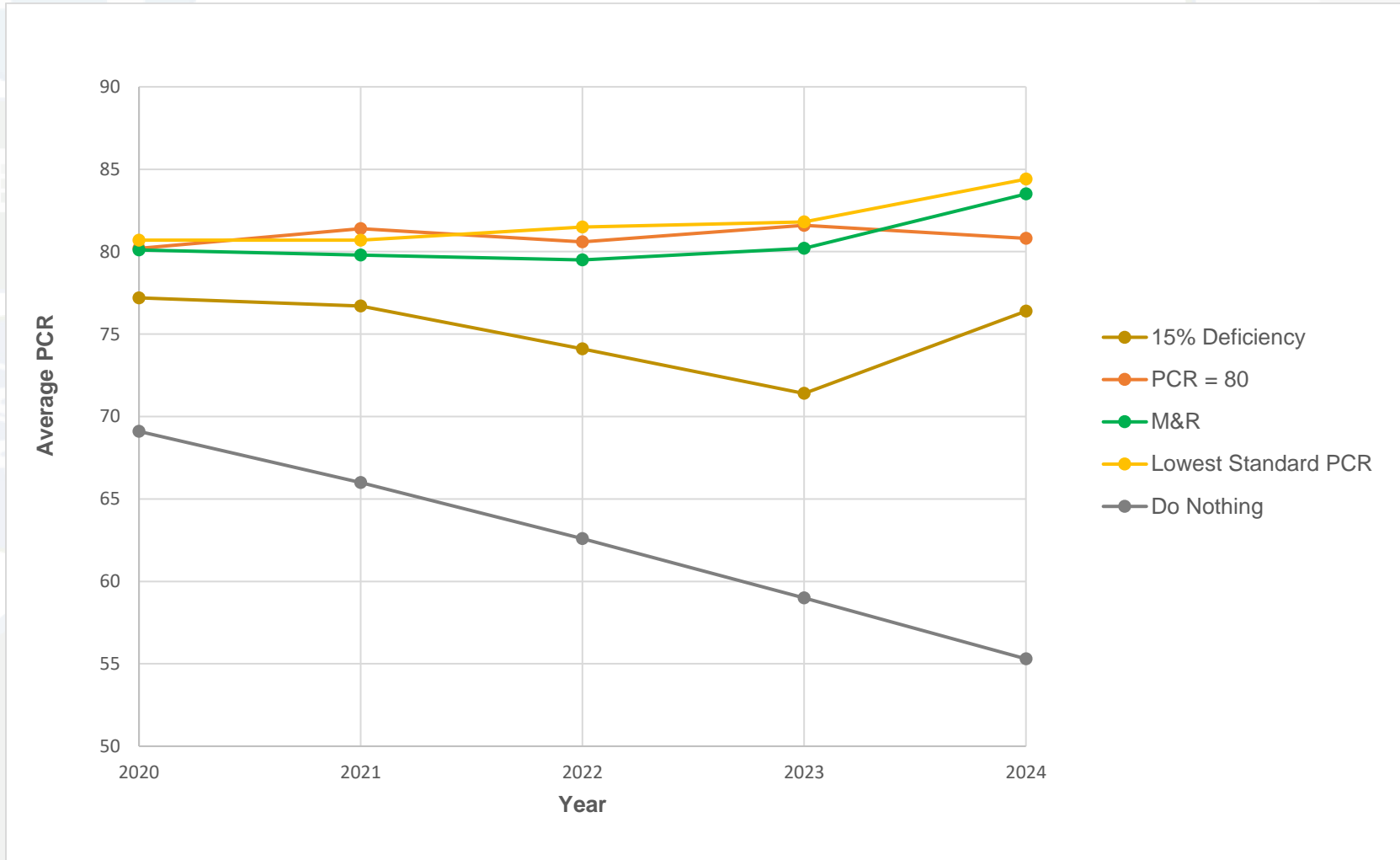
Maintenance Strategy	Strategy Group	5-Year Total Required Dollars	Network Average PCR	Network PCR at the End of the 5-Year Period	Percent of Pavement below the Minimum PCR
2020 Current Backlog	2020 Backlog	2,022,825	80.2	-	0%
Maintain 15% Deficiency	NOACA Transportation Asset Management Targets	3,544,707	75.2	76.4	13.5%
Maintain an Average Network PCR of 80		3,790,084	80.9	80.8	0%
M&R Program	Scenarios	4,477,170	80.6	83.5	0%
Maintain Lowest Standard PCR		4,473,029	81.8	84.4	0%

Note: The Backlog required budget is for the year of 2020 only.

The Appendix lists all the treatments with their implementation years in the period of 2020 to 2024 for the above maintenance strategies.

Figure 6 illustrates the annual network average PCR for the discussed maintenance and rehabilitation strategies. It should be noted that the Backlog scenario has only one value of 80.2 for 2020.

Figure 6: Average PCR Comparison by the Constraint Scenarios and by Year



As expected, the treatments of the “M&R” program maintain the pavement network condition with the highest network average PCR. This strategy requires a budget of over four million dollars during the analysis period.

Compared to the “M&R” program, the “Maintain Lowest Standard PCR” scenario provides almost the same level of condition with a similar budget requirement.

The “Maintain an Average Network PCR of 80” scenario requires a budget of about 3.8 million dollars, and its network average PCR is almost similar to the “M&R” program.

The “Maintain 15% Deficiency” scenario requires the lowest budget of about 3.5 million dollars, and maintains the network pavement condition at an acceptable level. Also, as the scenario name indicates, about 14 percent of pavements will be below the minimum acceptable PCR level.

It should be noted that the Backlog cost as the benchmark is about 45 percent of the “M&R” program budget, and both strategies have a similar network average PCR.

APPENDIX

The 2020 Current Backlog

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDATION TREATMENT	LANE-MILES	TREATMENT COST
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	FULL DEPTH RECLAMATION (FDR)	1.80	185,043
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	FULL DEPTH RECLAMATION (FDR)	2.44	228,033
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	FULL DEPTH RECLAMATION (FDR)	0.18	18,504
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	1.22	114,016
ROOT RD	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.56	145,791
ROOT RD	REED RD	LORAIN RD	PAVEMENT MILLING	1.32	54,363
ROOT RD	SPRAGUE RD	REED RD	PAVEMENT MILLING	2.04	84,015
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.88	82,241
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	FULL DEPTH RECLAMATION (FDR)	0.76	99,437
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	FULL DEPTH RECLAMATION (FDR)	3.96	444,104
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	FULL DEPTH RECLAMATION (FDR)	1.58	177,193
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.48	165,978
SUGAR RIDGE RD	EAST BROAD ST	0.30 MI W OF RACE RD	FULL DEPTH RECLAMATION (FDR)	2.18	224,107
REQUIRED BACKLOG BUDGET (2020\$)					\$2,022,825

The Maintain 15% Deficiency

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
COOK RD	LORAIN COUNTY ECL	LORAIN RD (SR-10)	PARTIAL & FULL DEPTH PATCHING, CHIP PATCHING	0.70	15,893	2020
LEAR NAGLE RD	CENTER RIDGE RD (US-20)	N LEAR NAGLE RD	CLEANING & SEALING OF JOINT AND CRACKS	0.34	2,765	2020
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	PAVEMENT MILLING	0.50	26,770	2020
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	PAVEMENT MILLING	0.72	29,652	2020
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	FULL DEPTH RECLAMATION (FDR)	0.76	99,437	2020
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	PAVEMENT MILLING	0.48	24,710	2020
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	FULL DEPTH RECLAMATION (FDR)	3.96	444,104	2020
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	FULL DEPTH RECLAMATION (FDR)	1.58	177,193	2020
SR 83	LORAIN RD	HEDGEROW PARK DR	PAVEMENT MILLING	0.72	35,583	2020
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.48	165,978	2020
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	PAVEMENT MILLING	2.46	182,362	2020
US 20	ELYRIA ECL	JAYCOX RD	PAVEMENT MILLING	6.82	505,575	2020
THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$1,710,022	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	PAVEMENT MILLING	0.44	18,610	2021
LEAR NAGLE RD	N LEAR NAGLE RD	ADELE ST	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.60	10,151	2021

The Maintain 15% Deficiency

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
MILLS RD	AVON BELDEN RD (SR-83)	JAYCOX RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.28	6,871	2021
ROOT RD	REED RD	LORAIN RD	FULL DEPTH RECLAMATION (FDR)	1.32	126,693	2021
ROOT RD	SPRAGUE RD	REED RD	FULL DEPTH RECLAMATION (FDR)	2.04	195,798	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$358,123	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	MICROSURFACING & SLURRY SEALING	0.44	6,720	2024
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	FULL DEPTH RECLAMATION (FDR)	4.66	484,479	2024
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	2.40	249,517	2024
CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80) OVERPASS	BAINBRIDGE RD	PARTIAL & FULL DEPTH PATCHING, CHIP PATCHING	1.24	37,582	2024
COOK RD	LORAIN COUNTY ECL	LORAIN RD (SR-10)	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.70	3,700	2024
LEAR NAGLE RD	CENTER RIDGE RD (US-20)	N LEAR NAGLE RD	CLEANING & SEALING OF JOINT AND CRACKS	0.34	3,076	2024
LEAR NAGLE RD	N LEAR NAGLE RD	ADELE ST	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.60	10,996	2024
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	FULL DEPTH RECLAMATION (FDR)	1.80	205,852	2024
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	MICROSURFACING & SLURRY SEALING	0.50	9,927	2024

The Maintain 15% Deficiency

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
LORAIN RD	S OF OHIO TURNPIKE (I-80)	OHIO TURNPIKE (I-80) NORTH RAMPS	FULL DEPTH RECLAMATION (FDR)	0.50	67,578	2024
MILLS RD	AVON BELDEN RD (SR-83)	JAYCOX RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.28	7,443	2024
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	1.22	126,838	2024
ROOT RD	REED RD	LORAIN RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.32	6,978	2024
ROOT RD	SPRAGUE RD	REED RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	2.04	10,784	2024
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.88	91,490	2024
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.76	5,625	2024
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.48	3,172	2024
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.00	7,401	2024
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	3.96	25,121	2024
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.58	10,023	2024
SR 83	LORAIN RD	HEDGEROW PARK DR	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.72	4,567	2024

The Maintain 15% Deficiency

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.48	9,389	2024
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	CRACK SEALING, REJUVENATORS, CHIP SEALING	2.46	23,408	2024
US 20	ELYRIA ECL	JAYCOX RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	6.82	64,896	2024
THE 2024 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$1,476,562	

Note: The “Maintain 15% Deficiency” strategy does not have any pavement maintenance treatments with the recommended implementation years of 2022 and 2023.

The Maintain an Average Network PCR of 80

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	FULL DEPTH RECLAMATION (FDR)	1.80	185,043	2020
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	FULL DEPTH RECLAMATION (FDR)	2.44	228,033	2020
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	FULL DEPTH RECLAMATION (FDR)	0.18	18,504	2020
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	1.22	114,016	2020
ROOT RD	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.56	145,791	2020
ROOT RD	REED RD	LORAIN RD	PAVEMENT MILLING	1.32	54,363	2020
ROOT RD	SPRAGUE RD	REED RD	PAVEMENT MILLING	2.04	84,015	2020
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.88	82,241	2020
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	FULL DEPTH RECLAMATION (FDR)	0.76	99,437	2020
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	FULL DEPTH RECLAMATION (FDR)	3.96	444,104	2020
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	FULL DEPTH RECLAMATION (FDR)	1.58	177,193	2020
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.48	165,978	2020
SUGAR RIDGE RD	EAST BROAD ST	0.30 MI W OF RACE RD	FULL DEPTH RECLAMATION (FDR)	2.18	224,107	2020
THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$2,022,825	

The Maintain an Average Network PCR of 80

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	PAVEMENT MILLING	4.66	197,099	2021
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	PAVEMENT MILLING	0.50	27,492	2021
LORAIN RD	S OF OHIO TURNPIKE (I-80)	OHIO TURNPIKE (I-80) NORTH RAMPS	PAVEMENT MILLING	0.50	27,492	2021
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	PAVEMENT MILLING	0.72	30,453	2021
SR 10	I-480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	PAVEMENT MILLING	0.48	25,378	2021
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	PAVEMENT MILLING	0.48	25,378	2021
STONE RIDGE RD	STONE CREEK DR	MILLS RD	PAVEMENT MILLING	2.70	137,039	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$470,331	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	PAVEMENT MILLING	0.44	19,113	2022
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN COUNTY ECL	PAVEMENT MILLING	2.40	104,251	2022
LORAIN RD	BAGLEY RD	S OF OHIO TURNPIKE (I-80)	PARTIAL DEPTH REPAIR	1.36	139,169	2022
THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$262,533	

The Maintain an Average Network PCR of 80

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2023\$)	YEAR
LORAIN RD	ISLAND RD	BAGLEY RD	PARTIAL DEPTH REPAIR	2.24	269,038	2023
US 20	ELYRIA ECL	JAYCOX RD	PAVEMENT MILLING	6.82	547,642	2023
THE 2023 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$816,680	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
SUGAR RIDGE RD	0.3 MI SOUTHWEST OF RACE RD	SR-83 (AVON BELDEN RD)	PAVEMENT MILLING	3.52	217,715	2024
THE 2024 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$217,715	

The M&R Program

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	FULL DEPTH RECLAMATION (FDR)	1.80	185,043	2020
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	FULL DEPTH RECLAMATION (FDR)	2.44	228,033	2020
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	FULL DEPTH RECLAMATION (FDR)	0.18	18,504	2020
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	1.22	114,016	2020
ROOT RD	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.56	145,791	2020
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.88	82,241	2020
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	FULL DEPTH RECLAMATION (FDR)	0.76	99,437	2020
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	FULL DEPTH RECLAMATION (FDR)	3.96	444,104	2020
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	FULL DEPTH RECLAMATION (FDR)	1.58	177,193	2020
SR 83	LORAIN RD	HEDGEROW PARK DR	PAVEMENT MILLING	0.72	35,583	2020
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.48	165,978	2020
SUGAR RIDGE RD	EAST BROAD ST	0.30 MI W OF RACE RD	FULL DEPTH RECLAMATION (FDR)	2.18	224,107	2020
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	PAVEMENT MILLING	2.46	182,362	2020
THE 2020 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$2,102,392	

The M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
ROOT RD	REED RD	LORAIN RD	FULL DEPTH RECLAMATION (FDR)	1.32	126,693	2021
ROOT RD	SPRAGUE RD	REED RD	FULL DEPTH RECLAMATION (FDR)	2.04	195,798	2021
THE 2021 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$322,491	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
LORAIN RD	BAGLEY RD	S OF OHIO TURNPIKE (I-80)	PARTIAL DEPTH REPAIR	1.36	139,169	2022
LORAIN RD	ISLAND RD	BAGLEY RD	PARTIAL DEPTH REPAIR	2.24	261,965	2022
SR 10	I-480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	FULL DEPTH RECLAMATION (FDR)	0.48	59,142	2022
THE 2022 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$460,276	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2023\$)	YEAR
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.80	10,192	2023
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	CRACK SEALING, REJUVENATORS, CHIP SEALING	2.44	12,560	2023
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.22	6,280	2023
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	FULL DEPTH RECLAMATION (FDR)	0.72	72,887	2023

The M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2023\$)	YEAR
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.88	4,530	2023
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	FULL DEPTH RECLAMATION (FDR)	0.48	60,739	2023
SR 83	BUTTERNUT RIDGE RD	CHESTNUT RIDGE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.94	10,645	2023
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	3.96	24,460	2023
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.58	9,759	2023
SR 83	LORAIN RD	HEDGEROW PARK DR	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.72	4,447	2023
STONE RIDGE RD	STONE CREEK DR	MILLS RD	FULL DEPTH RECLAMATION (FDR)	2.70	327,992	2023
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	CRACK SEALING, REJUVENATORS, CHIP SEALING	2.46	22,793	2023
THE 2023 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$567,284	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.44	45,745	2024
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	FULL DEPTH RECLAMATION (FDR)	4.66	484,479	2024
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	2.40	249,517	2024
CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80) OVERPASS	BAINBRIDGE RD	PARTIAL & FULL DEPTH PATCHING, CHIP PATCHING	1.24	37,582	2024
COOK RD	LORAIN COUNTY ECL	LORAIN RD (SR-10)	PAVEMENT MILLING	0.70	32,071	2024
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	0.50	67,578	2024

The M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
LORAIN RD	S OF OHIO TURNPIKE (I-80)	OHIO TURNPIKE (I-80) NORTH RAMPS	FULL DEPTH RECLAMATION (FDR)	0.50	67,578	2024
ROOT RD	REED RD	LORAIN RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.32	6,978	2024
ROOT RD	SPRAGUE RD	REED RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	2.04	10,784	2024
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.76	5,625	2024
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.00	7,401	2024
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.48	9,389	2024
THE 2024 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$1,024,727	

The Maintain Lowest Standard PCR

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
LORAIN RD	AVON BELDEN RD (SR-83)	ISLAND RD	FULL DEPTH RECLAMATION (FDR)	1.80	185,043	2020
MILLS RD	STONE RIDGE RD	AVON BELDEN RD (SR-83)	FULL DEPTH RECLAMATION (FDR)	2.44	228,033	2020
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	FULL DEPTH RECLAMATION (FDR)	0.18	18,504	2020
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80)	FULL DEPTH RECLAMATION (FDR)	1.22	114,016	2020
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	PAVEMENT MILLING	0.72	29,652	2020
ROOT RD	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.56	145,791	2020
ROOT RD	REED RD	LORAIN RD	PAVEMENT MILLING	1.32	54,363	2020
ROOT RD	SPRAGUE RD	REED RD	PAVEMENT MILLING	2.04	84,015	2020
S BARTON RD	CENTER RIDGE RD (US-20)	LORAIN COUNTY ECL	FULL DEPTH RECLAMATION (FDR)	0.88	82,241	2020
SR 10	0.14 MI S OF VICTORY LN	N OF VICTORY LN	FULL DEPTH RECLAMATION (FDR)	0.76	99,437	2020
SR 10	I-480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	PAVEMENT MILLING	0.48	24,710	2020
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	PAVEMENT MILLING	0.48	24,710	2020
SR 83	CENTER RIDGE RD (US-20)	MILLS RD	FULL DEPTH RECLAMATION (FDR)	3.96	444,104	2020
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	FULL DEPTH RECLAMATION (FDR)	1.58	177,193	2020
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	FULL DEPTH RECLAMATION (FDR)	1.48	165,978	2020
SUGAR RIDGE RD	EAST BROAD ST	0.30 MI W OF RACE RD	FULL DEPTH RECLAMATION (FDR)	2.18	224,107	2020
THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$2,101,897	

The Maintain Lowest Standard PCR

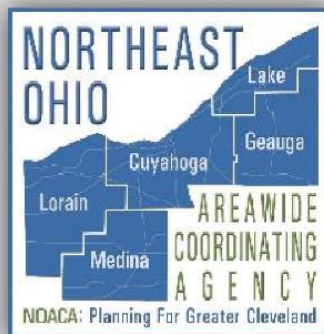
Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAGLEY RD	OHIO TURNPIKE (I-80)	LORAIN COUNTY ECL	PAVEMENT MILLING	0.44	18,610	2021
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN COUNTY ECL	PAVEMENT MILLING	2.40	101,510	2021
LORAIN RD	BAGLEY RD	S OF OHIO TURNPIKE (I-80)	CLEANING & SEALING OF JOINT AND CRACKS	1.36	9,937	2021
LORAIN RD	OHIO TURNPIKE (I-80) NORTH RAMPS	S OF OHIO TURNPIKE (I-80)	PAVEMENT MILLING	0.50	27,492	2021
LORAIN RD	S OF OHIO TURNPIKE (I-80)	OHIO TURNPIKE (I-80) NORTH RAMPS	PAVEMENT MILLING	0.50	27,492	2021
STONE RIDGE RD	STONE CREEK DR	MILLS RD	PAVEMENT MILLING	2.70	137,039	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$322,080	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
BAGLEY RD	LORAIN RD	OHIO TURNPIKE (I-80)	MICROSURFACING & SLURRY SEALING	1.94	28,090	2022
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	PAVEMENT MILLING	4.66	202,421	2022
CHESTNUT RIDGE RD	OHIO TURNPIKE (I-80) OVERPASS	BAINBRIDGE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.24	7,458	2022
LEAR NAGLE RD	CENTER RIDGE RD (US-20)	N LEAR NAGLE RD	CLEANING & SEALING OF JOINT AND CRACKS	0.34	2,916	2022
SPRAGUE RD	ROOT RD	LORAIN COUNTY ECL	MICROSURFACING & SLURRY SEALING	0.68	10,830	2022
SUGAR RIDGE RD	0.3 MI SOUTHWEST OF RACE RD	SR-83 (AVON BELDEN RD)	PAVEMENT MILLING	3.52	206,418	2022
THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$458,133	

The Maintain Lowest Standard PCR

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2023\$)	YEAR
LORAIN RD	ISLAND RD	BAGLEY RD	PARTIAL DEPTH REPAIR	2.24	269,038	2023
N LEAR NAGLE RD	US-20 (CENTER RIDGE RD)	LEAR NAGLE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.18	1,019	2023
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I-480 SOUTH RAMPS	CRACK SEALING, REJUVENATORS, CHIP SEALING	0.48	3,088	2023
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.58	9,759	2023
SR 83	SUGAR RIDGE RD	OHIO TURNPIKE (I-80)	PAVEMENT MILLING	1.48	85,831	2023
US 20	E OF BROAD BLVD	LORAIN COUNTY ECL	PAVEMENT MILLING	2.46	197,536	2023
THE 2023 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$566,271	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2024\$)	YEAR
BAINBRIDGE RD	AVON BELDEN RD (SR-83)	CHESTNUT RIDGE RD	PAVEMENT MILLING	3.38	185,827	2024
LORAIN RD	BAGLEY RD	S OF OHIO TURNPIKE (I-80)	PARTIAL DEPTH REPAIR	1.36	146,785	2024
MILLS RD	JAYCOX RD	LEAR NAGLE RD	PAVEMENT MILLING	1.76	80,635	2024
SR 83	LORAIN RD	HEDGEROW PARK DR	PAVEMENT MILLING	0.72	39,584	2024
SR 83	OHIO TURNPIKE (I-80)	CENTER RIDGE RD (US-20)	CRACK SEALING, REJUVENATORS, CHIP SEALING	1.48	9,389	2024
US 20	ELYRIA ECL	JAYCOX RD	PAVEMENT MILLING	6.82	562,428	2024
THE 2024 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$1,024,648	



NORTHEAST OHIO
AREAWIDE
COORDINATING
AGENCY
1299 Superior Ave.
Cleveland, Ohio 44114

Phone: 216-241-2414 FAX: 216-621-3024

www.noaca.org

 noaca.org  [@noaca_mpo](https://twitter.com/noaca_mpo)

The preparation of this publication was financed through grants received from the Federal Highway Administration and the Ohio Department of Transportation, and appropriations from the counties of and municipalities within Cuyahoga, Geauga, Lake, Lorain and Medina. The contents do not necessarily reflect official views or policies of the U.S. Department of Transportation or the Ohio Department of Transportation. This document does not constitute a standard or regulation.

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