

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 NORTH RIDGEVILLE**

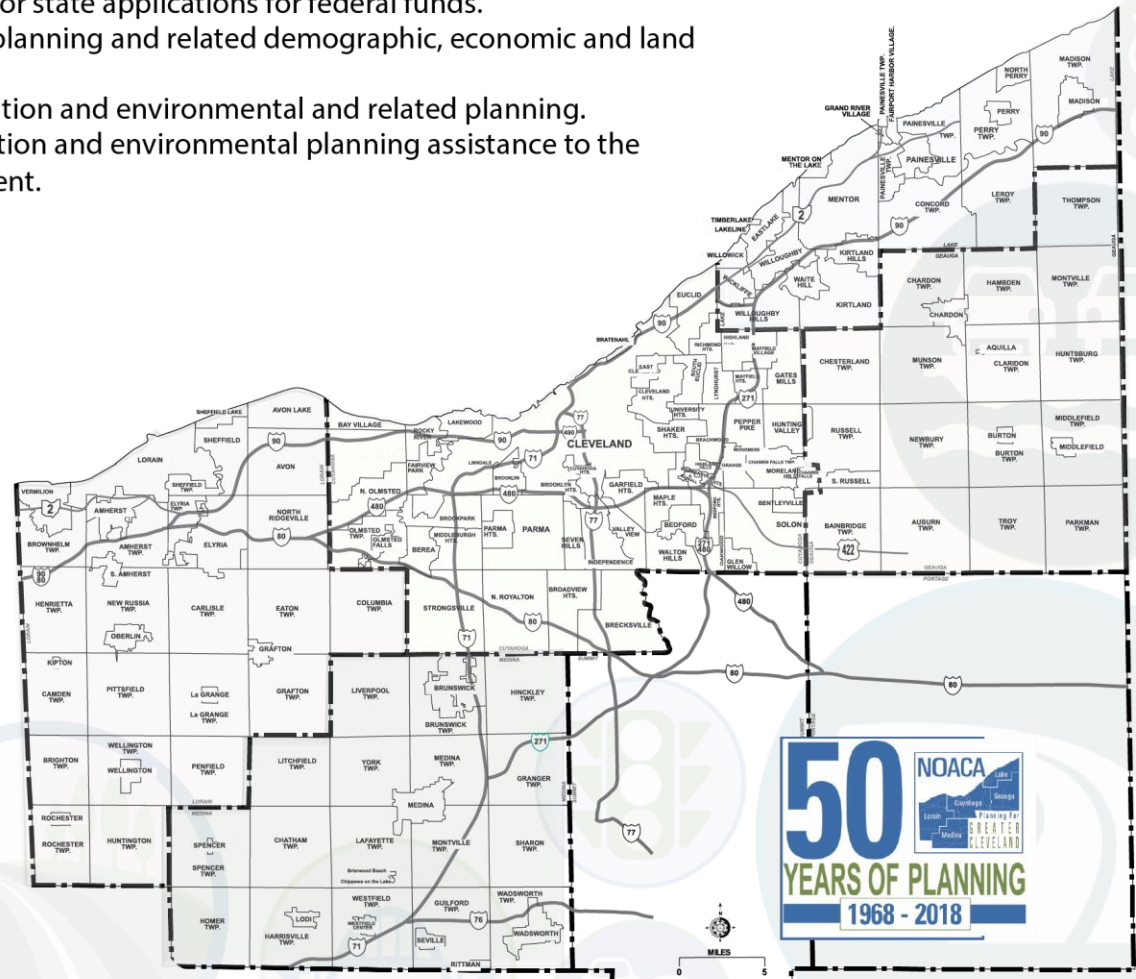


The **Northeast Ohio Areawide Coordinating Agency** (NOACA) is a public organization serving the counties of and municipalities and townships within Cuyahoga, Geauga, Lake, Lorain and Medina (covering an area with 2.1 million people). NOACA is the agency designated or recognized to perform the following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

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## EXECUTIVE SUMMARY

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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 North Ridgeville there are 37.63 centerline miles of federal-aid roads, which are equivalent to 76.52 lane-miles within the city boundary that include 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). The 2016 ODOT pavement database has 48 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 Ratings (PCR), etc.

According to the PCR measure, 70 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition and only a small percent of pavement is in the “Fair to Poor” status and demands some kind of immediate preventive maintenance and /or 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 48 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 (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

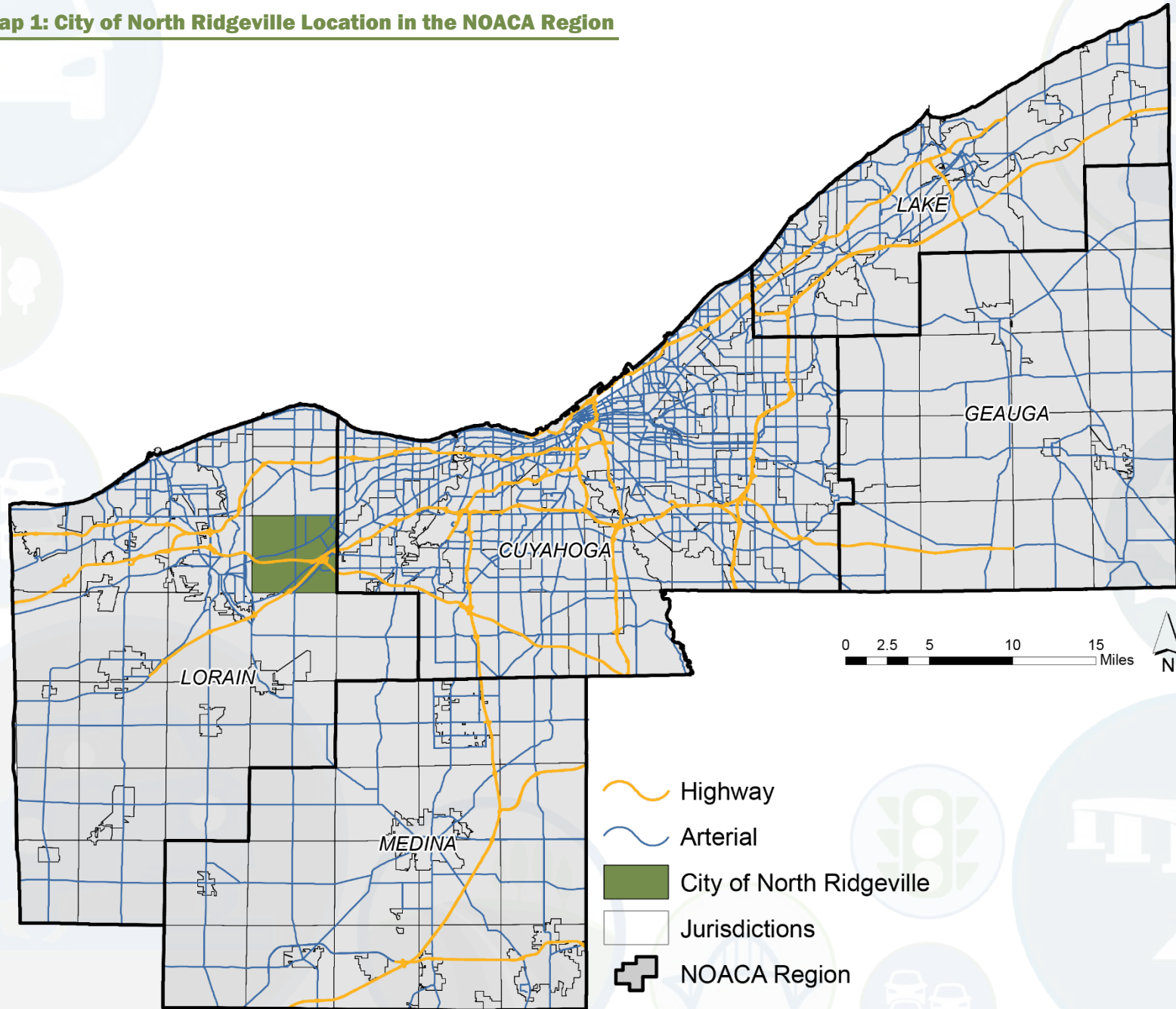
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North Ridgeville is a city located along the eastern border of Lorain County, Ohio. The first settlement of what is now North Ridgeville was made in 1810. The village was named for a ridge near the original town site.

As of the Northeast Ohio Areawide Coordinating Agency (NOACA) 2015 estimates, the city had a population of 33,858 and employment of 8,605. 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



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 North Ridgeville 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 North Ridgeville 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 North Ridgeville 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 48 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 Ratings (PCR), etc.

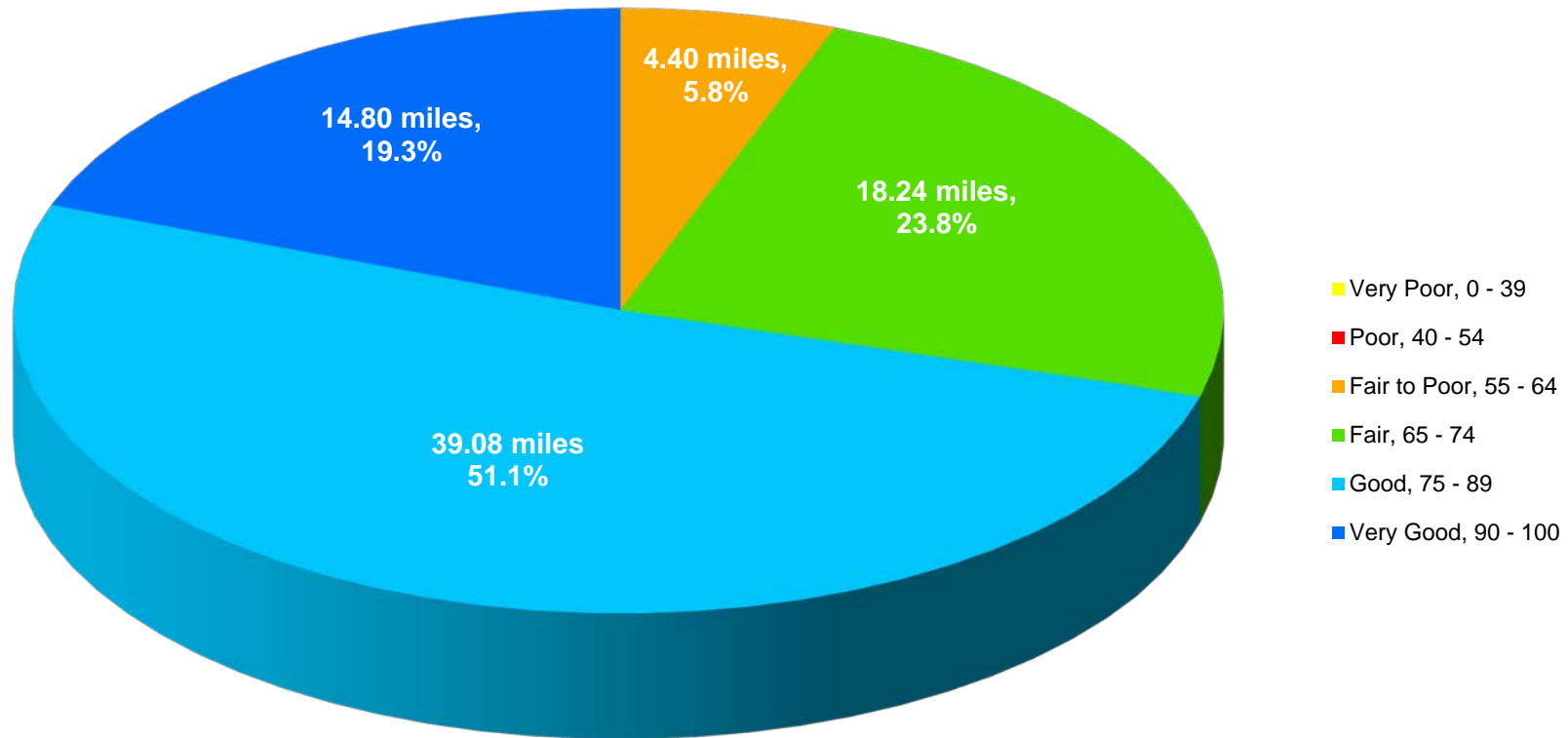
Based on the utilized ODOT database, there are 37.63 centerline miles of federal-aid eligible roads which are equivalent to 76.52 lane-miles in the City of North Ridgeville. The total area of roadway is 6,356,646 Sq. Ft.

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 North Ridgeville segment PCRs is about 80. Table 2 and Figure 1 summarize the 2016 North Ridgeville pavement network conditions by percentages of roadway lane-miles length.

**Table 2: 2016 North Ridgeville Pavement Network Condition**

Pavement Condition	PCR Range	Lane-Miles	Percent of Lane-Miles
Very Poor	0 - 39	0	0%
Poor	40 - 54	0	0%
Fair to Poor	55 - 64	4.40	5.8%
Fair	65 - 74	18.24	23.8%
Good	75 - 89	39.08	51.1%
Very Good	90 - 100	14.80	19.3%

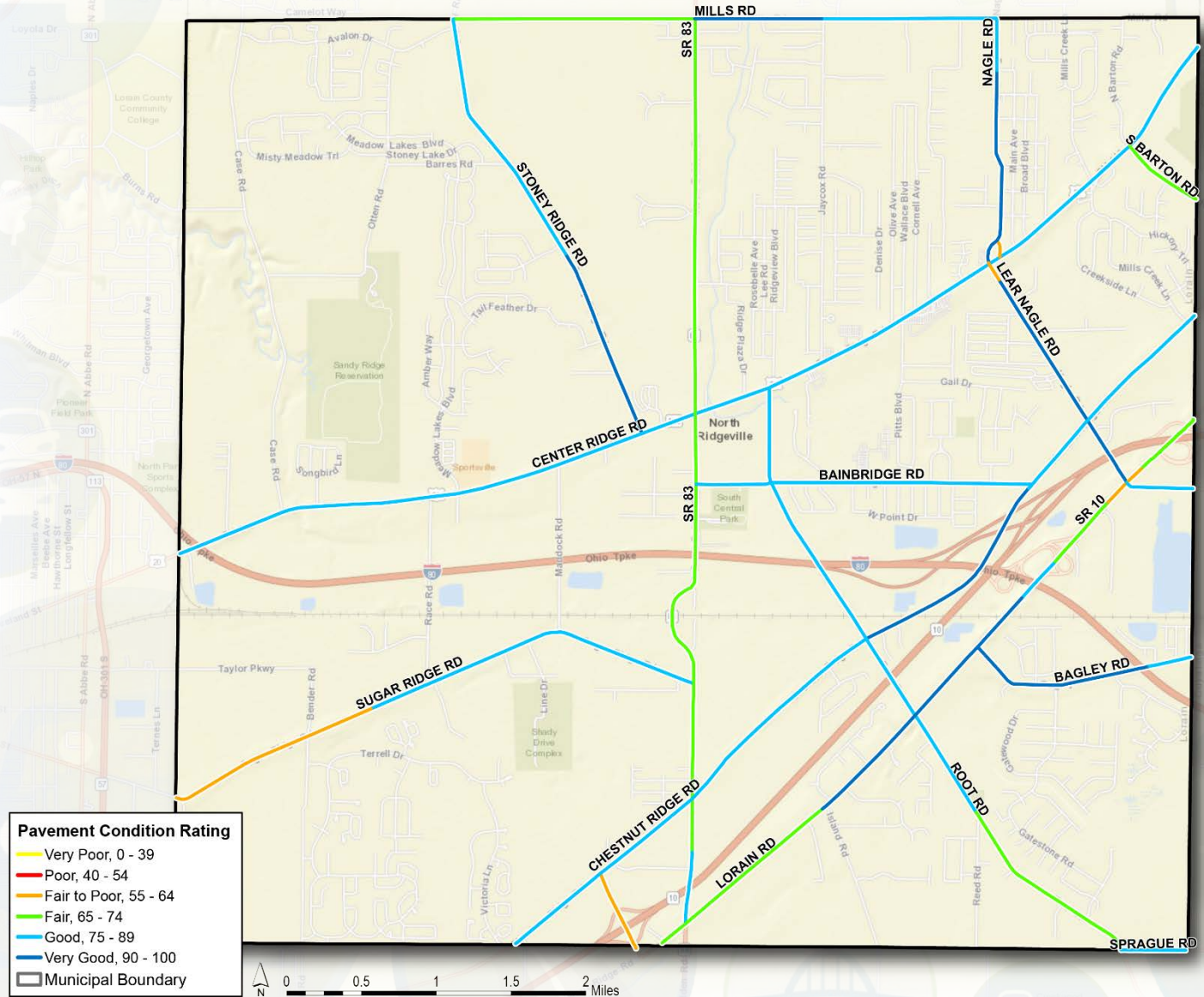
**Figure 1: 2016 North Ridgeville Pavement Network Condition Chart by Lane-Miles**



As indicated, 70 percent of the pavement lane-miles are currently in the “Good” to “Very Good” condition” condition and the lane-mile weighted average PCR also represents a “Good” condition. A small percent of pavement is in the “Fair to Poor” status and demands some kind of immediate maintenance and rehabilitation treatments.

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

Map 2: 2016 City of North Ridgeville Pavement Condition



**Table 3: 2016 City of North Ridgeville Pavement Condition Listing**

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
BAGLEY RD	LORAIN RD	UP TO THE OHIO TURNPIKE (I 80)	MINOR ARTERIAL	1.94	90
BAGLEY RD	OHIO TURNPIKE (I 80)	LORAIN/CUYAHOGA COUNTY LINE	MINOR ARTERIAL	0.44	89
BAINBRIDGE RD	SR 83	CHESTNUT RIDGE RD	MAJOR COLLECTOR	3.38	86
CENTER RIDGE RD (US 20)	ELYRIA ECL	LORAIN / CUYAHOGA COUNTY LINE	PRINCIPAL ARTERIAL-OTHER	11.8	83
CHESTNUT RIDGE RD	ARCHER RD	ROOT RD	MAJOR COLLECTOR	4.66	84
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN/CUYAHOGA COUNTY LINE	MAJOR COLLECTOR	2.4	80
CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80) OVERPASS	BAINBRIDGE RD	MAJOR COLLECTOR	1.24	90
CHESTNUT RIDGE RD	ROOT RD	OHIO TURNPIKE (I 80) OVERPASS	MAJOR COLLECTOR	1.08	91
COOK RD	LORAIN / CUYAHOGA COUNTY LINE	SR 10	MAJOR COLLECTOR	0.7	86
LEAR NAGLE RD	0.10 MILES S OF US 20	US 20	MAJOR COLLECTOR	0.2	64
LEAR NAGLE RD	ADELE ST	MILLS RD	MAJOR COLLECTOR	0.52	89
LEAR NAGLE RD	ELYRIA ST	ADELE ST	MAJOR COLLECTOR	1.54	91
LEAR NAGLE RD	I 480	0.10 MILES S OF US 20	MAJOR COLLECTOR	2.2	98
LEAR NAGLE RD	N LEAR NAGLE RD	ELYRIA ST	MAJOR COLLECTOR	0.1	91
LEAR NAGLE RD	SR 10	I 480	MAJOR COLLECTOR	0.2	98
LEAR NAGLE RD	US 20 (CENTER RIDGE RD)	N LEAR NAGLE RD	MAJOR COLLECTOR	0.34	96
LORAIN RD	ISLAND RD	UP TO THE OHIO TURNPIKE (I 80)	MINOR ARTERIAL	2.92	96
LORAIN RD	OHIO TURNPIKE (I 80)	OHIO TURNPIKE (I 80) NORTH RAMPS	MINOR ARTERIAL	1	78
LORAIN RD	SR 83	ISLAND RD	MINOR ARTERIAL	1.82	71
MILLS RD	JAYCOX RD	LEAR NAGLE RD	MAJOR COLLECTOR	1.76	86

**Table 3: 2016 City of North Ridgeville Pavement Condition Listing (Continued)**

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
MILLS RD	SR 83 (AVON BELDEN RD)	JAYCOX RD	MAJOR COLLECTOR	1.28	93
MILLS RD	STONEY RIDGE RD	SR 83 (AVON BELDEN RD)	MAJOR COLLECTOR	2.44	74
N LEAR NAGLE RD	0.03 MILES N OF US 20	LEAR NAGLE RD	MAJOR COLLECTOR	0.12	64
N LEAR NAGLE RD	US 20	0.03 MILES N OF US 20	MAJOR COLLECTOR	0.06	64
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80)	MINOR ARTERIAL	1.22	81
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	MINOR ARTERIAL	0.72	82
ROOT RD	OHIO TURNPIKE (I 80)	US 20	MINOR ARTERIAL	1.56	86
ROOT RD	REED RD	LORAIN RD	MINOR ARTERIAL	1.32	82
ROOT RD	SPRAGUE RD	REED RD	MINOR ARTERIAL	2.04	73
S BARTON RD	US 20	LORAIN/CUYAHOGA COUNTY LINE	MAJOR COLLECTOR	0.88	68
SPRAGUE RD	ROOT RD	LORAIN/CUYAHOGA COUNTY LINE	MINOR ARTERIAL	0.68	83
SR 10	I 480 SOUTH RAMPS	LORAIN/CUYAHOGA COUNTY LINE	PRINCIPAL ARTERIAL-OTHER	0.48	66
SR 10	LORAIN/CUYAHOGA COUNTY LINE	I 480 SOUTH RAMPS	PRINCIPAL ARTERIAL-OTHER	0.48	69
SR 10	LEAR NAGLE RD / COOK RD	I 480 SOUTH RAMPS	MINOR ARTERIAL	0.52	70
SR 10	OHIO TURNPIKE (I 80) NORTH RAMPS	VICTORY LN	MINOR ARTERIAL	0.78	68
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	MINOR ARTERIAL	1	55

**Table 3: 2016 City of North Ridgeville Pavement Condition Listing (Continued)**

ROAD NAME	FROM	TO	FUNCTION CLASS	LANE-MILES	PCR
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	MINOR ARTERIAL	1.58	69
SR 83	LORAIN RD	HEDGEROW PARK DR	MINOR ARTERIAL	0.72	78
SR 83	OHIO TURNPIKE (I 80)	US 20 (CENTER RIDGE RD)	MINOR ARTERIAL	1.48	73
SR 83	PATRICIA AVE	SR 83 (AVON BELDEN RD)	MINOR ARTERIAL	0.3	74
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	MINOR ARTERIAL	0.84	55
SR 83	SUGAR RIDGE RD	OHIO TURNPIKE (I 80)	MINOR ARTERIAL	1.48	73
SR 83	US 20 (CENTER RIDGE RD)	MILLS RD	MINOR ARTERIAL	3.96	67
STONEY RIDGE RD	STONE CREEK DR	MILLS RD	MAJOR COLLECTOR	2.68	78
STONEY RIDGE RD	US 20 (CENTER RIDGE RD)	STONE CREEK DR	MAJOR COLLECTOR	1.96	95
SUGAR RIDGE RD	0.30 MILES SOUTHWEST OF RACE RD	RACE RD	MINOR ARTERIAL	0.6	78
SUGAR RIDGE RD	EAST BROAD ST	0.30 MILES SOUTHWEST OF RACE RD	MINOR ARTERIAL	2.18	61
SUGAR RIDGE RD	RACE RD	SR 83 (AVON BELDEN RD)	MINOR ARTERIAL	2.92	78

## PART II: 2018 CURRENT BACKLOG

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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.

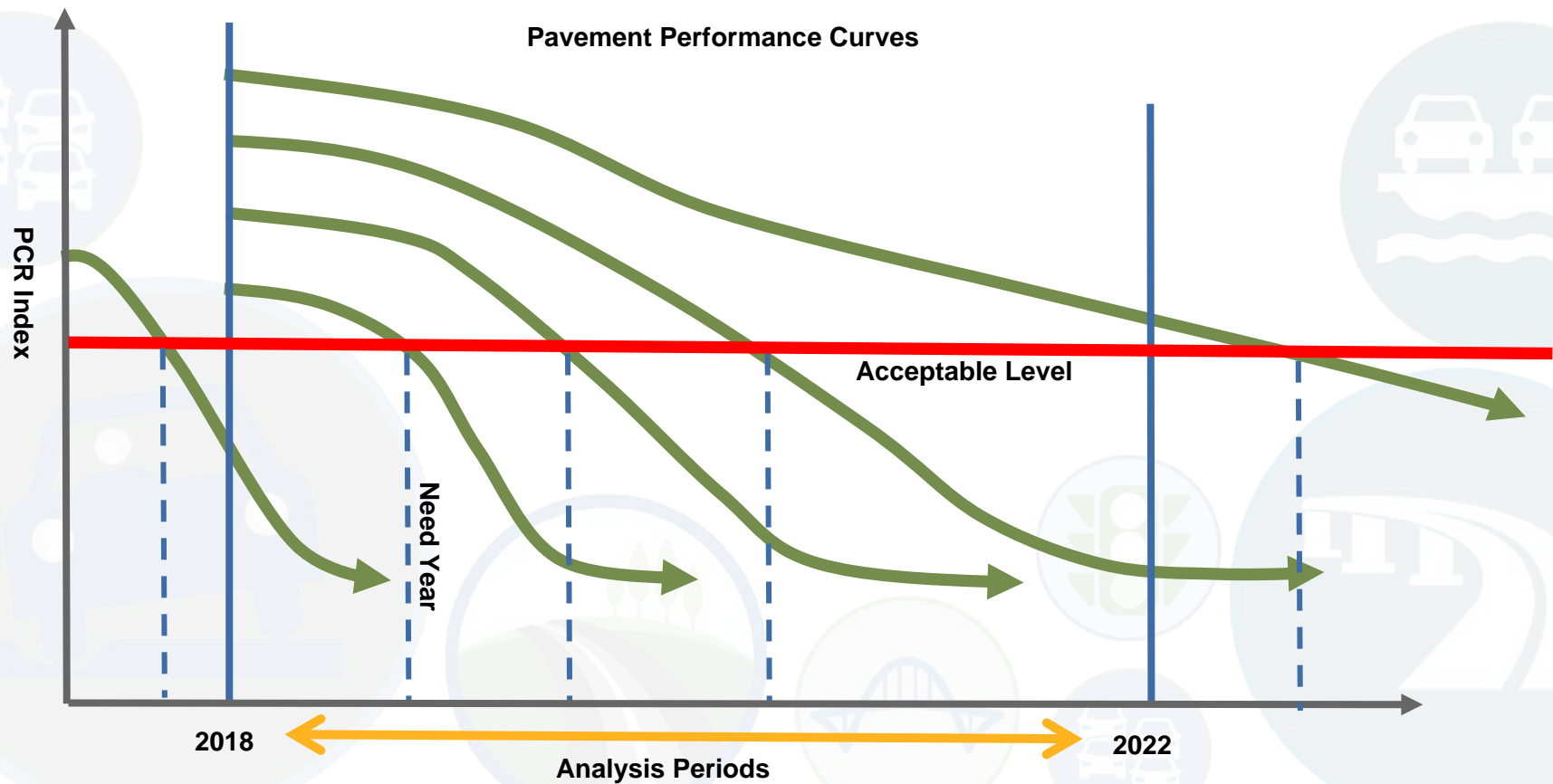
The Appendix includes all the backlog pavement treatments. As illustrated, the 2018 backlog treatment list includes segments which their 2018 PCRs are below the minimum acceptable level and are recommended with various reconstruction treatments. There are four segments in the 2018 backlog list with the total of 4.5 lane-miles. The 2018 backlog cost of the recommended treatments is over four million dollars.

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

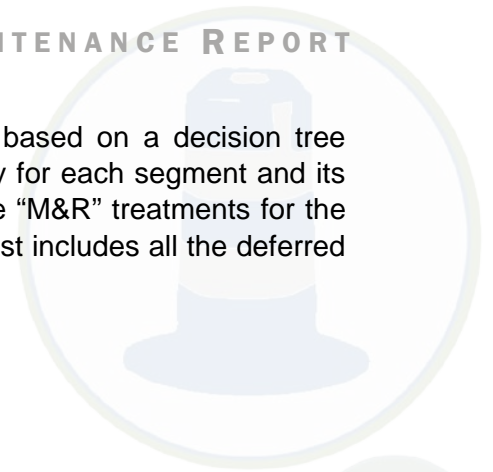
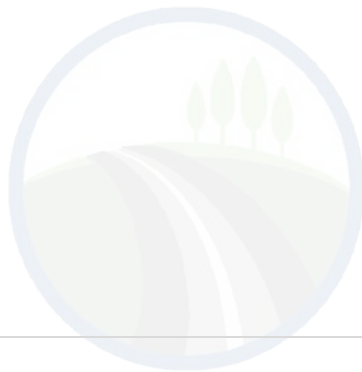
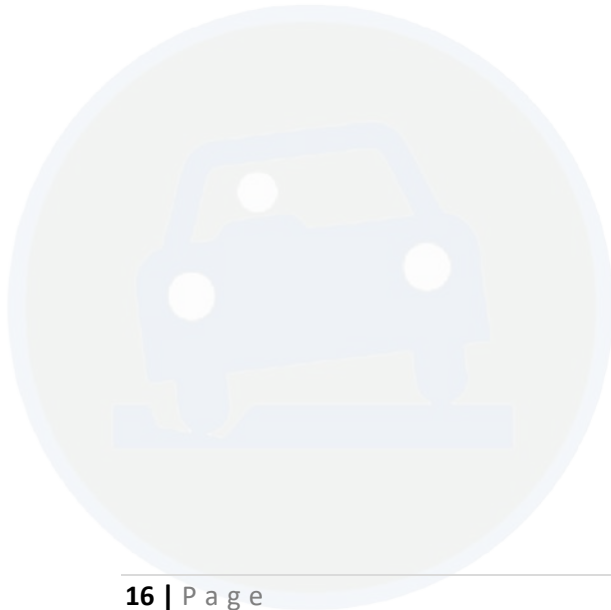
In order to estimate the preventive maintenance and rehabilitation requirements of a pavement network over a period of time, the first step is to determine the “Need Year” or when a pavement segment requires rehabilitation. The “Need Year” of a pavement is defined as the year in which the pavement condition 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 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-mile weighted average.

**Table 4: Performance Comparison of the Constraint Scenarios**

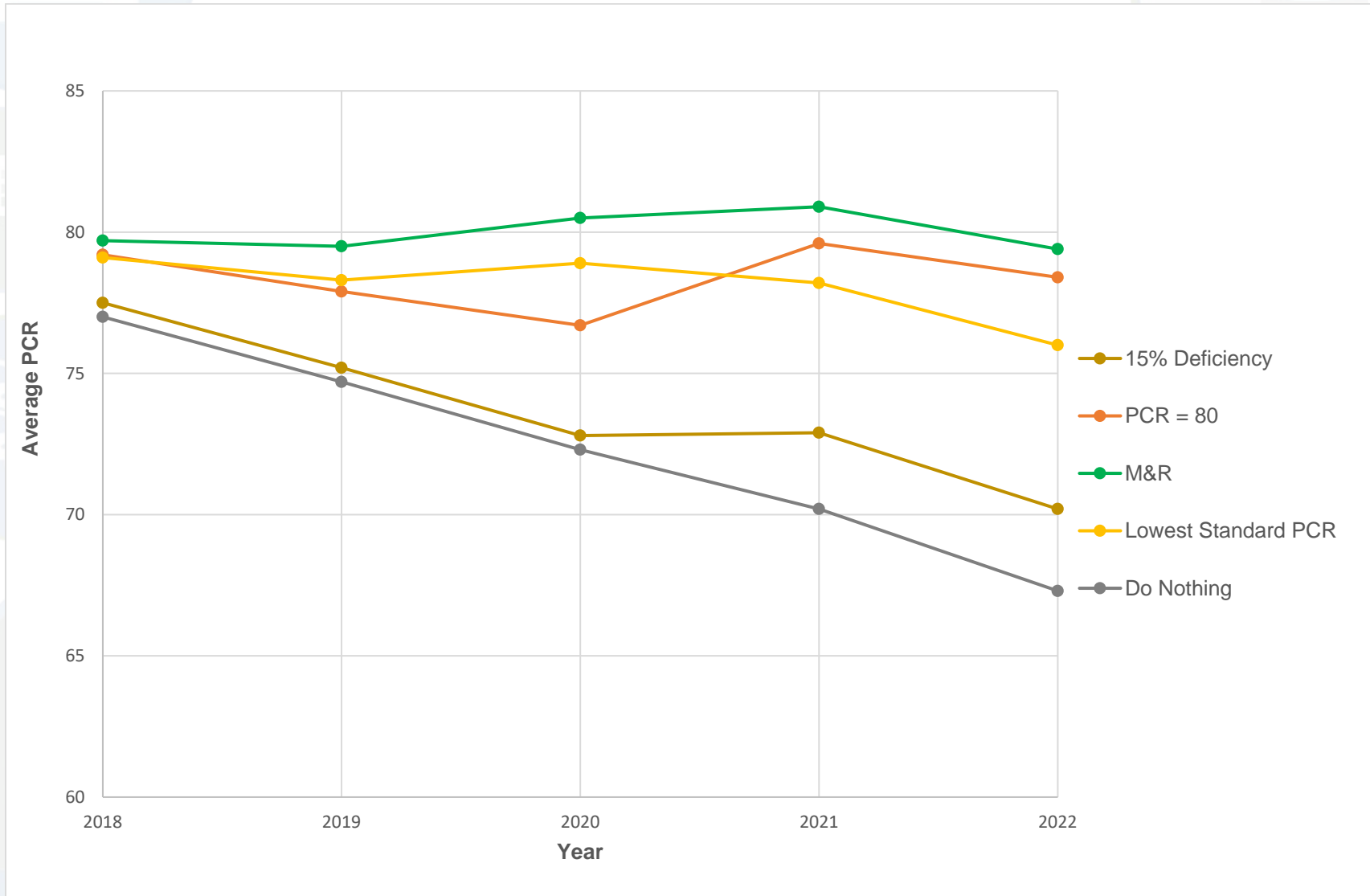
Maintenance Strategy	Strategy Group	5-Year Total Required Dollars	Network Average PCR	Network PCR at the End of the 5-Year Period	Percent of Pavement below the Minimum PCR
2018 Current Backlog	2018 Backlog	4,373,358	80.2	-	0%
Maintain 15% Deficiency	NOACA Transportation Asset Management Targets	572,749	73.7	70.2	10.5%
Maintain an Average Network PCR of 80		2,170,131	78.4	78.4	2.1%
M&R Program	Scenarios	2,389,305	80	79.4	0%
Maintain Lowest Standard PCR		1,577,812	78.1	76	0%

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 80.2 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. This strategy requires a budget of 2.4 million dollars during the analysis period. The “Maintain an Average Network PCR of 80” scenario provides almost the same level of condition with a similar budget requirement. Contrary to the above scenarios, the “Maintain Lowest Standard PCR” scenario requires about 1.6 million dollars and offers a similar network average of PCR. The required budget for the “Maintain 15% deficiency” is much less than the others and this is due to the general good pavement conditions in this city. More than 10 percent of the segments will have pavement conditions below the acceptable level in this scenario.

It should be noted that the backlog cost as the benchmark is about two times more than the “M&R” program cost and both strategies have a similar network average PCR. 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
SUGAR RIDGE RD	EAST BROAD ST	0.30 MILES SOUTHWEST OF RACE RD	MINOR REHAB WITH REPAIRS (AC)	2.18	1,550,333
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	STRUCTURAL CPR (REHAB WITH MORE REPAIR WORK)	0.48	365,979
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	MAJOR REHAB/RECONSTRUCTION	0.84	1,292,568
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	MAJOR REHAB/RECONSTRUCTION	1.00	1,164,478
<b>REQUIRED BACKLOG BUDGET (2018\$)</b>					<b>\$4,373,358</b>

**Maintain 15% Deficiency**

**Pavement Treatment List**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
LEAR NAGLE RD	0.1 MILES SOUTH OF US 20 (CENTER RIDGE RD)	US 20 (CENTER RIDGE RD)	SELECTIVE PATCH, MILL & 1.5" O/L	0.2	23,275	2021
SR 83	US 20 (CENTER RIDGE RD)	MILLS RD	SELECTIVE PATCH, MILL & 1.5" O/L	3.96	549,474	2021
<b>THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN 15% DEFICIENCY" STRATEGY</b>					<b>\$572,749</b>	

**Note: The "Maintain 15% Deficiency" strategy does not have any pavement maintenance treatments with the recommended implementation years of 2018, 2019, 2020 and 2022.**

**Maintain an Average Network PCR of 80**

**Pavement Treatment List**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
MILLS RD	STONE RIDGE RD	SR 83 (AVON BELDEN RD)	PREVENTATIVE MAINTENANCE MINOR	2.44	74,416	2018
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	SELECTIVE PATCH, MILL & 1.5" O/L	1.00	116,448	2018
SR 83	LORAIN RD	HEDGEROW PARK DR	PREVENTATIVE MAINTENANCE MINOR	0.72	30,942	2018
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	SELECTIVE PATCH, MILL & 1.5" O/L	0.84	129,257	2018
<b>THE 2018 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY</b>					<b>\$351,063</b>	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
LORAIN RD	OHIO TURNPIKE (I 80)	OHIO TURNPIKE (I 80) NORTH RAMPS	PREVENTATIVE MAINTENANCE MINOR	1.00	35,517	2019
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	51,144	2019
SUGAR RIDGE RD	0.3 MILES SOUTHWEST OF RACE RD	RACE RD	PREVENTATIVE MAINTENANCE MINOR	0.60	23,015	2019
SUGAR RIDGE RD	RACE RD	SR 83 (AVON BELDEN RD)	PREVENTATIVE MAINTENANCE MINOR	2.92	112,005	2019
<b>THE 2019 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY</b>					<b>\$221,681</b>	

**Maintain an Average Network PCR of 80**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
SR 10	LORAIN / CUYAHOGA COUNTY LINE	I 480 SOUTH RAMPS	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	52,412	2020
SR 10	OHIO TURNPIKE (I 80) NORTH RAMPS	VICTORY LN	SELECTIVE PATCH, MILL & 1.5" O/L	0.78	91,983	2020
STONE RIDGE RD	STONE CREEK DR	MILLS RD	PREVENTATIVE MAINTENANCE MINOR	2.68	93,643	2020
<b>THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY</b>					<b>\$238,038</b>	

**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	BAINBRIDGE RD	LORAIN / CUYAHOGA COUNTY LINE	PREVENTATIVE MAINTENANCE MINOR	2.40	85,939	2021
LEAR NAGLE RD	0.1 MILE SOUTH OF US 20 (CENTER RIDGE RD)	US 20 (CENTER RIDGE RD)	SELECTIVE PATCH, MILL & 1.5" O/L	0.20	23,275	2021
LEAR NAGLE RD	ADELE ST	MILLS RD	CRACK FILL & SLURRY	0.52	16,138	2021
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80)	PREVENTATIVE MAINTENANCE MINOR	1.22	43,686	2021
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	PREVENTATIVE MAINTENANCE MINOR	0.72	25,782	2021
ROOT RD	REED RD	LORAIN RD	PREVENTATIVE MAINTENANCE MINOR	1.32	47,267	2021
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	CRACK FILL	1.00	6,684	2021
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	CRACK FILL	0.84	7,419	2021
SR 83	US 20 (CENTER RIDGE RD)	MILLS RD	SELECTIVE PATCH, MILL & 1.5" O/L	3.96	549,474	2021
SUGAR RIDGE RD	EAST BROAD ST	0.3 MILES SOUTHWEST OF RACE RD	SELECTIVE PATCH, MILL & 1.5" O/L	2.18	263,457	2021
<b>THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY</b>					<b>\$1,069,121</b>	

**Maintain an Average Network PCR of 80**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
BAGLEY RD	LORAIN RD	UP TO THE OHIO TURNPIKE (I 80)	CRACK FILL & SLURRY	1.94	66,444	2022
BAGLEY RD	OHIO TURNPIKE (I 80)	LORAIN / CUYAHOGA COUNTY LINE	CRACK FILL & SLURRY	0.44	16,146	2022
CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80) OVERPASS	BAINBRIDGE RD	CRACK FILL & SLURRY	1.24	36,402	2022
LEAR NAGLE RD	ELYRIA ST	ADELE ST	CRACK FILL & SLURRY	1.54	48,977	2022
LEAR NAGLE RD	N LEAR NAGLE RD	ELYRIA ST	CRACK FILL & SLURRY	0.10	3,180	2022
N LEAR NAGLE RD	0.03 MILES NORTH OF US 20 (CENTER RIDGE RD)	LEAR NAGLE RD	SELECTIVE PATCH, MILL & 1.5" O/L	0.12	12,110	2022
N LEAR NAGLE RD	US 20 (CENTER RIDGE RD)	0.03 MILES N OF US 20 (CENTER RIDGE RD)	SELECTIVE PATCH, MILL & 1.5" O/L	0.06	6,055	2022
SPRAGUE RD	ROOT RD	LORAIN / CUYAHOGA COUNTY LINE	PREVENTATIVE MAINTENANCE MINOR	0.68	31,192	2022
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	CRACK FILL	0.48	2,936	2022
SR 10	LEAR NAGLE RD / COOK RD	I 480 SOUTH RAMPS	SELECTIVE PATCH, MILL & 1.5" O/L	0.52	66,786	2022
<b>THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN AN AVERAGE NETWORK PCR OF 80" STRATEGY</b>					<b>\$290,228</b>	

**M&R Program**

**Pavement Treatment List**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
MILLS RD	STONE RIDGE RD	SR 83 (AVON BELDEN RD)	PREVENTATIVE MAINTENANCE MINOR	2.44	74,416	2018
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	49,906	2018
SR 10	LORAIN / CUYAHOGA COUNTY LINE	I 480 SOUTH RAMPS	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	49,906	2018
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	SELECTIVE PATCH, MILL & 1.5" O/L	1.00	116,448	2018
SR 83	LORAIN RD	HEDGEROW PARK DR	PREVENTATIVE MAINTENANCE MINOR	0.72	30,942	2018
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	SELECTIVE PATCH, MILL & 1.5" O/L	0.84	129,257	2018
<b>THE 2018 REQUIRED BUDGET FOR THE "M&amp;R" PROGRAM</b>					<b>\$450,875</b>	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
LORAIN RD	OHIO TURNPIKE (I 80)	OHIO TURNPIKE (I 80) NORTH RAMPS	PREVENTATIVE MAINTENANCE MINOR	1.00	35,517	2019
SUGAR RIDGE RD	0.3 MILES SOUTHWEST OF RACE RD	RACE RD	PREVENTATIVE MAINTENANCE MINOR	0.60	23,015	2019
SUGAR RIDGE RD	EAST BROAD ST	0.3 MILES SOUTHWEST OF RACE RD	SELECTIVE PATCH, MILL & 1.5" O/L	2.18	250,860	2019
SUGAR RIDGE RD	RACE RD	SR 83 (AVON BELDEN RD)	PREVENTATIVE MAINTENANCE MINOR	2.92	112,005	2019
<b>THE 2019 REQUIRED BUDGET FOR THE "M&amp;R" PROGRAM</b>					<b>\$421,397</b>	

**M&R Program**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
SR 10	OHIO TURNPIKE (I 80) NORTH RAMPS	VICTORY LN	SELECTIVE PATCH, MILL & 1.5" O/L	0.78	91,983	2020
SR 83	US 20 (CENTER RIDGE RD)	MILLS RD	SELECTIVE PATCH, MILL & 1.5" O/L	3.96	536,177	2020
STONE RIDGE RD	STONE CREEK DR	MILLS RD	PREVENTATIVE MAINTENANCE MINOR	2.68	93,643	2020
<b>THE 2020 REQUIRED BUDGET FOR THE "M&amp;R" PROGRAM</b>					<b>\$721,803</b>	

**M&R Program**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
CHESTNUT RIDGE RD	BAINBRIDGE RD	LORAIN / CUYAHOGA COUNTY LINE	PREVENTATIVE MAINTENANCE MINOR	2.40	85,939	2021
LEAR NAGLE RD	0.1 MILES SOUTH OF US 20 (CENTER RIDGE RD)	US 20 (CENTER RIDGE RD)	SELECTIVE PATCH, MILL & 1.5" O/L	0.20	23,275	2021
LEAR NAGLE RD	ADELE ST	MILLS RD	CRACK FILL & SLURRY	0.52	16,138	2021
N LEAR NAGLE RD	US 20 (CENTER RIDGE RD)	0.03 MILES NORTH OF US 20 (CENTER RIDGE RD)	SELECTIVE PATCH, MILL & 1.5" O/L	0.06	5,909	2021
ROOT RD	CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80)	PREVENTATIVE MAINTENANCE MINOR	1.22	43,686	2021
ROOT RD	LORAIN RD	CHESTNUT RIDGE RD	PREVENTATIVE MAINTENANCE MINOR	0.72	25,782	2021
ROOT RD	REED RD	LORAIN RD	PREVENTATIVE MAINTENANCE MINOR	1.32	47,267	2021
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	CRACK FILL	0.48	2,865	2021
SR 10	LEAR NAGLE RD / COOK RD	I 480 SOUTH RAMPS	SELECTIVE PATCH, MILL & 1.5" O/L	0.52	65,170	2021
SR 10	LORAIN / CUYAHOGA COUNTY LINE	I 480 SOUTH RAMPS	CRACK FILL	0.48	2,865	2021
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	CRACK FILL	1.00	6,684	2021
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	SELECTIVE PATCH, MILL & 1.5" O/L	1.58	233,380	2021
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	CRACK FILL	0.84	7,419	2021
<b>THE 2021 REQUIRED BUDGET FOR THE "M&amp;R" PROGRAM</b>					<b>\$566,379</b>	

**M&R Program**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
BAGLEY RD	LORAIN RD	UP TO THE OHIO TURNPIKE (I 80)	CRACK FILL & SLURRY	1.94	66,444	2022
BAGLEY RD	OHIO TURNPIKE (I 80)	LORAIN / CUYAHOGA COUNTY LINE	CRACK FILL & SLURRY	0.44	16,146	2022
CHESTNUT RIDGE RD	OHIO TURNPIKE (I 80) OVERPASS	BAINBRIDGE RD	CRACK FILL & SLURRY	1.24	36,402	2022
LEAR NAGLE RD	ELYRIA ST	ADELE ST	CRACK FILL & SLURRY	1.54	48,977	2022
LEAR NAGLE RD	N LEAR NAGLE RD	ELYRIA ST	CRACK FILL & SLURRY	0.10	3,180	2022
N LEAR NAGLE RD	0.03 MILES NORTH OF US 20 (CENTER RIDGE RD)	LEAR NAGLE RD	SELECTIVE PATCH, MILL & 1.5" O/L	0.12	12,110	2022
SPRAGUE RD	ROOT RD	LORAIN / CUYAHOGA COUNTY LINE	PREVENTATIVE MAINTENANCE MINOR	0.68	31,192	2022
SUGAR RIDGE RD	EAST BROAD ST	0.3 MILES SOUTHWEST OF RACE RD	CRACK FILL	2.18	14,400	2022
<b>THE 2022 REQUIRED BUDGET FOR THE "M&amp;R" PROGRAM</b>					<b>\$228,851</b>	

**Maintain Lowest Standard PCR**

**Pavement Treatment List**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2018\$)	YEAR
LEAR NAGLE RD	0.1 MILES SOUTH OF US 20 (CENTER RIDGE RD)	US 20 (CENTER RIDGE RD)	MICRO - PAVE (TYPE II SURF. TR.)	0.20	10,409	2018
N LEAR NAGLE RD	0.03 MILES NORTH OF US 20 (CENTER RIDGE RD)	LEAR NAGLE RD	MICRO - PAVE (TYPE II SURF. TR.)	0.12	5,285	2018
N LEAR NAGLE RD	US 20 (CENTER RIDGE RD)	0.03 MILES NORTH OF US 20 (CENTER RIDGE RD)	MICRO - PAVE (TYPE II SURF. TR.)	0.06	2,643	2018
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	SELECTIVE PATCH, MILL & 1.5" O/L	0.48	49,906	2018
SR 10	LEAR NAGLE RD / COOK RD	I 480 SOUTH RAMPS	MICRO - PAVE (TYPE II SURF. TR.)	0.52	29,146	2018
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	SELECTIVE PATCH, MILL & 1.5" O/L	1.00	116,448	2018
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	SELECTIVE PATCH, MILL & 1.5" O/L	0.84	129,257	2018
<b>THE 2018 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY</b>					<b>\$343,094</b>	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2019\$)	YEAR
SUGAR RIDGE RD	EAST BROAD ST	0.3 MILES SOUTHWEST OF RACE RD	SELECTIVE PATCH, MILL & 1.5" O/L	2.18	250,860	2019
<b>THE 2019 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY</b>					<b>\$250,860</b>	

**Maintain Lowest Standard PCR**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2020\$)	YEAR
SR 10	OHIO TURNPIKE (I 80) NORTH RAMPS	VICTORY LN	SELECTIVE PATCH, MILL & 1.5" O/L	0.78	91,983	2020
SR 83	US 20 (CENTER RIDGE RD)	MILLS RD	SELECTIVE PATCH, MILL & 1.5" O/L	3.96	536,177	2020
<b>THE 2020 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY</b>					<b>\$628,160</b>	
ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2021\$)	YEAR
LEAR NAGLE RD	0.1 MILES S OF US 20 (CENTER RIDGE RD)	US 20 (CENTER RIDGE RD)	MICRO - PAVE (TYPE II SURF. TR.)	0.20	11,203	2021
N LEAR NAGLE RD	0.03 MILES N OF US 20 (CENTER RIDGE RD)	LEAR NAGLE RD	MICRO - PAVE (TYPE II SURF. TR.)	0.12	5,688	2021
N LEAR NAGLE RD	US 20 (CENTER RIDGE RD)	0.03 MILES N OF US 20 (CENTER RIDGE RD)	MICRO - PAVE (TYPE II SURF. TR.)	0.06	2,844	2021
SR 10	I 480 SOUTH RAMPS	LORAIN / CUYAHOGA COUNTY LINE	CRACK FILL	0.48	2,865	2021
SR 10	LORAIN / CUYAHOGA COUNTY LINE	I 480 SOUTH RAMPS	2.0IN. HOT MIX MILL & OVERLAY	0.48	68,035	2021
SR 10	VICTORY LN	LEAR NAGLE RD / COOK RD	CRACK FILL	1.00	6,684	2021
SR 83	HEDGEROW PARK DR	SUGAR RIDGE RD	SELECTIVE PATCH, MILL & 1.5" O/L	1.58	233,380	2021
SR 83	SR 10 SOUTH RAMPS	CHESTNUT RIDGE RD	CRACK FILL	0.84	7,419	2021
<b>THE 2021 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY</b>					<b>\$338,118</b>	

**Maintain Lowest Standard PCR**

**Pavement Treatment List (Continued)**

ROAD NAME	FROM	TO	RECOMMENDED TREATMENT	LANE-MILES	IMPLEMENTATION	
					COST (2022\$)	YEAR
LEAR NAGLE RD	N LEAR NAGLE RD	ELYRIA ST	CRACK FILL & SLURRY	0.10	3,180	2022
SUGAR RIDGE RD	EAST BROAD ST	0.3 MILES SOUTHWEST OF RACE RD	CRACK FILL	2.18	14,400	2022
<b>THE 2022 REQUIRED BUDGET FOR THE "MAINTAIN LOWEST STANDARD PCR" STRATEGY</b>					<b>\$17,580</b>	

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**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**