

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



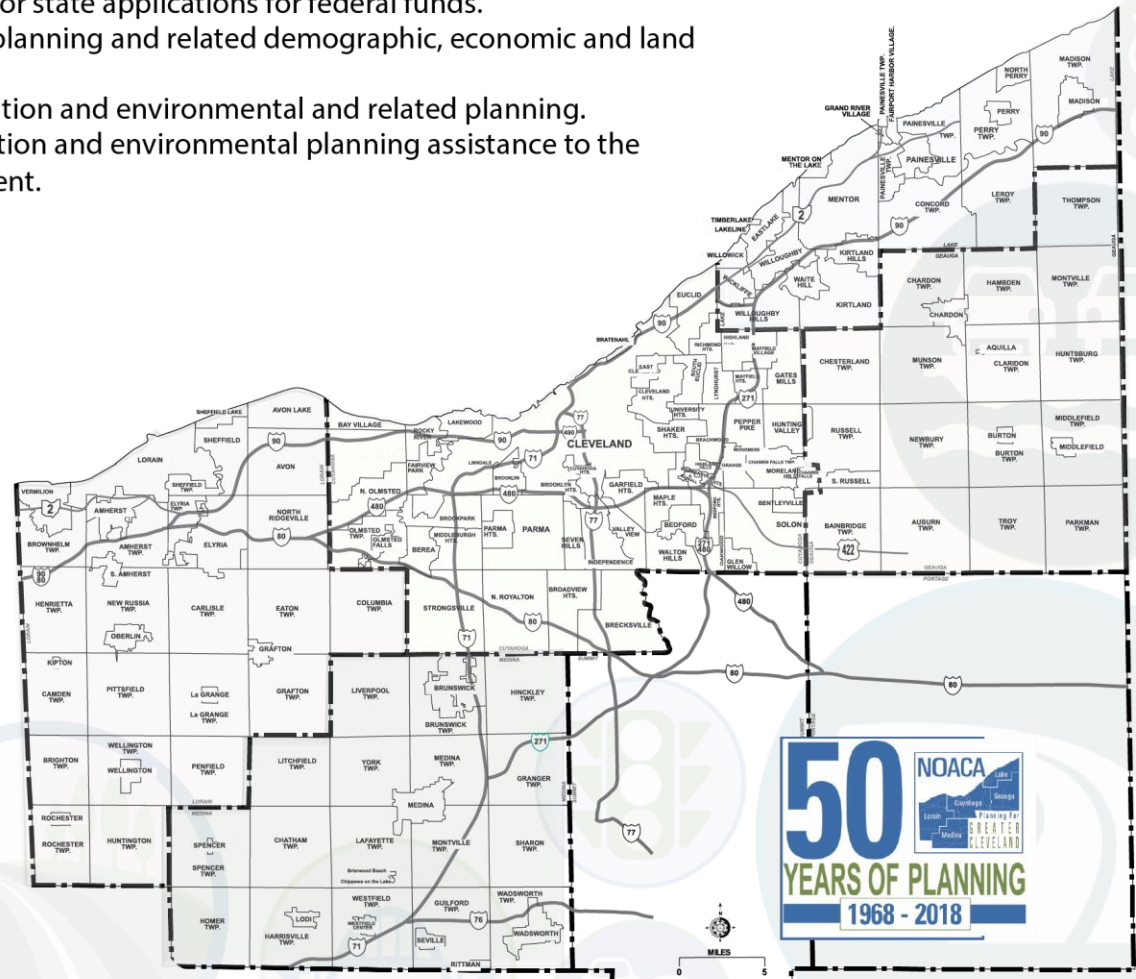
CITY OF LORAIN

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 45 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.

For more information, call (216) 241-2414 or log on at <http://www.noaca.org>



2018 NOACA BOARD OF DIRECTORS

BOARD OFFICERS

President: Armond Budish,
County Executive, Cuyahoga County

First Vice President: Valarie J. McCall,
Chief of Government & International Affairs, City of
Cleveland

Second Vice President: Timothy C. Lennon,
Commissioner, Geauga County

Secretary: Ted Kalo,
Commissioner, Lorain County

Assistant Secretary: Holly C. Brinda,
Mayor, City of Elyria

Assistant Secretary: Michael P. Summers,
Mayor, City of Lakewood

Treasurer: Daniel P. Troy,
Commissioner, Lake County

Assistant Treasurer: James R. Gills, P.E., P.S.,
Lake County Engineer

Assistant Treasurer: Kirsten Holzheimer Gail,
Mayor, City of Euclid

Immediate Past President: Adam Friedrich,
Commissioner, Medina County

BOARD MEMBERS

CUYAHOGA COUNTY

Samuel J. Alai,
Mayor, City of Broadview Heights

Annette M. Blackwell,
Mayor, City of Maple Heights

Pamela Bobst,
Mayor, City of Rocky River

Michael Dylan Brennan,
Mayor, City of University Heights

Tanisha R. Briley,
City Manager, Cleveland Heights

Armond Budish,
County Executive

Glenn Coyne,
Executive Director, Planning
Commission

Timothy J. DeGeeter,
Mayor, City of Parma

Michael W. Dever, MPA
Public Works Director

Kirsten Holzheimer Gail,
Mayor, City of Euclid

Michael D. Gammella,
Mayor, City of Brook Park

Dale Miller,
County Councilman

David H. Roche,
Mayor, City of Richmond Heights

Robert A. Stefanik,
Mayor, City of North Royalton

Michael P. Summers,
Mayor, City of Lakewood

CITY OF CLEVELAND

Anthony Brancatelli,
City Councilman

Freddy L. Collier, Jr.,
Director, City Planning Commission

Blaine A. Griffin,
City Councilman

Frank G. Jackson,
Mayor, City of Cleveland

Martin J. Keane,
City Councilman

Valarie J. McCall,
Chief of Government & International
Affairs

Matthew L. Spronz, P.E., PMP,
Capital Projects Director

GEAUGA COUNTY

Walter "Skip" Claypool,
County Commissioner

Timothy C. Lennon,
County Commissioner

Ralph Spidalieri,
County Commissioner

LAKE COUNTY

Ben Capelle,
General Manager, Laketrans

Jerry C. Cirino,
County Commissioner

James R. Gills, P.E., P.S.,
County Engineer

John Hamercheck,
County Commissioner

Daniel P. Troy,
County Commissioner

LORAIN COUNTY

Holly C. Brinda, Mayor, City of Elyria

Kenneth P. Carney, Sr., P.E., P.S.,
County Engineer

Richard Heidecker,
Trustee, Columbia Township

John D. Hunter,
Mayor, Village of Sheffield

Ted Kalo,
County Commissioner

Matt Lundy,
County Commissioner

Chase M. Ritenauer,
Mayor, City of Lorain

MEDINA COUNTY

Jeff Brandon,
Trustee, Montville Township

Andrew H. Conrad, P.E., P.S.,
County Engineer

Adam Friedrich,
County Commissioner

Patrick Patton,
City Engineer, City of Medina

REGIONAL AND STATE

Greater Cleveland Regional
Transit Authority (GCRTA)
Joseph A. Calabrese,
CEO and General Manager

Northeast Ohio Regional Sewer
District (NEORSDD)
Kyle Dreyfuss-Wells, Chief Executive Officer

Cleveland-Cuyahoga County Port Authority
William D. Friedman, President/CEO

Ohio Department of Transportation (ODOT)
Myron S. Pakush, Deputy Director, District 12

Ex Officio Member:

Kurt Princic, Chief, Northeast District Office,
Ohio Environmental Protection Agency (OEPA)

NOACA DIRECTORS

Grace Gallucci,
Executive Director

Billie Geyer,
Comptroller

Marvin Hayes,
Director of Communications & Public Affairs

Randy Lane,
Director of Programming

Susanna Merlone, EMBA,
Director of Administrative Services

Kathy Sarli,
Director of Planning

Jonathan Giblin,
Associate Director of Compliance

TABLE OF CONTENTS

1. Executive Summary	2
2. Background	3
3. PART I: 2016 Pavement Condition	8
4. PART II: 2018 Current Backlog.....	15
5. PART III: Maintenance & Rehabilitation (M&R) Program.....	16
6. PART IV: Comparative Analysis.....	18
7. Appendix	22

MAPS

1: City of Lorain Location in the NOACA Region	4
2: 2016 City of Lorain Pavement Condition	10

FIGURES

1: 2016 Lorain Pavement Network Condition Chart by Lane-Miles.....	9
2: The PCR Acceptable Level and “Need Year” Relation	16
3: Average PCR Comparison by the Constraint Scenarios and by Year.....	20

TABLES

1: Selected Pavement Treatments and Their Planning Level Costs	6
2: 2016 Lorain Pavement Network Condition	8
3: 2016 City of Lorain Pavement Condition Listing.....	11
4: Performance Comparison of the Constraint Scenarios.....	19

APPENDIX

The “2018 Current Backlog” Pavement Treatment List.....	22
The “Maintain 15% Deficiency” Pavement Treatment List	23
The “Maintain an Average Network PCR of 80” Pavement Treatment List	26
The “M&R” Pavement Treatment List	29
The “Maintain Lowest Standard PCR” Pavement Treatment List	34

EXECUTIVE SUMMARY

The 2016 Ohio Department of Transportation (ODOT) pavement database has 3,626 segment records for the Northeast Ohio Areawide Coordinating Agency (NOACA) region. The NOACA region has a total of 3,330 centerline miles of roadways including freeways and federal-aid highways which is equivalent to 8,561 lane-miles. The regional segment average Pavement Condition Ratings (PCR) is about 77.

In the City of Lorain there are 52.10 centerline miles of federal-aid roads, which are equivalent to 153.66 lane-miles within the city boundary that include U.S. Route 6 (US 6), State Route 2 (SR 2), State Route 611 (SR 611), State Route 58 (SR 58), and State Route 57 (SR 57). The 2016 ODOT pavement database has 75 segment records for the City of Lorain 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 Ratings (PCR), etc.

According to the PCR measure, about 44 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition and the average PCR also represents a good condition. About 14 percent of the lane-miles are in the “Very Poor” to “Poor” status and demand some kind of immediate maintenance and rehabilitation treatments.

This pavement study includes four parts:

- Part I: The 2016 pavement network condition,
- Part II: The 2018 backlog,
- Part III: The Maintenance and Rehabilitation (M&R) program,
- Part IV: The Comparative analysis.

Considering the five-year study period of 2018 - 2022, this pavement study focuses on the required preventive maintenance treatments and some rehabilitation techniques rather than reconstruction.

Part I of this study analyzes the 2016 pavement network condition and tabulates the important information of all the 75 road segments in the City of Lorain.

In Part II, the backlog is defined as the cost of pavement rehabilitation of all roads within one year (2018) 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

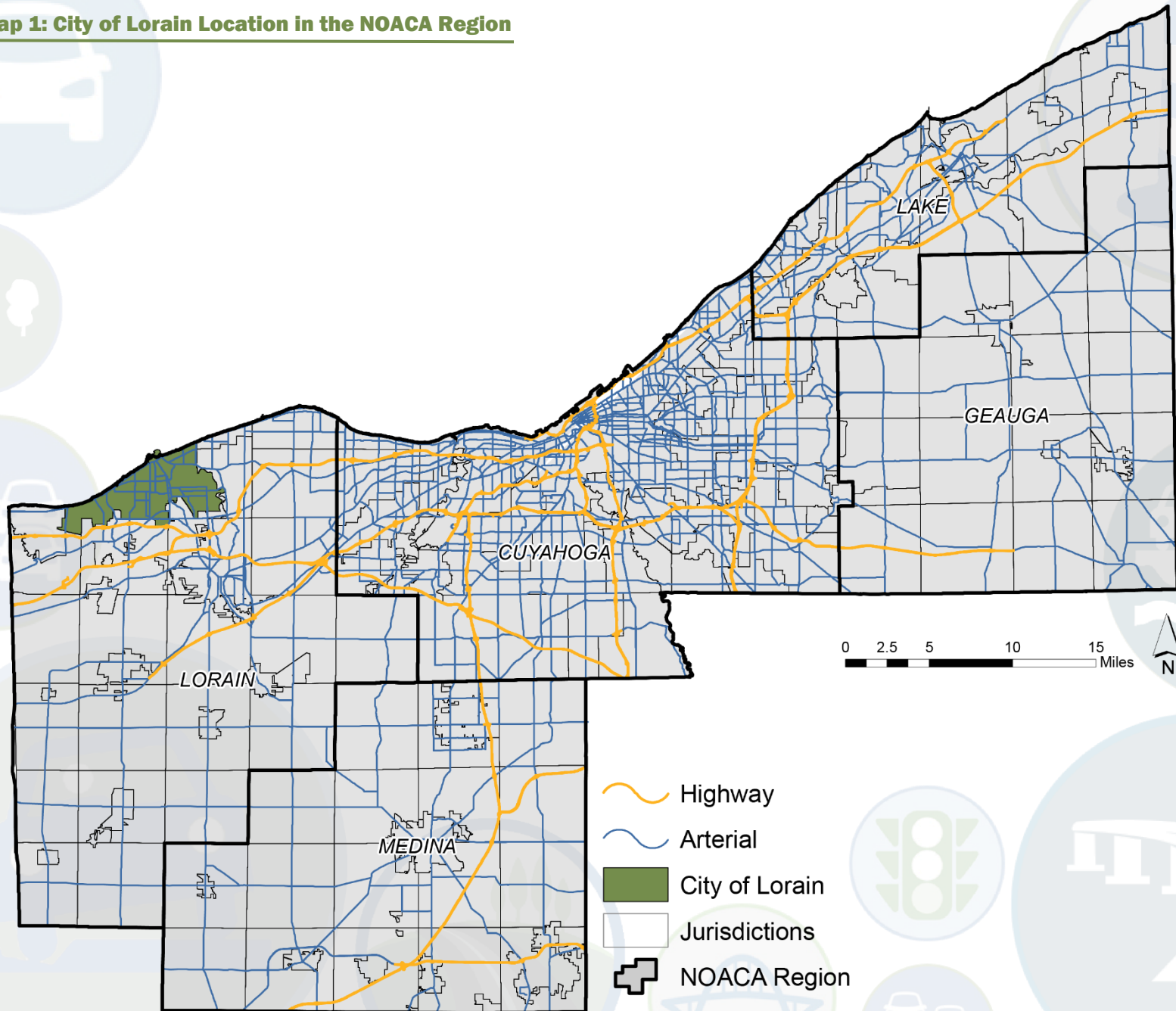
The City of Lorain is located in on Lake Erie at the mouth of the Black River, approximately 30 miles west of Cleveland. The city was the former home to the American Ship Building Company Lorain Yard, Ford Motor Company Lorain Assembly Plant, and United States Steel Corporation's sprawling steel mill on the city's south side.

As of the Northeast Ohio Areawide Coordinating Agency (NOACA) 2015 estimates, the city had a population of 62,928 and employment of 20,942. The City of Lorain includes U.S. Route 6 (US 6), State Route 2 (SR 2), State Route 611 (SR 611), State Route 58 (SR 58), and State Route 57 (SR 57). Cleveland-Hopkins International Airport is the nearest airport.

Map 1 illustrates the City of Lorain location in the NOACA region.

THE CITY OF LORAIN ROADWAY PAVEMENT MAINTENANCE REPORT

Map 1: City of Lorain Location in the NOACA Region



For the purpose of this study:

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.

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.

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. Projects that address deficiencies in the pavement structure or increase the structural capacity of the facility are not considered preventive maintenance.

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 reconstruction of pavement that has deteriorated to a poor condition.

This pavement study analyzes the current status of the Lorain pavement network condition and considers the five-year study period of 2018-2022. It mainly focuses on the required roadway pavement preventive maintenance treatments and some rehabilitation techniques rather than reconstruction. The 2016 Ohio Department of Transportation (ODOT) pavement database was used as the input data and RoadMatrix software was utilized as the NOACA Pavement Management platform.

Seven roadway pavement preventive maintenance and rehabilitation treatments were considered in the Lorain pavement network analysis for the study period and Table 1 illustrates the selected treatment and their associated planning level costs.

Table 1: Selected Pavement Treatments and Their Planning Level Costs

Maintenance Treatment Type	Cost per SQ FT (2016\$)	Estimated Cost per 12-FT lane-Mile (2016\$)
Crack Fill	0.08	5,100
Joint Repair	0.24	15,200
Crack Fill and Slurry	0.4	25,300
Preventive Maintenance Minor	0.5	31,700
Micro – Pave Type Surface Treatment	0.722	45,700
Selective Patch, Mill and 1.5" O/L	1.5	95,000
2.0 inch Hot Mix Mill and Overlay	1.9	120,400

Pavement Maintenance Treatment Definitions

Crack Fill: it is the placement of asphalt emulsion into non-working cracks to reduce water infiltration and to reinforce the adjacent pavement.

Slurry Seal: a mixture of fine aggregate, asphalt emulsion, water, and mineral filler, used when the primary problem is excessive oxidation and hardening of the existing surface. Slurry seals are used to retard surface raveling, and improve surface friction.

Joint Repair: used to remove deteriorated concrete pavement long joint/crack repairs. It minimizes infiltration of surface water and incompressible material into the joint system.

Preventive Maintenance (Minor): typically applied to pavements in good condition having significant remaining service life. Examples of minor preventive treatments include asphalt crack sealing, chip sealing, slurry or micro-surfacing, thin and ultra-thin hot-mix asphalt overlay, and concrete joint sealing.

Micro – Pave (Type II Surface Treatment): consist of the application of a mixture of water, asphalt emulsion, aggregate (very small crushed rock), and chemical additives. It is used to treat surfacing and rut filling on roads that get moderate to heavy levels of traffic.

2.0in Hot Mix Mill & Overlay: applied as a maintenance treatment. Thin overlays should only be placed on structurally sound pavements. That is because they offer little structural improvement, but they can renew the surface in terms of functional performance (i.e., ride quality).

Selective Patching, Mill & 1.5 O/L: it is primarily done to extend the life of a roadway. Patch mill and overlay projects are designed to remove damaged portions of the roadway and replace it with new smooth pavement.

This report includes the following four parts:

- I. The 2016 status of the Lorain pavement network condition,
- II. The 2018 “backlog” treatment list,
- III. The optimal preventive maintenance and rehabilitation strategies, and
- IV. The comparative analysis.

PART I: 2016 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 2016 ODOT pavement database has 75 segment records for the City of Lorain 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 Ratings (PCR), etc.

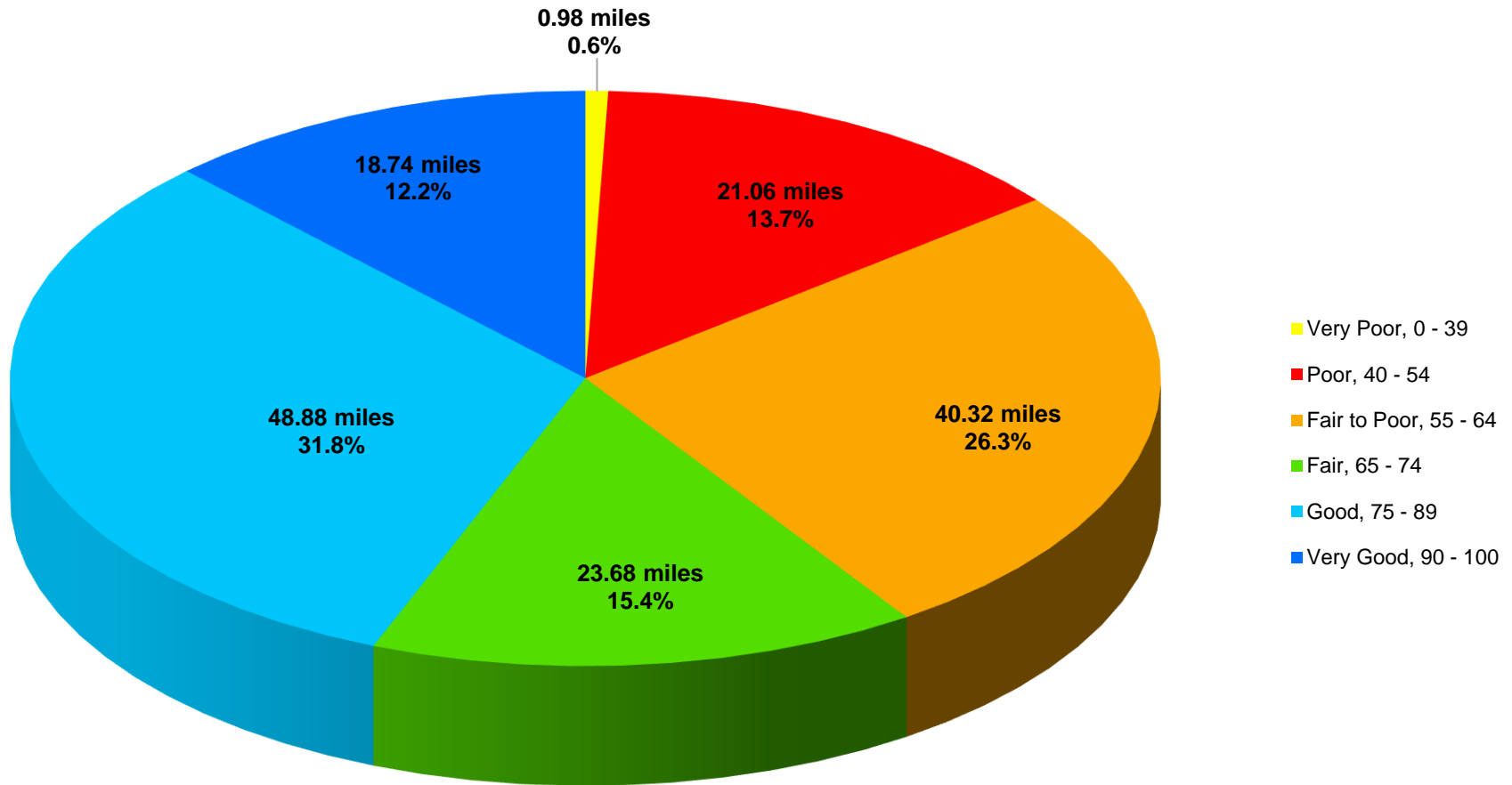
Based on the utilized ODOT database, there are 52.10 centerline miles of federal-aid eligible roads which are equivalent to 153.66 lane-miles in the City of Lorain. The total area of roadway is 11,243,178 Sq. Ft.

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-mile weighted average of the City of Lorain segment PCRs is about 72. Table 2 and Figure 1 summarize the 2016 Lorain pavement network conditions by percentages of roadway lane-miles length.

Table 2: 2016 Lorain Pavement Network Condition

Pavement Condition	PCR Range	Lane-Miles	Percent of Lane-Miles
Very Poor	0 - 39	0.98	0.6%
Poor	40 - 54	21.06	13.7%
Fair to Poor	55 - 64	40.32	26.3%
Fair	65 - 74	23.68	15.4%
Good	75 - 89	48.88	31.8%
Very Good	90 - 100	18.74	12.2%

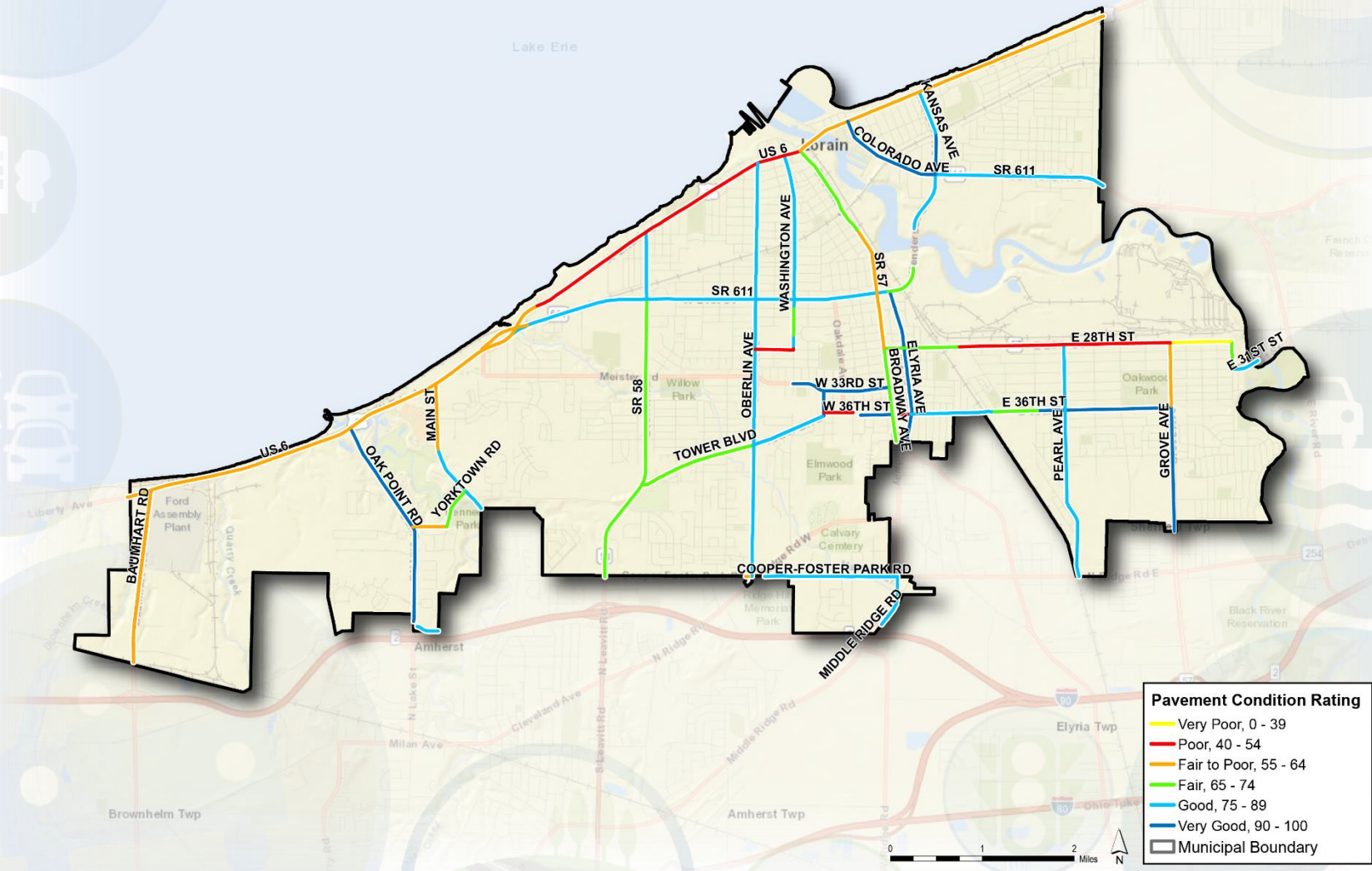
Figure 1: 2016 Lorain Pavement Network Condition Chart by Lane-Miles



As indicated, about 44 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition and the lane-mile weighted average PCR also represents a “Fair” condition. About 14 percent of the lane-miles are in the “Very Poor” to “Poor” status and demand some kind of immediate maintenance and rehabilitation treatments.

Map 2 illustrates the 2016 Lorain roadway pavement condition for each segment record and Table 3 tabulates the 2016 Lorain pavement condition listing.

Map 2: 2016 City of Lorain Pavement Condition



THE CITY OF LORAIN ROADWAY PAVEMENT MAINTENANCE REPORT

Table 3: 2016 City of Lorain Pavement Condition Listing

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	PRINCIPAL ARTERIAL-OTHER	2.84	59
BAUMHART RD	US 6 (W ERIE AVE)	LORAIN SCL	PRINCIPAL ARTERIAL-OTHER	2.84	50
BROADWAY AVE	W 39TH ST	SR 57 (E 28TH ST)	PRINCIPAL ARTERIAL-OTHER	3.12	73
COLORADO AVE	GEORGIA AVE	SR 611 (HENDRICKS DR) / KANSAS AVE	PRINCIPAL ARTERIAL-OTHER	1.32	90
COLORADO AVE	US 6 (ERIE ST)	GEORGIA AVE	PRINCIPAL ARTERIAL-OTHER	2.24	91
COOPER-FOSTER PARK RD	AMHERST WCL	OBERLIN AVE	MINOR ARTERIAL	0.08	62
COOPER-FOSTER PARK RD	NORTH RIDGE RD	BROADWAY AVE	MINOR ARTERIAL	2.18	84
COOPER-FOSTER PARK RD	OAK POINT RD	LORAIN ECL / HOLLSTEIN DR	MINOR ARTERIAL	0.36	86
E 28TH ST	SR 57 (GROVE AVE)	TACOMA AVE	MAJOR COLLECTOR	0.98	32
E 31ST ST	TACOMA AVE	LORAIN ECL	MAJOR COLLECTOR	0.84	84
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	MAJOR COLLECTOR	0.18	50
E 36TH ST	DALLAS AVE	DUNTON RD	MAJOR COLLECTOR	0.50	81
E 36TH ST	DUNTON RD	EAGLE AVE / PLANT ST	MAJOR COLLECTOR	0.14	83
E 36TH ST	EAGLE AVE / PLANT ST	GLOBE AVE	MAJOR COLLECTOR	0.76	69
E 36TH ST	ELYRIA AVE	DALLAS AVE	MAJOR COLLECTOR	0.68	83
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	MAJOR COLLECTOR	2.20	61
ELYRIA AVE	E 23RD ST	SR 611 (HENDERSON DR)	MINOR ARTERIAL	0.26	96
ELYRIA AVE	E 36TH ST	E 23RD ST	MINOR ARTERIAL	1.76	96
ELYRIA AVE	LINCOLN AVE	E 36TH ST	MINOR ARTERIAL	0.46	94
FALBO AVE	TOWER BLVD	W 36TH ST	MAJOR COLLECTOR	0.08	98

THE CITY OF LORAIN ROADWAY PAVEMENT MAINTENANCE REPORT

Table 3: 2016 City of Lorain Pavement Condition Listing (Continued)

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
FALBO AVE	TOWER BLVD	W 34TH ST	MAJOR COLLECTOR	0.16	94
FALBO AVE	W 34TH ST	MEISTER RD	MAJOR COLLECTOR	0.20	94
HIGHLAND PARK BLVD	OBERLIN AVE	WASHINGTON AVE	MAJOR COLLECTOR	0.64	40
KANSAS AVE	F ST	US 6 (ERIE AVE)	MAJOR COLLECTOR	1.44	79
KANSAS AVE	SR 611	F ST	MAJOR COLLECTOR	1.36	90
MAIN ST	AMHERST SCL	LONGBROOK DR	MINOR ARTERIAL	0.36	83
MAIN ST	BEAVERCREST DR	US 6 (ERIE AVE)	MINOR ARTERIAL	1.08	64
MAIN ST	LONGBROOK RD	BEAVERCREST DR	MINOR ARTERIAL	0.86	82
MEISTER RD	WASHINGTON AVE	FALBO AVE	MAJOR COLLECTOR	0.54	98
MIDDLE RIDGE RD	SR-2 NORTH RAMPS	COOPER FOSTER PARK	PRINCIPAL ARTERIAL-OTHER	1.76	77
OAK POINT RD	AMHERST NCL	US 6 (ERIE AVE)	MAJOR COLLECTOR	3.32	93
OAK POINT RD	COOPER FOSTER PARK RD	AMHERST NCL	MAJOR COLLECTOR	0.16	92
OBERLIN AVE	COOPER FOSTER PARK RD	MEISTER RD	MINOR ARTERIAL	6.44	89
OBERLIN AVE	MEISTER RD	US 6 (ERIE AVE)	MINOR ARTERIAL	6.96	81
PEARL AVE	E 36TH ST	SR 57 (E 28TH ST)	MAJOR COLLECTOR	1.08	79
PEARL AVE	NORTH RIDGE RD	E 36TH ST	MAJOR COLLECTOR	2.76	79
SR 57	0.18 MILES N OF SR 254	E 36TH ST	MINOR ARTERIAL	2.04	91
SR 57	BROADWAY AVE	FULTON RD	MINOR ARTERIAL	2.44	72
SR 57	E 14TH ST	E 9TH ST	PRINCIPAL ARTERIAL-OTHER	1.24	74
SR 57	E 36TH ST	E 28TH ST (SR 57)	MINOR ARTERIAL	3.12	55
SR 57	E 36TH ST	0.18 MILES N OF SR 254	MINOR ARTERIAL	2.04	92

THE CITY OF LORAIN ROADWAY PAVEMENT MAINTENANCE REPORT

Table 3: 2016 City of Lorain Pavement Condition Listing (Continued)

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
SR 57	E 9TH ST	US 6 (ERIE AVE)	PRINCIPAL ARTERIAL-OTHER	1.96	71
SR 57	FULTON RD	GROVE AVE (SR 57)	MINOR ARTERIAL	6.88	52
SR 57	SR 57 (E 28TH ST)	E 14TH ST	PRINCIPAL ARTERIAL-OTHER	4.00	61
SR 58	COOPER FOSTER PARK RD	SR 611	MINOR ARTERIAL	9.36	71
SR 58	SR 611	US 6	MINOR ARTERIAL	1.14	77
SR 611	ASHLAND AVE	ELYRIA AVE	PRINCIPAL ARTERIAL-OTHER	2.54	82
SR 611	DIDRICKSON DR	SR 58 (LEAVITT RD)	MINOR ARTERIAL	3.36	83
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	PRINCIPAL ARTERIAL-OTHER	1.28	71
SR 611	HENDERSON DR BRIDGE OVER THE BLACK RIVER	SR 611 (COLORADO AVE)	PRINCIPAL ARTERIAL-OTHER	1.96	80
SR 611	SR 58 (LEAVITT RD)	ASHLAND AVE	PRINCIPAL ARTERIAL-OTHER	2.84	81
SR 611	SR 611 (HENDRICKS DR) / KANSAS AVE	LORAIN ECL	PRINCIPAL ARTERIAL-OTHER	5.52	85
SR 611	US 6 (W ERIE AVE)	DIDRICKSON DR	MINOR ARTERIAL	1.20	85
SR 611	W 21ST ST	US 6 (W ERIE AVE)	MINOR ARTERIAL	0.88	56
TACOMA AVE	E 31ST ST	E 28TH ST	MAJOR COLLECTOR	0.46	69
TOWER BLVD	FALBO AVE	OBERLIN AVE	MAJOR COLLECTOR	1.24	88
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	MAJOR COLLECTOR	1.94	67
TOWER BLVD	OBERLIN AVE	FALBO AVE	MAJOR COLLECTOR	1.24	94
TOWER BLVD	SR 58 (LEAVITT RD)	OBERLIN AVE	MAJOR COLLECTOR	1.94	64
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	PRINCIPAL ARTERIAL-OTHER	3.04	63

THE CITY OF LORAIN ROADWAY PAVEMENT MAINTENANCE REPORT

Table 3: 2016 City of Lorain Pavement Condition Listing (Continued)

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
US 6	PUEBLO DR	SR 58 (LEAVITT RD)	PRINCIPAL ARTERIAL-OTHER	4.28	50
US 6	SR 57 (BROADWAY)	LORAIN WCL	PRINCIPAL ARTERIAL-OTHER	5.46	57
US 6	SR 58 (LEAVITT RD)	SR 57 (BROADWAY)	PRINCIPAL ARTERIAL-OTHER	5.76	54
US 6	VERMILION ECL	WESTLAKE GDNS DRIVEWAY	PRINCIPAL ARTERIAL-OTHER	12.08	60
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	PRINCIPAL ARTERIAL-OTHER	3.04	56
W 33RD ST	FALBO AVE	BROADWAY AVE	MAJOR COLLECTOR	1.08	94
W 36TH ST	FALBO AVE	DAYTON AVE	MAJOR COLLECTOR	0.48	40
W 36TH ST	LEXINGTON AVE	BROADWAY AVE	MAJOR COLLECTOR	0.48	93
WASHINGTON AVE	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK DR	N CENTRAL DR	MAJOR COLLECTOR	0.14	77
WASHINGTON AVE	HIGHLAND PARK RD	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK RD	MAJOR COLLECTOR	0.08	80
WASHINGTON AVE	N CENTRAL DR	W 22ND ST	MAJOR COLLECTOR	0.44	74
WASHINGTON AVE	W 13TH ST	US 6 (ERIE AVE)	MAJOR COLLECTOR	1.46	87
WASHINGTON AVE	W 22ND ST	W 13TH ST	MAJOR COLLECTOR	1.04	88
YORKTOWN RD	OAK POINT RD	LONGBROOK RD	MAJOR COLLECTOR	0.56	62
YORKTOWN RD	YORKTOWN RD	KOLBE RD	MAJOR COLLECTOR	0.68	70

PART II: 2018 CURRENT BACKLOG

The backlog is defined as the cost of pavement rehabilitation of all roads within the current year (2018) 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 pavement preventive maintenance treatments, but instead considers rehabilitation or reconstruction 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.

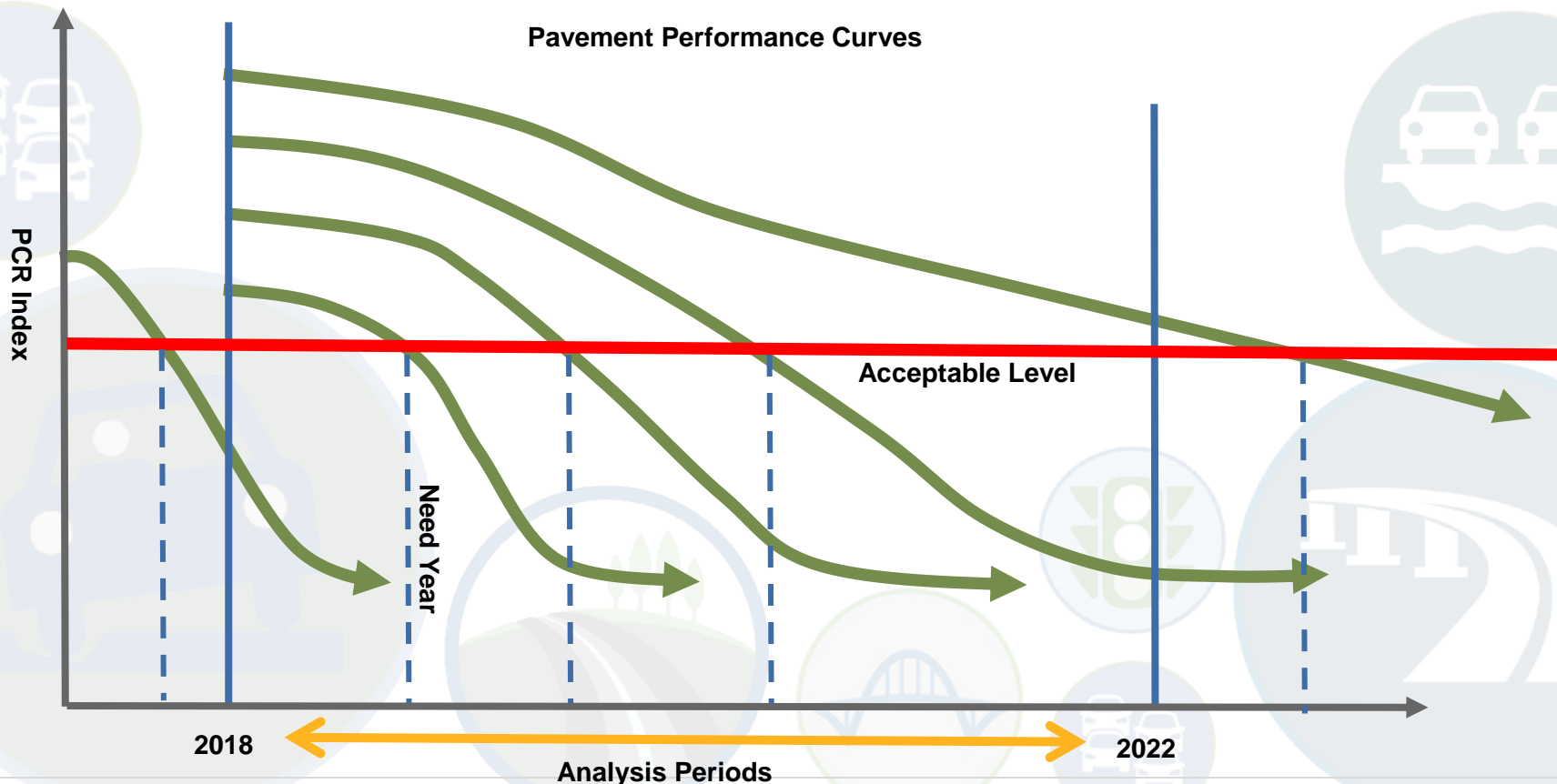
The Appendix includes all the backlog pavement treatments. As illustrated, the 2018 backlog treatment list includes segments which their 2018 PCRs are below the minimum acceptable level and are recommended with various reconstruction treatments. There are 12 segments in the 2018 backlog list with the total of 45.74 lane-miles. The 2018 backlog cost of the recommended treatments is about 60 million dollars.

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

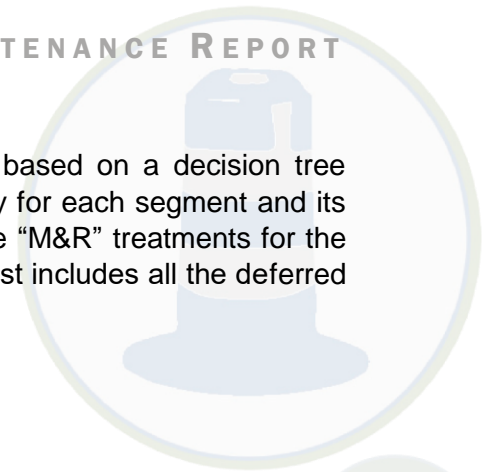
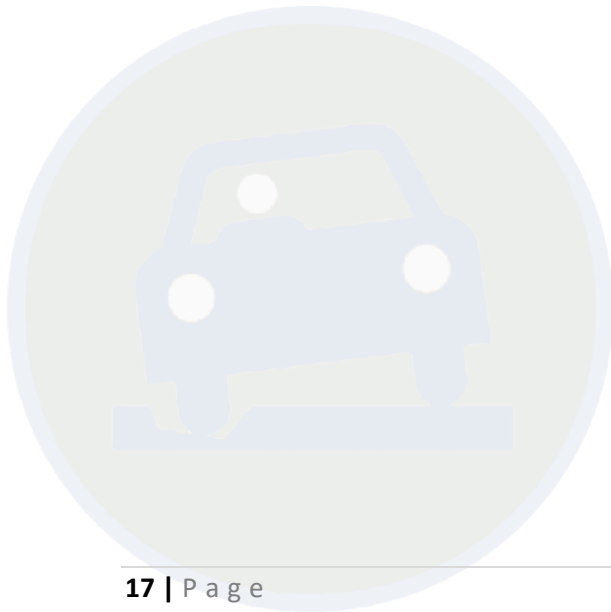
In order to estimate the preventive maintenance and rehabilitation requirements of a pavement network over a period of time, the first step is to determine the “Need Year” or when a pavement segment requires rehabilitation. The “Need Year” of a pavement is defined as the year in which the pavement condition 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 2 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 2: 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 2018 to 2022 and the “M&R” program cost includes all the deferred maintenance cost.



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%.
- 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 Lorain. 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-mile weighted average.

Table 4: Performance Comparison of the Constraint Scenarios

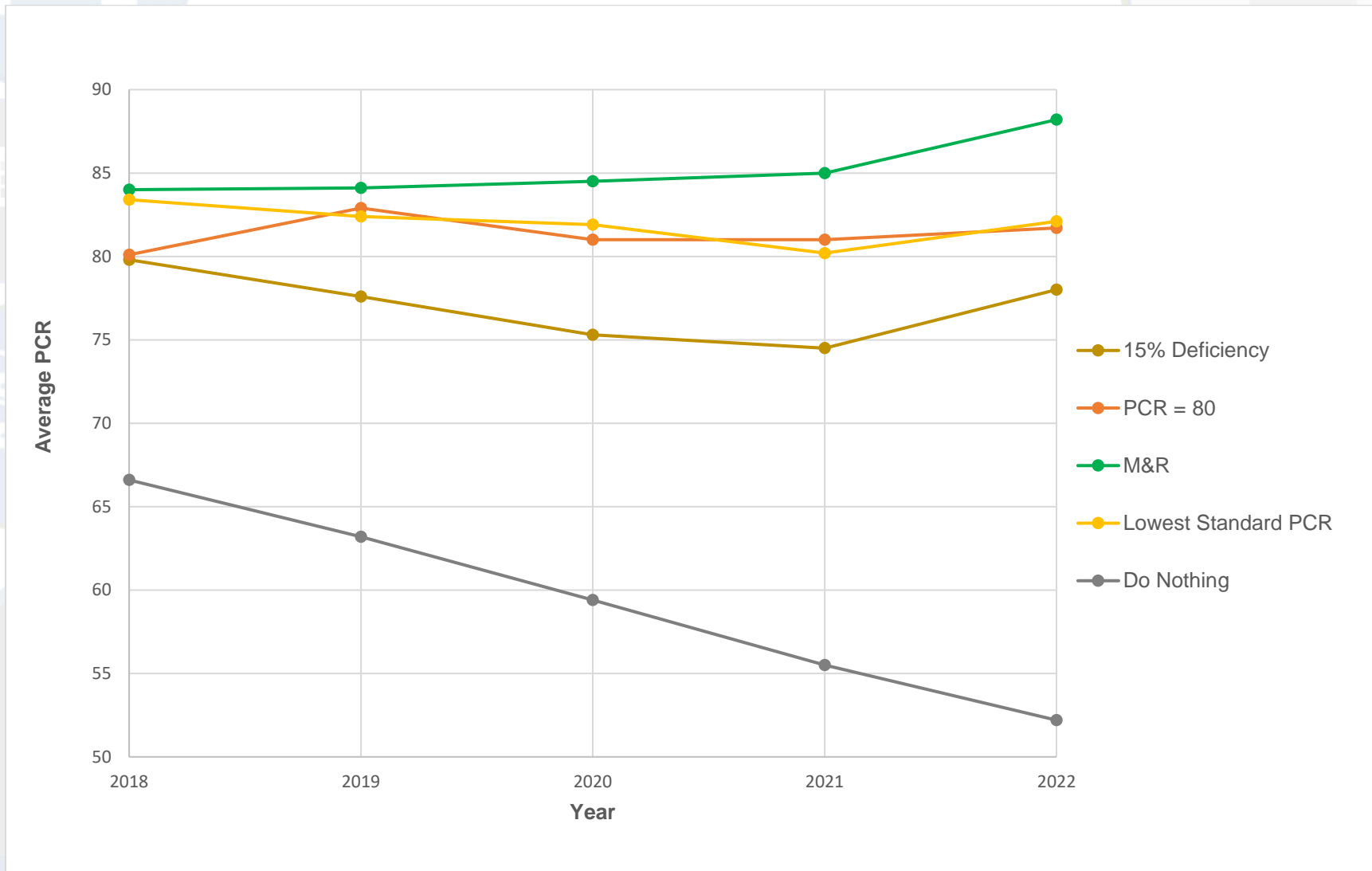
Maintenance Strategy	Strategy Group	5-Year Total Required Dollars	Network Average PCR	Network PCR at the End of the 5-Year Period	Percent of Pavement below the Minimum PCR
2018 Current Backlog	2018 Backlog	59,367,590	82.8	-	3.2%
Maintain 15% Deficiency	NOACA Transportation Asset Management Targets	8,469,395	77	78	14.4%
Maintain an Average Network PCR of 80		9,639,979	81.3	81.7	10.4%
M&R Program	Scenarios	12,477,802	85.2	88.2	3.4%
Maintain Lowest Standard PCR		10,609,038	81.9	82.1	3.4%

Note: The backlog required budget is for the year of 2018 only.

The Appendix lists all the treatments with their implementation years in the period of 2018 to 2022 for the above maintenance strategies

Figure 3 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 82.8 for 2018.

Figure 3: 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 of 85. This strategy requires a budget of over 12 million dollars during the analysis period.

The “Maintain an Average Network PCR of 80” and the “Maintain Lowest Standard PCR” scenarios provide almost the same level of condition with a budget of nearly 10 million dollars. Three percent of pavements will be below the minimum acceptable level in the latter scenario and that percentage is about 10 for the former scenario.

The “Maintain 15% deficiency” scenario requires the lowest budget of about eight million dollars and maintains the network pavement conditions in an acceptable level. As the scenario name indicates, about 14 percent of pavements will be below the minimum acceptable PCR level.

The high budget requirements for all the scenarios is due to the fact that more than 50 percent of the pavement conditions are below the fair condition.

It should be noted that the backlog cost as the benchmark is five times more than the “M&R” program cost and its network average PCR is six points loss than that of the “M&R” program. The high backlog cost is because of the general poor pavement conditions in the city. This comparison indicates that the annual maintenance investment provides a better pavement management policy with much smaller budget than the reconstruction treatments with high costs.

APPENDIX

2018 Current Backlog

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDATION TREATMENT	LANE-MILES	TREATMENT COST
BAUMHART RD	US 6	LORAIN SCL	MAJOR REHAB/RECONSTRUCTION	2.84	3,425,224
E 28TH ST	SR 57 (GROVE AVE)	TACOMA AVE	MAJOR REHAB/RECONSTRUCTION	0.98	1,059,672
E 36TH ST	0.09 MILES W OF ELYRIA AVE	ELYRIA AVE	MAJOR REHAB/RECONSTRUCTION	0.18	134,753
HIGHLAND PARK BLVD	OBERLIN AVE	WASHINGTON AVE	MAJOR REHAB/RECONSTRUCTION	0.64	798,499
SR 57	E 36TH ST	E 28TH ST (SR 57)	MAJOR REHAB/RECONSTRUCTION	3.12	3,957,557
SR 57	FULTON RD	GROVE AVE (SR 57)	MAJOR REHAB/RECONSTRUCTION	6.88	7,582,421
US 6	PUEBLO DR	SR 58 (LEAVITT RD)	MAJOR REHAB/RECONSTRUCTION	4.28	4,627,967
US 6	SR 57 (BROADWAY)	LORAIN WCL	MAJOR REHAB/RECONSTRUCTION	5.46	10,672,448
US 6	SR 58	SR 57 (BROADWAY)	MAJOR REHAB/RECONSTRUCTION	5.76	6,467,849
US 6	VERMILION ECL	WESTLAKE GDNS DRIVEWAY	MAJOR REHAB/RECONSTRUCTION	12.08	16,076,450
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	MAJOR REHAB/RECONSTRUCTION	3.04	4,045,728
W 36TH ST	FALBO AVE	DAYTON AVE	MAJOR REHAB/RECONSTRUCTION	0.48	519,022
REQUIRED BACKLOG BUDGET (2018\$)					\$59,367,590

Maintain 15% Deficiency

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.84	342,522	2018
BAUMHART RD	US 6 (W ERIE AVE)	LORAIN SCL	2.0IN. HOT MIX MILL & OVERLAY	2.84	433,862	2018
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.18	13,475	2018
SR 57	E 36TH ST	E 28TH ST (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	3.12	395,756	2018
SR 57	FULTON RD	GROVE AVE (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	6.88	758,242	2018
SR 57	SR 57 (E 28TH ST)	E 14TH ST	2.0IN. HOT MIX MILL & OVERLAY	4.00	526,788	2018
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	JOINT REPAIR	1.94	21,945	2018
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	SELECTIVE PATCH, MILL & 1.5" O/L	3.04	404,573	2018
US 6	SR 57 (BROADWAY)	LORAIN WCL	2.0IN. HOT MIX MILL & OVERLAY	5.46	1,351,843	2018
US 6	SR 58 (LEAVITT RD)	SR 57 (BROADWAY)	2.0IN. HOT MIX MILL & OVERLAY	5.76	819,261	2018
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	2.0IN. HOT MIX MILL & OVERLAY	3.04	512,459	2018
THE 2018 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$5,580,726	

Maintain 15% Deficiency

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	CRACK FILL	2.84	19,661	2021
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	CRACK FILL	0.18	773	2021
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.20	196,944	2021
SR 57	E 36TH ST	E 28TH ST (SR 57)	CRACK FILL	3.12	22,717	2021
SR 57	FULTON RD	GROVE AVE (SR 57)	CRACK FILL	6.88	43,524	2021
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	SELECTIVE PATCH, MILL & 1.5" O/L	1.28	117,451	2021
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	CRACK FILL	3.04	23,223	2021
WASHINGTON AVE	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK DR	N CENTRAL DR	JOINT REPAIR	0.14	2,607	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$426,900	

Maintain 15% Deficiency

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
COLORADO AVE	GEORGIA AVE	SR 611 (HENDRICKS DR) / KANSAS AVE	PREVENTATIVE MAINTENANCE MINOR	1.32	40,366	2022
COOPER-FOSTER PARK RD	NORTH RIDGE RD	BROADWAY AVE	PREVENTATIVE MAINTENANCE MINOR	2.18	103,330	2022
E 36TH ST	DUNTON RD	EAGLE AVE / PLANT ST	PREVENTATIVE MAINTENANCE MINOR	0.14	5,566	2022
E 36TH ST	ELYRIA AVE	DALLAS AVE	PREVENTATIVE MAINTENANCE MINOR	0.68	27,033	2022
OBERLIN AVE	COOPER FOSTER PARK RD	MEISTER RD	CRACK FILL & SLURRY	6.44	252,078	2022
SR 57	BROADWAY AVE	FULTON RD	SELECTIVE PATCH, MILL & 1.5" O/L	2.44	279,808	2022
SR 57	E 14TH ST	E 9TH ST	SELECTIVE PATCH, MILL & 1.5" O/L	1.24	147,886	2022
SR 57	E 36TH ST	0.18 MILES NORTH OF SR 254	CRACK FILL & SLURRY	2.04	84,841	2022
SR 58	COOPER FOSTER PARK RD	SR 611	SELECTIVE PATCH, MILL & 1.5" O/L	9.36	1,202,164	2022
SR 611	US 6 (W ERIE AVE)	DIDRICKSON DR	PREVENTATIVE MAINTENANCE MINOR	1.20	33,026	2022
SR 611	W 21ST ST	US 6 (W ERIE AVE)	2.0IN. HOT MIX MILL & OVERLAY	0.88	117,600	2022
TOWER BLVD	SR 58 (LEAVITT RD)	OBERLIN AVE	SELECTIVE PATCH, MILL & 1.5" O/L	1.94	151,279	2022
W 36TH ST	LEXINGTON AVE	BROADWAY AVE	CRACK FILL & SLURRY	0.48	15,265	2022
WASHINGTON AVE	HIGHLAND PARK RD	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK RD	JOINT REPAIR	0.08	1,527	2022
THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY					\$2,461,769	

Note: The "Maintain 15% Deficiency" strategy does not have any pavement maintenance treatments with the recommended implementation years of 2019 and 2020.

Maintain an Average Network PCR of 80

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.84	342,522	2018
BAUMHART RD	US 6 (W ERIE AVE)	LORAIN SCL	2.0IN. HOT MIX MILL & OVERLAY	2.84	433,862	2018
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.18	13,475	2018
HIGHLAND PARK BLVD	OBERLIN AVE	WASHINGTON AVE	2.0IN. HOT MIX MILL & OVERLAY	0.64	101,143	2018
SR 57	E 36TH ST	E 28TH ST (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	3.12	395,756	2018
SR 57	FULTON RD	GROVE AVE (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	6.88	758,242	2018
SR 57	SR 57 (E 28TH ST)	E 14TH ST	2.0IN. HOT MIX MILL & OVERLAY	4.00	526,788	2018
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	JOINT REPAIR	1.94	21,945	2018
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	SELECTIVE PATCH, MILL & 1.5" O/L	3.04	404,573	2018
US 6	SR 57 (BROADWAY)	LORAIN WCL	2.0IN. HOT MIX MILL & OVERLAY	5.46	1,351,843	2018
US 6	SR 58 (LEAVITT RD)	SR 57 (BROADWAY)	2.0IN. HOT MIX MILL & OVERLAY	5.76	819,261	2018
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	2.0IN. HOT MIX MILL & OVERLAY	3.04	512,459	2018
W 36TH ST	FALBO AVE	DAYTON AVE	PREVENTATIVE MAINTENANCE MAJOR	0.48	138,406	2018
THE 2018 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$5,820,275	

Maintain an Average Network PCR of 80

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
SR 611	SR 611 (HENDRICKS DR) / KANSAS AVE	LORAIN ECL	JOINT REPAIR	5.52	94,105	2019
TACOMA AVE	E 31ST ST	E 28TH ST	JOINT REPAIR	0.46	8,156	2019
US 6	VERMILION ECL	WESTLAKE GDNS DRIVEWAY	2.0IN. HOT MIX MILL & OVERLAY	12.08	2,086,852	2019
THE 2019 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$2,189,113	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	CRACK FILL	2.84	19,661	2021
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	CRACK FILL	0.18	773	2021
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.20	196,944	2021
SR 57	E 36TH ST	E 28TH ST (SR 57)	CRACK FILL	3.12	22,717	2021
SR 57	FULTON RD	GROVE AVE (SR 57)	CRACK FILL	6.88	43,524	2021
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	SELECTIVE PATCH, MILL & 1.5" O/L	1.28	117,451	2021
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	CRACK FILL	3.04	23,223	2021
WASHINGTON AVE	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK DR	N CENTRAL DR	JOINT REPAIR	0.14	2,607	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$426,900	

Maintain an Average Network PCR of 80

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
SR 58	COOPER FOSTER PARK RD	SR 611	SELECTIVE PATCH, MILL & 1.5" O/L	9.36	1,202,164	2022
WASHINGTON AVE	HIGHLAND PARK RD	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK RD	JOINT REPAIR	0.08	1,527	2022
THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY					\$1,203,691	

Note: The "Maintain an Average Network PCR of 80" strategy does not have any pavement maintenance treatments with the recommended implementation year of 2020.

M&R Program

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.84	342,522	2018
BAUMHART RD	US 6 (W ERIE AVE)	LORAIN SCL	2.0IN. HOT MIX MILL & OVERLAY	2.84	433,862	2018
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.18	13,475	2018
HIGHLAND PARK BLVD	OBERLIN AVE	WASHINGTON AVE	2.0IN. HOT MIX MILL & OVERLAY	0.64	101,143	2018
SR 57	E 36TH ST	E 28TH ST (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	3.12	395,756	2018
SR 57	FULTON RD	GROVE AVE (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	6.88	758,242	2018
SR 57	SR 57 (E 28TH ST)	E 14TH ST	2.0IN. HOT MIX MILL & OVERLAY	4.00	526,788	2018
TACOMA AVE	E 31ST ST	E 28TH ST	JOINT REPAIR	0.46	7,958	2018
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	JOINT REPAIR	1.94	21,945	2018
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	SELECTIVE PATCH, MILL & 1.5" O/L	3.04	404,573	2018
US 6	SR 57 (BROADWAY)	LORAIN WCL	2.0IN. HOT MIX MILL & OVERLAY	5.46	1,351,843	2018
US 6	SR 58 (LEAVITT RD)	SR 57 (BROADWAY)	2.0IN. HOT MIX MILL & OVERLAY	5.76	819,261	2018
US 6	VERMILION ECL	WESTLAKE GDNS DRIVEWAY	2.0IN. HOT MIX MILL & OVERLAY	12.08	2,036,350	2018
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	2.0IN. HOT MIX MILL & OVERLAY	3.04	512,459	2018
W 36TH ST	FALBO AVE	DAYTON AVE	PREVENTATIVE MAINTENANCE MAJOR	0.48	138,406	2018
WASHINGTON AVE	DRIVEWAY 0.04 MILES N OF HIGHLAND PARK DR	N CENTRAL DR	JOINT REPAIR	0.14	2,422	2018
WASHINGTON AVE	N CENTRAL DR	W 22ND ST	JOINT REPAIR	0.44	7,612	2018
THE 2018 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$7,874,617	

M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
SR 57	E 9TH ST	US 6 (ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	1.96	217,190	2019
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	SELECTIVE PATCH, MILL & 1.5" O/L	1.28	111,835	2019
SR 611	SR 611 (HENDRICKS DR) / KANSAS AVE	LORAIN ECL	JOINT REPAIR	5.52	94,105	2019
SR 611	W 21ST ST	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	0.88	86,263	2019
WASHINGTON AVE	HIGHLAND PARK RD	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK RD	JOINT REPAIR	0.08	1,418	2019
THE 2019 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$510,811	

M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
BROADWAY AVE	W 39TH ST	SR 57 (E 28TH ST)	SELECTIVE PATCH, MILL & 1.5" O/L	3.12	354,307	2020
COOPER-FOSTER PARK RD	AMHERST WCL	OBERLIN AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.08	11,181	2020
KANSAS AVE	F ST	US 6 (ERIE AVE)	PREVENTATIVE MAINTENANCE MINOR	1.44	39,833	2020
MAIN ST	BEAVERCREST DR	US 6 (ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	1.08	141,513	2020
PEARL AVE	E 36TH ST	SR 57 (E 28TH ST)	PREVENTATIVE MAINTENANCE MINOR	1.08	44,027	2020
PEARL AVE	NORTH RIDGE RD	E 36TH ST	PREVENTATIVE MAINTENANCE MINOR	2.76	112,512	2020
TOWER BLVD	SR 58 (LEAVITT RD)	OBERLIN AVE	SELECTIVE PATCH, MILL & 1.5" O/L	1.94	144,046	2020
WASHINGTON AVE	W 13TH ST	US 6 (ERIE AVE)	CRACK FILL & SLURRY	1.46	61,217	2020
YORKTOWN RD	OAK POINT RD	Longbrook Rd	SELECTIVE PATCH, MILL & 1.5" O/L	0.56	66,040	2020
THE 2020 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$974,676	

M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	CRACK FILL	2.84	19,661	2021
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	CRACK FILL	0.18	773	2021
E 36TH ST	DALLAS AVE	DUNTON RD	PREVENTATIVE MAINTENANCE MINOR	0.50	19,396	2021
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.20	196,944	2021
MAIN ST	AMHERST SCL	Longbrook Dr	PREVENTATIVE MAINTENANCE MINOR	0.36	16,114	2021
MAIN ST	Longbrook Rd	Beavercrest Dr	PREVENTATIVE MAINTENANCE MINOR	0.86	38,494	2021
OBERLIN AVE	Meister Rd	US 6 (ERIE AVE)	PREVENTATIVE MAINTENANCE MINOR	6.96	186,918	2021
SR 57	0.18 MILES NORTH OF SR 254	E 36TH ST	CRACK FILL & SLURRY	2.04	82,788	2021
SR 57	E 36TH ST	E 28TH ST (SR 57)	CRACK FILL	3.12	22,717	2021
SR 57	FULTON RD	GROVE AVE (SR 57)	CRACK FILL	6.88	43,524	2021
SR 611	DIDRICKSON DR	SR 58 (LEAVITT RD)	PREVENTATIVE MAINTENANCE MINOR	3.36	125,328	2021
TOWER BLVD	FALBO AVE	OBERLIN AVE	CRACK FILL & SLURRY	1.24	38,482	2021
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	CRACK FILL	3.04	23,223	2021
W 36TH ST	FALBO AVE	DAYTON AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	55,860	2021
WASHINGTON AVE	W 22ND ST	W 13TH ST	CRACK FILL & SLURRY	1.04	32,275	2021
THE 2021 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$902,497	

M&R Program

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
COLORADO AVE	GEORGIA AVE	SR 611 (HENDRICKS DR) / KANSAS AVE	PREVENTATIVE MAINTENANCE MINOR	1.32	40,366	2022
COOPER-FOSTER PARK RD	NORTH RIDGE RD	BROADWAY AVE	PREVENTATIVE MAINTENANCE MINOR	2.18	103,330	2022
E 36TH ST	DUNTON RD	EAGLE AVE / PLANT ST	PREVENTATIVE MAINTENANCE MINOR	0.14	5,566	2022
E 36TH ST	ELYRIA AVE	DALLAS AVE	PREVENTATIVE MAINTENANCE MINOR	0.68	27,033	2022
OBERLIN AVE	COOPER FOSTER PARK RD	MEISTER RD	CRACK FILL & SLURRY	6.44	252,078	2022
SR 57	BROADWAY AVE	FULTON RD	SELECTIVE PATCH, MILL & 1.5" O/L	2.44	279,808	2022
SR 57	E 14TH ST	E 9TH ST	SELECTIVE PATCH, MILL & 1.5" O/L	1.24	147,886	2022
SR 57	E 36TH ST	0.18 MILES NORTH OF SR 254	CRACK FILL & SLURRY	2.04	84,841	2022
SR 57	E 9TH ST	US 6 (ERIE AVE)	CRACK FILL	1.96	12,467	2022
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	CRACK FILL	1.28	6,419	2022
SR 611	US 6 (W ERIE AVE)	DIDRICKSON DR	PREVENTATIVE MAINTENANCE MINOR	1.20	33,026	2022
SR 611	W 21ST ST	US 6 (W ERIE AVE)	CRACK FILL	0.88	4,952	2022
SR00058	COOPER FOSTER PARK RD	SR 611	SELECTIVE PATCH, MILL & 1.5" O/L	9.36	1,202,164	2022
W 36TH ST	LEXINGTON AVE	BROADWAY AVE	CRACK FILL & SLURRY	0.48	15,265	2022
THE 2022 REQUIRED BUDGET FOR THE "M&R" PROGRAM					\$2,215,201	

Maintain Lowest Standard PCR

Pavement Treatment List

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	2.84	342,522	2018
BAUMHART RD	US 6 (W ERIE AVE)	LORAIN SCL	2.0IN. HOT MIX MILL & OVERLAY	2.84	433,862	2018
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.18	13,475	2018
HIGHLAND PARK BLVD	OBERLIN AVE	WASHINGTON AVE	2.0IN. HOT MIX MILL & OVERLAY	0.64	101,143	2018
SR 57	E 36TH ST	E 28TH ST (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	3.12	395,756	2018
SR 57	FULTON RD	GROVE AVE (SR 57)	SELECTIVE PATCH, MILL & 1.5" O/L	6.88	758,242	2018
SR 57	SR 57 (E 28TH ST)	E 14TH ST	2.0IN. HOT MIX MILL & OVERLAY	4.00	526,788	2018
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	SELECTIVE PATCH, MILL & 1.5" O/L	3.04	404,573	2018
US 6	SR 57 (BROADWAY)	LORAIN WCL	2.0IN. HOT MIX MILL & OVERLAY	5.46	1,351,843	2018
US 6	SR 58 (LEAVITT RD)	SR 57 (BROADWAY)	2.0IN. HOT MIX MILL & OVERLAY	5.76	819,261	2018
US 6	VERMILION ECL	WESTLAKE GDNS DRIVEWAY	2.0IN. HOT MIX MILL & OVERLAY	12.08	2,036,350	2018
US 6	WESTLAKE GDNS DRIVEWAY	PUEBLO DR	2.0IN. HOT MIX MILL & OVERLAY	3.04	512,459	2018
W 36TH ST	FALBO AVE	DAYTON AVE	PREVENTATIVE MAINTENANCE MAJOR	0.48	138,406	2018
THE 2018 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$7,834,680	

Maintain Lowest Standard PCR

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
COOPER-FOSTER PARK RD	AMHERST WCL	OBERLIN AVE	PREVENTATIVE MAINTENANCE MINOR	0.08	3,637	2019
E 36TH ST	EAGLE AVE / PLANT ST	GLOBE AVE	PREVENTATIVE MAINTENANCE MINOR	0.76	21,594	2019
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	MICRO - PAVE (TYPE II SURF. TR.)	2.20	90,263	2019
MAIN ST	BEAVERCREST DR	US 6 (ERIE AVE)	MICRO - PAVE (TYPE II SURF. TR.)	1.08	66,467	2019
SR 611	W 21ST ST	US 6 (W ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	0.88	86,263	2019
TACOMA AVE	E 31ST ST	E 28TH ST	JOINT REPAIR	0.46	8,156	2019
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	PREVENTATIVE MAINTENANCE MINOR	1.94	46,853	2019
TOWER BLVD	SR 58 (LEAVITT RD)	OBERLIN AVE	PREVENTATIVE MAINTENANCE MINOR	1.94	46,853	2019
WASHINGTON AVE	HIGHLAND PARK RD	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK RD	JOINT REPAIR	0.08	1,418	2019
YORKTOWN RD	OAK POINT RD	Longbrook Rd	PREVENTATIVE MAINTENANCE MINOR	0.56	21,481	2019
YORKTOWN RD	YORKTOWN RD	KOLBE RD	PREVENTATIVE MAINTENANCE MINOR	0.68	21,253	2019
THE 2019 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$414,238	

Maintain Lowest Standard PCR

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
E 36TH ST	DUNTON RD	EAGLE AVE / PLANT ST	CRACK FILL & SLURRY	0.14	4,240	2020
SR 57	E 9TH ST	US 6 (ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	1.96	222,577	2020
SR 611	ELYRIA AVE	BRIDGE OVER BLACK RIVER	SELECTIVE PATCH, MILL & 1.5" O/L	1.28	114,609	2020
WASHINGTON AVE	DRIVEWAY 0.04 MILES NORTH OF HIGHLAND PARK DR	N CENTRAL DR	JOINT REPAIR	0.14	2,544	2020
WASHINGTON AVE	N CENTRAL DR	W 22ND ST	JOINT REPAIR	0.44	7,995	2020
THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$351,965	

Maintain Lowest Standard PCR

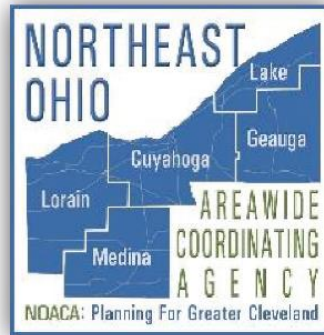
Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
BAUMHART RD	LORAIN SCL	US 6 (W ERIE AVE)	CRACK FILL	2.84	19,661	2021
E 36TH ST	0.09 MILES WEST OF ELYRIA AVE	ELYRIA AVE	CRACK FILL	0.18	773	2021
MAIN ST	AMHERST SCL	Longbrook Dr	PREVENTATIVE MAINTENANCE MINOR	0.36	16,114	2021
SR 57	BROADWAY AVE	FULTON RD	MICRO - PAVE (TYPE II SURF. TR.)	2.44	131,422	2021
SR 57	E 14TH ST	E 9TH ST	PREVENTATIVE MAINTENANCE MINOR	1.24	48,102	2021
SR 57	E 36TH ST	E 28TH ST (SR 57)	CRACK FILL	3.12	22,717	2021
SR 57	FULTON RD	GROVE AVE (SR 57)	CRACK FILL	6.88	43,524	2021
US 6	PUEBLO DR	WESTLAKE GDNS DRIVEWAY	CRACK FILL	3.04	23,223	2021
W 36TH ST	FALBO AVE	DAYTON AVE	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	55,860	2021
THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$361,396	

Maintain Lowest Standard PCR

Pavement Treatment List (Continued)

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
COOPER-FOSTER PARK RD	AMHERST WCL	OBERLIN AVE	PREVENTATIVE MAINTENANCE MINOR	0.08	3,914	2022
E 36TH ST	DALLAS AVE	DUNTON RD	PREVENTATIVE MAINTENANCE MINOR	0.50	19,877	2022
E 36TH ST	EAGLE AVE / PLANT ST	GLOBE AVE	PREVENTATIVE MAINTENANCE MINOR	0.76	23,241	2022
E 36TH ST	GLOBE AVE	SR 57 (GROVE AVE)	MICRO - PAVE (TYPE II SURF. TR.)	2.20	97,147	2022
MAIN ST	BEAVERCREST DR	US 6 (ERIE AVE)	SELECTIVE PATCH, MILL & 1.5" O/L	1.08	148,619	2022
SR 58	COOPER FOSTER PARK RD	SR 611	SELECTIVE PATCH, MILL & 1.5" O/L	9.36	1,202,164	2022
SR 611	W 21ST ST	US 6 (W ERIE AVE)	CRACK FILL	0.88	4,952	2022
TOWER BLVD	OBERLIN AVE	SR 58 (LEAVITT RD)	PREVENTATIVE MAINTENANCE MINOR	1.94	50,426	2022
TOWER BLVD	SR 58 (LEAVITT RD)	OBERLIN AVE	PREVENTATIVE MAINTENANCE MINOR	1.94	50,426	2022
YORKTOWN RD	OAK POINT RD	Longbrook Rd	PREVENTATIVE MAINTENANCE MINOR	0.56	23,119	2022
YORKTOWN RD	YORKTOWN RD	KOLBE RD	PREVENTATIVE MAINTENANCE MINOR	0.68	22,874	2022
THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY					\$1,646,759	



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.

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 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