

Highway Preservation Needs



2030 Transportation Outlook



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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 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

AMATS Regional Transportation Goals and Objectives specify that maintaining the existing highway system should be a priority of the transportation planning process. As a result, the purpose of this report is to estimate AMATS funding requirements (in 2009 dollars) in order to preserve and maintain the existing highway system between now and 2030. Section 2 describes the state of the existing highway system and defines the roadway classifications that are eligible for federal funding.

Highway maintenance evaluations are reviewed in two separate sections. Section 3 discusses highway resurfacing and replacement needs. Section 4 examines bridge maintenance and repair. Other highway maintenance items, such as shoulder and drainage improvements, pavement repairs, guardrail, fence replacement, pavement markings, signage, lighting, painting, etc., are included as part and parcel of the highway resurfacing or the bridge maintenance curriculum. A summary of the report is found in Section 5.

It is not the intent of this report to list specific resurfacing and bridge maintenance projects or provide a maintenance or a replacement schedule. All highway system preservation projects on the federal aid system will be considered consistent with *Transportation Outlook*, the upcoming 2030 Regional Transportation Plan, and will be eligible for federal funding as it becomes available. 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 next twenty years.

State of the Existing Highway System

The Akron metropolitan area contains a network of roadways 4,200 miles long that includes approximately 880 bridges. Roadways are categorized in accordance with their federal functional classification. The federal functional class system is divided into the following seven categories:

- Interstates
- Freeways and Expressways
- Principal arterials
- Minor arterials
- Urban collectors/Major rural collectors
- Minor rural collectors
- Local roads

Map 1 shows roadways by federal classification. Only the most common local roads are exhibited on the map. There are approximately 165 miles of interstates, freeways, and expressways; 558 miles of arterials; 574 miles of collectors; and 2,890 miles of local roads.

The federal functional class system includes interstates, freeways, expressways, principal arterials, minor arterials, urban collectors, and major rural collectors. These roadways are

eligible for federal funding. Local roads and minor rural collectors, however, are not eligible for federal funds and thus are the sole responsibility of the local jurisdiction or county in which they are located.

Maintaining roads is either done by pavement resurfacing or pavement replacement. Pavement replacement is decided by a procedure called Pavement Condition Rating that is described in the next section. It is difficult to predict pavement quantities that need replacement in advance, especially over a long period of time. Hence, an estimated percentage of the total road surfaces will be used to determine pavement replacement quantities.

The federal definition of a bridge is a self-supported, public structure equal to or greater than 20 feet in length that provides a passage for vehicular traffic. Based on information from the Ohio Department of Transportation (ODOT), there are 880 state, county, and municipal bridges in the AMATS area supporting a total deck surface of 7.01 million square feet.

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 the 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 but may not have enough lane width 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. 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 Preservation and Replacement Needs

Resurfacing needs between 2009 and 2030 are identified for all roadways that are eligible for federal funding. First, an inventory of highway lane miles for roadways with federal classification of urban collector/major rural collector and above is documented. The Ohio Turnpike is excluded from this inventory since it is maintained by the toll revenue collected from users of this facility. The lane miles for different categories are then multiplied by a unit cost for resurfacing provided by ODOT, and adjusted for a 4.0% inflation rate to reflect 2009 dollars.

The resurfacing of interstates, freeways and expressways has been given an estimated cost of \$168,000 per lane mile. Rural arterials and collectors have an estimated cost of \$84,000 per lane mile, while urban arterials and collectors have been estimated at \$72,000 per lane mile. In general, roads are resurfaced every ten years. It is therefore assumed that all roads will be resurfaced twice between 2009 and 2030. To estimate resurfacing costs, Table 1 was prepared using the lane mile inventory, the unit prices adjusted for a 4.0% inflation, and the assumed conditions stipulated above. The total resurfacing cost arrived at in Table 1 is \$648.81 million.

Table 1 - PAVEMENT RESURFACING

Road Description	Length	Number of	Number of	Cost per	
(Federal Functional Class)	(in miles)	Lane Miles	Resurfacings	Lane Mile	Total Cost
Interstates/Freeways/Expressways (Ohio Turnpike not included)	137.8	630	2	\$175,000	\$220,360,000
Urban Arterials and Collectors	596.4	1,745	2	\$75,000	\$261,765,000
Rural Arterials and Collectors	468.8	953	2	\$87,500	\$166,687,500
PAVEMENT RESURFACING	1,203.0	3,327			\$648,812,500

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 procedure, known as Pavement Condition Rating or PCR, relies on 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.

ODOT has provided a cost estimate of \$750,000 per lane mile to be applied for replacing or reconstructing a deteriorating pavement of an interstate or a freeway. As for replacing arterials or collectors, we have used a lower value of \$650,000 per lane mile. Additionally, we have assumed that 5% of all freeways, and 10 % of the remaining roadways will be replaced or reconstructed between now and 2030. Table 2 demonstrates the estimated pavement replacement costs in the AMATS area between now and 2030. The cost for pavement replacement is \$200.46 million. Pavement resurfacing and pavement replacement estimated costs add up to a total of \$849.27 million.

Table 2 - PAVEMENT REPLACEMENT

Road Description	Length	Number of	Lane Miles	Cost per	
(Federal Functional Class)	(in miles)	Lane Miles	Replaced	Lane Mile	Total Cost
Interstates/Freeways/Expressways	137.8	630	32	\$780,000	\$24,960,000
Arterials/Collectors	1,064.6	2,698	270	\$650,000	\$175,500,000
PAVEMENT REPLACEMENT	1,202.4	3,327	333		\$200,460,000

Bridge Preservation Needs

Bridge preservation needs are varied depending on the age and degree of usage of the bridge. The four common stages of maintenance, reconstruction and repair are: a) painting of the structural steel, b) deck overlay, c) deck replacement, and d) reconstruction of the bridge superstructure.

Table 3 shows an inventory of the bridges in the AMATS area, including the number of bridges per county and the total surface deck area in each county for each group.

Table 3 - BRIDGE DECK AREA

COUNTY	No. of Bridges	Deck Area (sq. ft.)
Summit Co.	642	5,943,744
Portage Co.	204	931,056
Chippewa Twp (Wayne Co.)	34	139,225
BRIDGE DECK AREA	880	7,014,025

Table 4 gives an estimate of the cost of preserving the bridges from 2009 to 2030, or for a period of 21 years. The following assumptions were made with respect to the frequency of preservation of the four stages listed above:

Painting Structural Steel	every 17 years
Asphalt or Concrete Deck Overlay	every 17 years
Deck Replacement	every 50 years
Superstructure Replacement	every 80 years

In Table 4, the total deck area for each stage of preservation was derived by dividing 21 years by the frequency period above, and then multiplying by the total deck area of all the bridges as exhibited in Table 3. The unit prices were provided by ODOT District 4. The total preservation cost of AMATS bridges is \$1,093.77 million.

Table 4 - BRIDGE PRESERVATION

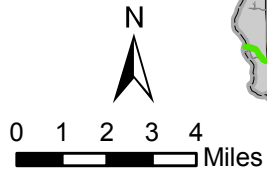
State of Preservation	Serviced Deck Area (sq. ft.)	Unit Cost (per sq.ft.)	Total Cost
Painting Bridge	8,664,384	\$23	\$199,280,832
Deck Overlay	8,664,384	\$38	\$329,246,592
Deck Replacement	2,945,891	\$105	\$309,318,555
New Superstructure	1,841,182	\$139	\$255,924,298
BRIDGE PRESERVATION			\$1,093,770,277

Summary

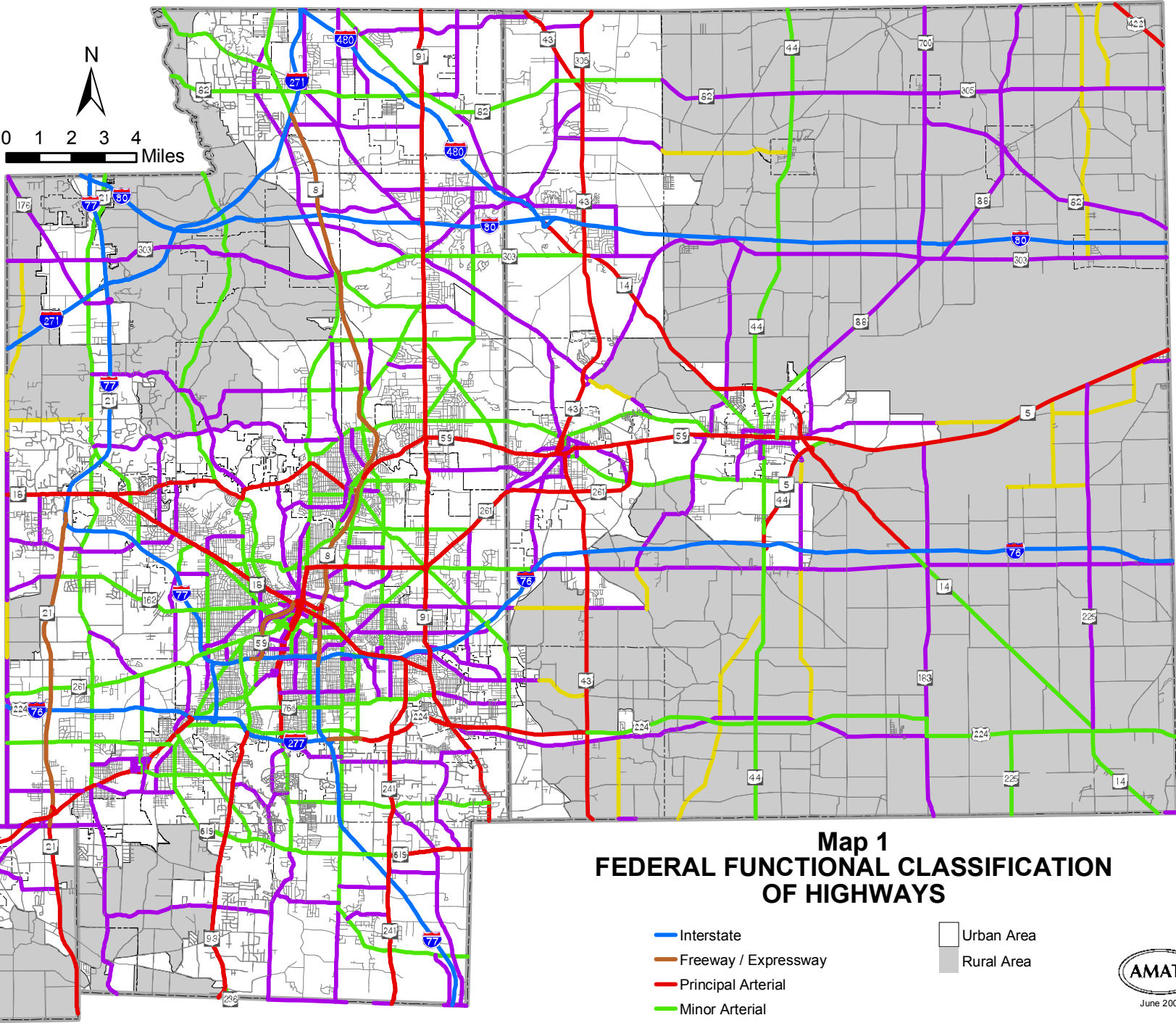
Adding the estimated costs of pavement resurfacing (\$648.81 million), pavement replacement (\$200.46 million) and bridge preservation (\$1,093.77 million), we arrive at a total cost for the preservation of AMATS highway system totaling \$1,943.04 million or approximately \$1.94 billion.

In closing, it should be noted that it is not the intent of this report to list specific resurfacing and bridge maintenance projects or to provide a replacement schedule. All highway system preservation projects on the federal aid system will be considered consistent with *Transportation Outlook* and will be eligible for federal funding as it becomes available.

The findings of this report will be used in determining the portion of anticipated federal funding that should be reserved for highway preservation projects to ensure maintenance and preservation of the existing highway system over the next twenty years.



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**Map 1
FEDERAL FUNCTIONAL CLASSIFICATION
OF HIGHWAYS**

- Interstate
 - Freeway / Expressway
 - Principal Arterial
 - Minor Arterial
 - Urban Collector / Major Rural Collector
 - Minor Rural Collector
- Urban Area
 - Rural Area





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