

HIGHWAY PRESERVATION NEEDS

July 2016

Akron Metropolitan Area Transportation Study
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This report was prepared by the Akron Metropolitan Area Transportation Study (AMATS) in cooperation with the U.S. Department of Transportation, the Ohio Department of Transportation, and the Village, City and County governments of Portage and Summit Counties and Chippewa and Milton Township in Wayne County. The contents of this report reflect the views of AMATS, which is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view and policies of the Ohio and/or U.S. Department of Transportation. This report does not constitute a standard, specification or regulation.

Introduction

The AMATS Regional Transportation Plan Goals and Objectives recognize that maintaining and preserving the existing highway system should be a priority of the transportation planning process. Therefore, the purpose of this report is to estimate the federal funds (in 2016 dollars) needed to preserve and maintain the existing highway system between now and 2040. This report will not list specific maintenance projects; however, it will describe the existing highway system and outline highway resurfacing and replacement needs as well as bridge maintenance and replacement needs.

All highway system preservation projects on the federal aid system will be considered consistent with Regional Transportation Plan, named *Transportation Outlook 2040*, and will be eligible for federal funding as it becomes available. Highway maintenance items, such as shoulder and drainage improvements, pavement repairs, guardrail, fence replacement, pavement markings, signage, lighting and painting are included in the estimated costs for highway resurfacing and bridge maintenance. The findings of this report will be used in determining the portion of anticipated federal funding that should be reserved for highway projects to ensure maintenance and preservation of the existing highway system over the life of *Transportation Outlook 2040*.

Existing Highway System

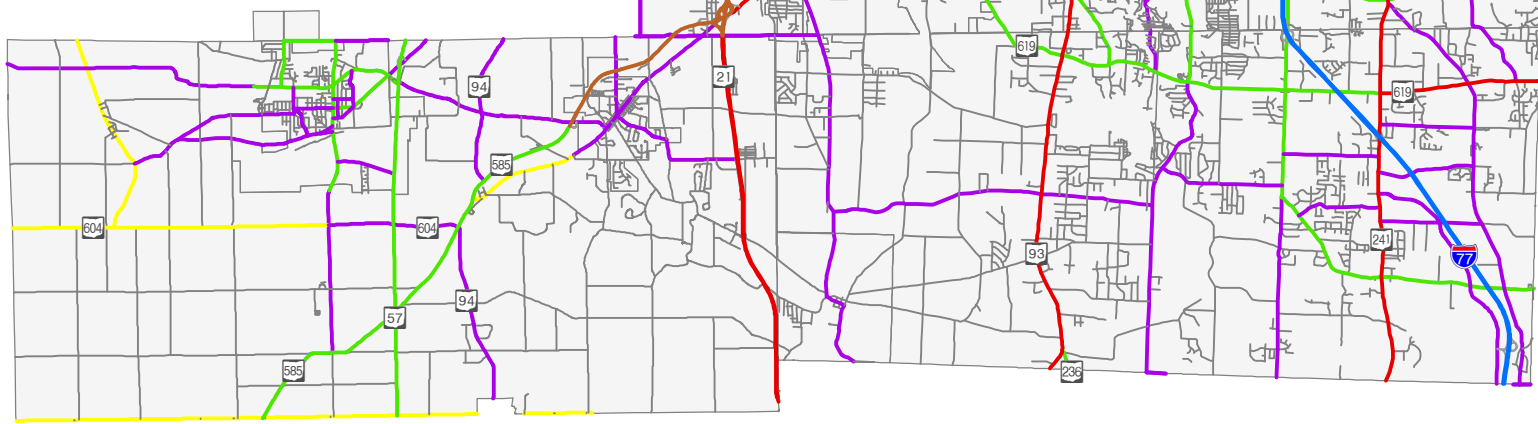
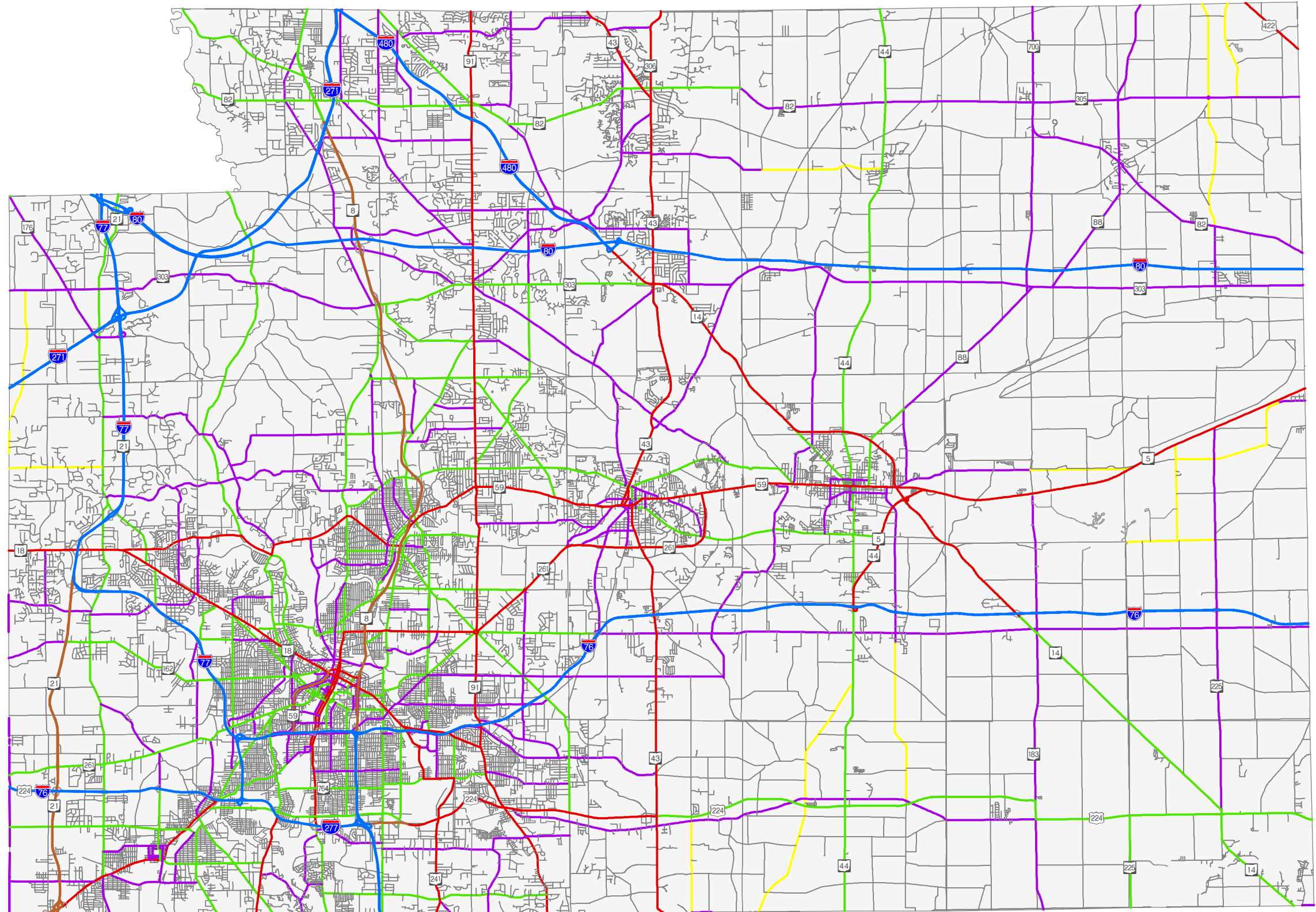
The Akron metropolitan area contains 4,774 miles of roadways. This mileage is higher than in the previous preservation study, which contained 4,155 miles of roadway, mostly due to Milton Township and Rittman in Wayne County being added to the AMATS area. Almost all the new mileage is local roadways. Map 1 shows the roadways by federal functional classification. Local roads are exhibited on the map for reference and are shown as thin light grey lines in the background. Table 1 shows the length in miles and lane miles for each classification.

Table 1 – Mileages by Roadway Classification

Federal Functional Classification	Length (in Miles)	Number of Lane Miles
Interstate	100	462
Expressway	35	171
Ohio Turnpike (I-80)	34	192
Principal Arterial	190	567
Minor Arterial	356	911
Major Collector	516	1,119
Minor Collector	64	127
Local	3,479	6,990
Totals:	4,774	10,539

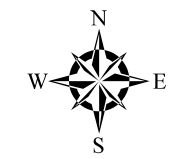
Please note that minor collectors and local roads are not considered part of the federal aid system; therefore, they are not eligible for federal funding and will not be included in the pavement cost estimates in the subsequent sections. The local jurisdiction or the county in which they are located assumes responsibility for maintaining these roadways.

MAP 1

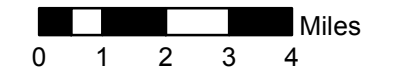


FEDERAL FUNCTIONAL CLASSIFICATION

- Interstate
- Freeway
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local



June 2016



The Akron metropolitan area contains 1,305 bridges. Table 2 shows the number and deck area for each type of bridge based on information from the Ohio Department of Transportation (ODOT).

Table 2 – Number and Deck Area of Bridges

Bridge Type	Number of Bridges	Deck Area (sq ft)
Bridges (20+ feet)*	912	7,371,227
Turnpike Bridges (20+ feet)	49	1,023,021
<i>Railroad bridges (20+ feet)</i>	30	118,262
<i>Bridges (<20 feet)</i>	314	163,364
Totals:	1,305	8,675,874

* Includes Pedestrian Bridges

The federal definition of a bridge is a self-supported structure equal or greater than 20 feet in length. Therefore, bridges under 20 feet are not included in bridge cost estimates because they are not eligible for federal funds. Also, the 34 “railroad bridges” listed in Table 2 are maintained by railroad companies so they are not included in bridge cost estimates.

All bridges are inspected annually using a consistent statewide procedure and assigned a rating. Ohio uses a general appraisal rating system of 1 to 9, with 9 being in best condition. Based on these ratings, bridges fall into two major categories. A rating of 1 to 4 signifies the bridge is deficient, while a rating of 5 to 9 means it is acceptable. A rating of 1 indicates an imminent failure condition and the bridge should be closed.

In addition, bridges may be assigned a “functionally obsolete” or “structurally deficient” rating. These descriptive ratings may not necessarily reflect the current bridge condition but will instead indicate how well the bridge is functioning. For instance, a functionally obsolete bridge may be in good shape structurally but does not meet the current design standards. These bridges may not have enough lane width, shoulder width, or proper drainage to handle increasing traffic volumes. A structurally deficient bridge may have been designed for the passage of cars and light trucks but now has to contend with heavier loads of traffic. These bridges typically have weight restrictions and some portion of the bridge is rated poorly; however the entire bridge isn’t deficient. Currently, due to a shortage of federal funds, there is a backlog of rebuilding or replacing functionally obsolete and structurally deficient bridges in Ohio.

Highway Resurfacing and Replacement Needs

Resurfacing needs between 2016 and 2040 are identified for all roadways in the AMATS area that are eligible for federal funding. An inventory of highway lane miles for roadways with federal classification major collector and above is documented in Table 3 below. Roadways are typically resurfaced every ten years; therefore we have assumed that all roads will be resurfaced twice between 2016 and 2040. To estimate resurfacing costs, the lane miles in each roadway type are multiplied by 2, the number of resurfacings within the timeframe, and then multiplied by the cost per lane mile provided by ODOT in 2016 dollars. The total resurfacing cost is estimated to be \$1.17 billion.

Table 3 – Pavement Resurfacing

Road Description (Federal Functional Class)	Length (in miles)	Number of Lane Miles	Number of Resurfacings	Cost per Lane Mile	Total Cost
Interstates/Expressways	135	633	2	\$292,000	\$369,672,000
Ohio Turnpike	34	192	2	\$292,000	\$112,128,000
Principal & Minor Arterials	546	1,478	2	\$136,000	\$402,016,000
Major Collectors	516	1,119	2	\$129,000	\$288,702,000
Pavement Resurfacing	1,231	3,422			\$1,172,518,000

Aside from periodically resurfacing the existing roads, ODOT has developed a rating method in order to determine the extent and severity of pavement deterioration. This rating, known as Pavement Condition Rating or PCR, is obtained by observing settlements, the extent and frequency of pavement erosion, and measurements of cracks and faulting in asphalt or concrete pavements. Calculated by a mathematical formula using data gathered in the field, the PCR is a single numeric value between 0 and 100 that is used to describe a pavement's condition at a given point in time. The higher this value is, the better the pavement condition. When the pavement PCR value drops below 65, an overlay or rehabilitation should be considered. However, ODOT may prioritize projects for pavement rehabilitation or reconstruction depending on the availability and distribution of federal funds.

Pavement replacement is done less frequently than resurfacing. AMATS assumed that only 5% of all roadways will be replaced between now and 2040. Table 4 shows the estimated pavement replacement costs in the AMATS area between now and 2040 using cost per lane mile provided by ODOT. The cost for pavement replacement is approximately \$0.15 billion. The total cost of pavement resurfacing and replacement combined is just over \$1.32 billion.

Table 4 – Pavement Replacement

Road Description (Federal Functional Class)	Length (in miles)	Number of Lane Miles	Lane Miles Replaced	Cost per Lane Mile	Total Cost
Interstates/Expressways	135	633	31.65	\$1,025,000	\$32,441,250
Ohio Turnpike	34	192	9.60	\$1,025,000	\$9,840,000
Principal & Minor Arterials	546	1,478	73.90	\$820,000	\$60,598,000
Major Collectors	516	1,119	55.95	\$820,000	\$45,879,000
Pavement Replacement	1,231	3,422			\$148,758,250

Bridge Maintenance and Replacement Needs

Bridge preservation needs are varied depending on the age and degree of usage of the bridge. The four common stages dealing with maintenance, repair, or replacement are: a) painting steel structure, b) deck overlay, c) deck replacement, and d) superstructure replacement. Table 5 shows an inventory of the bridges over 20 feet in length in AMATS area (excluding railroad bridges).

Table 5 – Bridge Deck Area by County

	Number of Bridges	Deck Area
Bridges (20+ feet)*		
Summit Co.	635	6,196,252
Portage Co.	204	952,459
Chippewa & Milton Twp (Wayne Co.)	73	222,516
Turnpike Bridges (20+ feet)		
Summit Co.	22	721,480
Portage Co.	27	301,541
Chippewa & Milton Twp (Wayne Co.)	0	0
Totals:	961	8,394,248

* Includes Pedestrian Bridges

Table 6 gives an estimate of the cost of preserving the bridges from 2016 to 2040 (i.e. 25 years). The following assumptions were made with respect to the frequency of preservation of the four stages listed above: a) painting steel structure every 17 years, b) deck overlay every 17 years, c) deck replacement every 50 years, and d) superstructure replacement every 80 years.

The preservation cost for each stage of preservation was derived by dividing 25 years by the frequency listed above, and then multiplying that quantity by the total bridge deck area listed in Table 5 above. The unit costs shown on Table 6 were provided by ODOT in 2016 dollars. The total preservation cost of AMATS area bridges is approximately \$1.90 billion.

Table 6 – Bridge Preservation Costs

State of Preservation	Serviced Deck Area (sq. ft.)	Unit Cost (per sq.ft.)	Total Cost
Painting Steel Structure	12,344,482	\$30	\$370,334,460
Deck Overlay	12,344,482	\$43	\$530,812,726
Deck Replacement	4,197,124	\$136	\$570,808,864
Superstructure Replacement	2,623,202	\$163	\$427,581,926
Bridge Preservation			\$1,899,537,976

Summary

It is necessary to assess the needs associated with maintaining and preserving the existing highway system at an acceptable level. Over the next 25 years, the total cost of preserving the AMATS existing highway system is estimated to be approximately \$3.22 billion, valued in 2016 dollars. This cost estimate is approximately 29% higher than the \$2.5 billion estimated in the last system preservation report, which was valued in 2012 dollars. While there has been a 3.6% increase in lane mileage and a 1.4% increase in bridge deck square footage, the higher preservation cost is primarily due to increased construction costs for both pavement and bridge maintenance.

The \$3.22 billion total was determined by adding the estimated costs of pavement resurfacing (\$1.17 billion), pavement replacement (\$0.15 billion) and bridge preservation (\$1.90 billion). The next step in the development of *Transportation Outlook 2040* is to determine the expected amount of revenue available over the life of the Plan. The total system preservation cost contained in this report will be subtracted from predicted revenues to determine the amount available for operational and expansion project recommendations.

Please note that this study does not account for any minor collector or local roadway preservation costs because they do not qualify for federal funds. If those roadway miles were added back into the report, then the costs would be substantially greater as they account for 74% of the total mileage and 67.5% of the total lane miles according to Table 1. This is important to point out as local communities struggle to find necessary funding for their transportation infrastructure.