HIGHWAY PRESERVATION NEEDS

July 2012

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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

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 2012 dollars) needed to preserve and maintain the existing highway system between now and 2035. This report will not list specific maintenance projects; however, it will describe the existing highway system, highway resurfacing and replacement needs, and bridge maintenance and replacement needs.

All highway system preservation projects on the federal aid system will be considered consistent with *Transportation Outlook 2035* 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 highway resurfacing and bridge maintenance calculations. 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 2035*.

Existing Highway System

The Akron metropolitan area contains 4,155 miles of 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/Expressway	137	635
Ohio Turnpike (I-80)	35	142
Urban Arterials	451	1,293
Rural Arterials	93	194
Urban Collectors	360	789
Major Rural Collectors	161	325
Minor Rural Collectors	*59*	*124*
Locals	*2,859*	*5,060*
Totals:	**4,155**	**8,562**

Please note that minor rural 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.

The Akron metropolitan area contains 1,251 bridges. Table 2 shows the number and deck area for each type of bridge based on information from the Ohio Department of Transportation (ODOT).

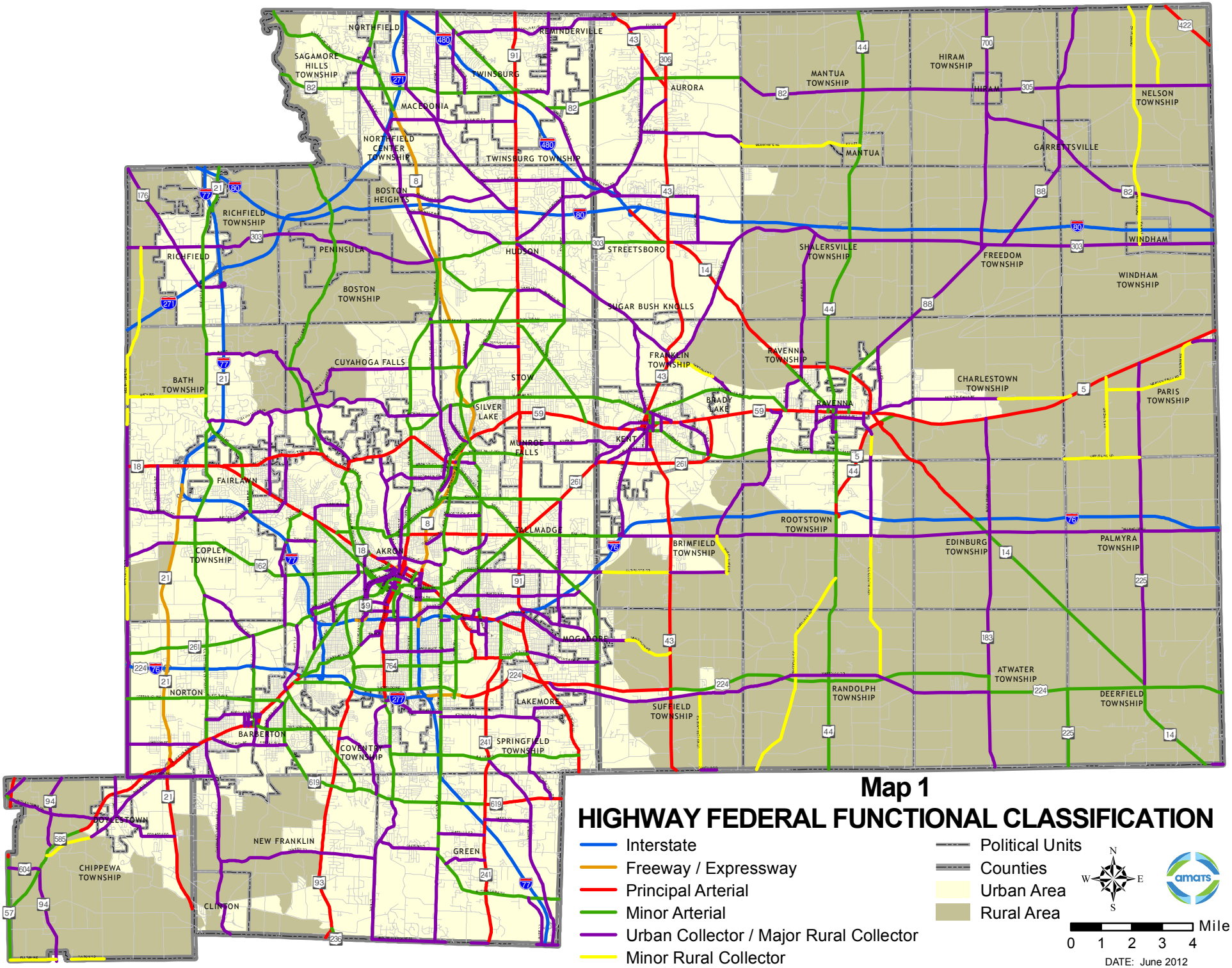
NORTHFIELD
REMINDERVILLE
SAGAMORE HILLS TOWNSHIP
TWINSBURG
AURORA
MANTUA TOWNSHIP
HIRAM TOWNSHIP
HIRAM
NELSON TOWNSHIP
MACEDONIA
NORTHFIELD CENTER TOWNSHIP
TWINSBURG TOWNSHIP
MANTUA
GARRETTSVILLE
BOSTON HEIGHTS
RICHFIELD TOWNSHIP
RICHFIELD
PENINSULA
HUDSON
STREETSBORO
SHALERSVILLE TOWNSHIP
FREEDOM TOWNSHIP
WINDHAM
WINDHAM TOWNSHIP
BOSTON TOWNSHIP
SUGAR BUSH KNOLLS
CUYAHOGA FALLS
FRANKLIN TOWNSHIP
RAVENNA TOWNSHIP
BATH TOWNSHIP
STOW
CHARLESTOWN TOWNSHIP
PARIS TOWNSHIP
SILVER LAKE
BRADY LAKE
RAVENNA
MUNROE FALLS
KENT
FAIRLAWN
ROOTSTOWN TOWNSHIP
TALLMADGE
COPLEY TOWNSHIP
AKRON
BRIMFIELD TOWNSHIP
EDINBURG TOWNSHIP
PALMYRA TOWNSHIP
MOGADORE
ATWATER TOWNSHIP
NORTON
LAKEMORE
RANDOLPH TOWNSHIP
DEERFIELD TOWNSHIP
SUFFIELD TOWNSHIP
BARBERTON
COVENTRY TOWNSHIP
SPRINGFIELD TOWNSHIP
DOYLESTOWN
NEW FRANKLIN
GREEN
CHIPPEWA TOWNSHIP
CLINTON
Map 1
HIGHWAY FEDERAL FUNCTIONAL CLASSIFICATION
Interstate
Freeway / Expressway
Principal Arterial
Minor Arterial
Urban Collector / Major Rural Collector
Minor Rural Collector
Political Units
Counties
Urban Area
Rural Area
N
W
E
S
amats
Miles
0 1 2 3 4
DATE: June 2012

Table 2 – Number and Deck Area of Bridges

Bridge Type	Number of Bridges	Deck Area (sq ft)
Bridges (20+ feet)*	870	7,222,248
Turnpike Bridges (20+ feet)	52	1,044,036
Railroad bridges (20+ feet)	*34*	*133,951*
Bridges (<20 feet)	*295*	*152,151*
Totals:	**1,251**	**8,552,386**

* 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 will not be 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 will not be 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 2012 and 2035 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 of urban collector/major rural 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 2012 and 2035. 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 2012 dollars. The total resurfacing cost is estimated to be $947.8 million.

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/Freeways/Expressways	137	635	2	$239,000	$303,530,000
Ohio Turnpike	35	142	2	$239,000	$67,876,000
Urban Arterials and Collectors	810	2,082	2	$112,000	$466,368,000
Rural Arterials and Major Collectors	254	519	2	$106,000	$110,028,000
Pavement Resurfacing	1,236	3,378			**$947,802,000**

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 2035. Table 4 shows the estimated pavement replacement costs in the AMATS area between now and 2035 using cost per lane mile provided by ODOT. The cost for pavement replacement is $134.4 million. The total cost of pavement resurfacing and replacement combined is just under $1.1 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/Freeways/Expressways	137	635	32	$950,000	$30,162,500
Ohio Turnpike	35	142	7	$950,000	$6,745,000
Urban Arterials and Collectors	810	2,082	104	$750,000	$78,075,000
Rural Arterials and Major Collectors	254	519	26	$750,000	$19,462,500
Pavement Replacement	1,236	3,378			**$134,445,000**

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

	No of Bridges	Deck Area
Bridges (20+ feet)*		
Summit Co.	638	6,163,576
Portage Co.	199	927,641
Chippewa Twp (Wayne Co.)	33	131,031
Turnpike Bridges (20+ feet)		
Summit Co.	25	742,452
Portage Co.	27	301,584
Chippewa Twp (Wayne Co.)	0	0
Totals:	**922**	**8,266,284**

* Includes Pedestrian Bridges

Table 6 gives an estimate of the cost of preserving the bridges from 2012 to 2035 (i.e. 23 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 23 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 2012 dollars. The total preservation cost of AMATS area bridges is approximately $1.4 billion.

Table 6 – Bridge Preservation Costs

State of Preservation	Serviced Deck Area (sq. ft.)	Unit Cost (per sq.ft.)	Total Cost
Painting Steel Structure	11,183,796	$25	$279,594,900
Deck Overlay	11,183,796	$36	$402,616,656
Deck Replacement	3,802,491	$112	$425,878,952
Superstructure Replacement	2,376,557	$134	$318,458,591
Bridge Preservation			**$1,426,549,099**

Summary

At a time of uncertainty in transportation funding, it is a priority to assess the needs associated with maintaining and preserving the existing highway system at an acceptable level. The total cost for the preservation of AMATS existing highway system through the life of *Transportation Outlook 2035* is estimated to be approximately $2.5 billion, valued in 2012 dollars. This total was determined by adding the estimated costs of pavement resurfacing ($947.8 million), pavement replacement ($134.4 million) and bridge preservation ($1.4 billion). This total system preservation cost will be subtracted from future revenues to determine the amount available for operational and expansion recommendations in *Transportation Outlook 2035*.