

# **NOACA**

## **Technical Memorandum**

### Estimated Bridge and Pavement Expenses for NOACA's Transportation Plan



The Northeast Ohio Areawide Coordinating Agency (NOACA) is a public Organization serving the counties of and municipalities & 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 Transportation Equity Act for the 21st Century.**
- **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.**
- **At NOACA Governing Board direction, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.**

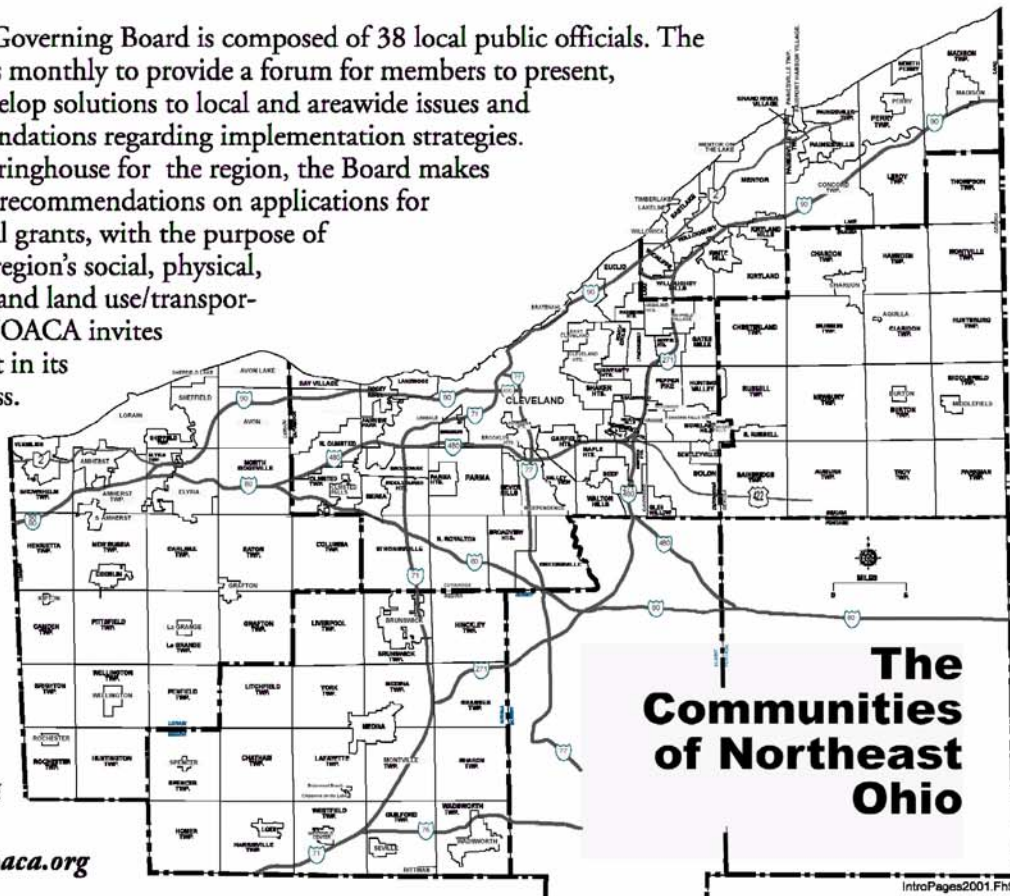
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# Estimated Bridge and Pavement Expenses for NOACA's Transportation Plan

June 2005

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## **Abstract**

This technical memorandum estimates typical annual expenditures needed to keep our region's pavements and bridges in a good state of repair. This information will be used in NOACA's Transportation Plan analysis. The financial estimates are based on current data received from the Ohio Department of Transportation (ODOT). This memo compliments two technical memos completed in 2004 dealing with the condition ratings of our region's bridges and pavements. The technical memorandums, *Bridge Conditions in the NOACA Region* and *Pavement Conditions in the NOACA Region* were completed in June and July of 2004 respectively. Both of these memos looked at current and historical conditions of our region's pavements and bridges. No financial information was considered in these memos.

This technical memorandum estimates the cost of maintaining our region's pavement and bridges during the course of NOACA's Transportation Plan. Between 2005 and 2030, a very conservative estimate is that we will need more than \$3 billion to maintain the pavements and over \$1 billion to maintain bridges in our region.

## **Introduction**

In January 2005 NOACA began working with staff from ODOT District 12 to estimate the annual cost of keeping pavement and bridge systems in good repair. Over time pavements and bridges deteriorate and need maintenance, repairs and eventually replacement. ODOT has developed a series of cost indices that reflect deterioration rates on bridges and pavements. These indices are based on historical monitoring of needed repairs and replacements on the bridge and highway systems. Over time, they can be used to estimate needed annual repairs to both bridges and highways. Expenses for roadways are estimated based on the number of lane miles. For bridges, expenses are estimated by the deck area of the bridge in square feet (sq.ft.).

These indices will be applied to the NOACA region's roadways and bridges to estimate expected annual recurring expenses. These annual expenditures will also be expanded to reflect the total cost through the life of NOACA's Transportation Plan.

## **Estimated Expenditures for Pavements**

ODOT has estimated needed annual roadway repairs by lane mile. Financial estimates (cost indices) of repairs are also reported by lane mile. All roadways that have a functional classification higher than an urban or rural local road are eligible for federal aid. These are the roadways to be considered in this analysis.

The classification of roadways shown in Table 1 above can be maintained under any jurisdiction (state, county or local).

The first step in this process was to calculate the number of lane miles by functional classification in the NOACA region. This was completed by using the 2004 NOACA highway network. The highway network has information showing the functional classification, length, and number of lanes for all links or roads. The results of these calculations are shown in Table 1, which lists the number of lane miles, by functional classification, by county.

**Table 1**  
**Approximate Lane Miles from NOACA 2004 Highway Network by Functional Classification**

FC code	FC name	Cuyahoga	Geauga	Lake	Lorain	Medina	Lane Miles
01	Rural-Interstate	0.00	0.00	31.76	20.49	122.79	175.04
02	Rural-Principal Arterial	0.00	62.56	0.00	60.66	88.48	211.70
06	Rural-Major Arterial	0.00	54.66	0.00	36.36	55.20	146.22
07	Rural-Major Collectors	0.00	267.36	35.74	172.80	250.93	726.83
08	Rural-Minor Collectors	0.00	17.59	46.76	106.52	84.18	255.05
11	Urban-Principal Arterial-Interstate	903.45	0.00	121.82	165.95	71.53	1,262.75
12	Urban-Principal Arterial-Freeways/Expressways	78.10	24.48	101.36	82.22	0.00	286.16
14	Urban-Principal Arterial-Other	934.51	57.04	141.60	196.40	37.98	1,367.53
16	Urban-Major Arterial	1,299.54	69.98	243.75	372.64	95.28	2,081.19
17	Urban-Collector	809.30	117.81	288.45	264.01	150.87	1,630.44
	Total	4,024.90	671.48	1,011.24	1,478.05	957.24	8,142.91

ODOT has identified three different paving categories. For each of these categories they provided NOACA with basic treatment costs from simple rehabilitation to complete rip out and replacement costs. The priority system is identified as interstates and freeways on both the urban and rural systems. The city paving/maintenance system considers work within city boundaries. The rural two-lane system is for non-freeway paving projects outside of city boundaries. For this analysis we combined the number of lane miles by functional classification in Table 1 into one of the three ODOT defined categories. The results are shown in Table 2.

**Table 2**  
**Approximate Lane Miles from NOACA 2004 Highway Network**  
**Compressed into ODOT Defined Paving Category**

Type of Paving	FC Codes	FC names	Cuyahoga	Geauga	Lake	Lorain	Medina	Total lane miles
Priority System	1,11,12	Urban & Rural Interstates, Urban Freeways/Expressways	981.55	24.48	254.94	268.66	194.32	1723.95
City Paving/Maintenance System	14,16,17	Urban; Principal Arterials, Major Arterials, Collectors	3043.35	244.83	673.80	833.05	284.13	5079.16
Rural 2-Lane System	2,6,7,8	Rural; Principal Arterial, Major Arterial, major & minor collectors	0.00	402.17	82.50	376.34	478.79	1339.80
Total Federal-Aid			4024.90	671.48	1011.24	1478.05	957.24	8142.91

Table 3, provided by ODOT District 12, shows the estimated percentage of lane miles that will need attention every year to keep roadways in acceptable condition. Also shown in this table is an approximate cost by lane mile for different types of preventative maintenance and other rehabilitation treatments that must be completed annually. The city paving percentages are slightly different for counties within District 12 and District 3. This information is also reflected on Table 3.

**Table 3  
Cost per Road Treatment Type and  
the Percentage of Lane Miles of the System to be Addressed Annually**

Pavement Unit Costs	Unit Cost per Lane Mile	Functional Classifications to Consider	District 3* Percentage of System to be Addressed on an Annual Basis	District 12* Percentage of System to be Addressed on an Annual Basis
Rural 2-lane paving \$80,000-\$100,000	\$90,000	2,6,7,8	10.00%	10.00%
Rural 2-lane Ripout/Rehab	\$250,000	2,6,7,8	1.00%	1.00%
City paving \$90,000-\$100,000	\$100,000	14,16,17	9.09%	8.33%
City paving Ripout/Rehab	\$280,000	14,16,17	1.00%	1.00%
Priority Paving Minor - \$190,000	\$190,000	1,11,12	10.00%	10.00%
Priority Paving Major - \$250,000	\$250,000	1,11,12	3.00%	3.00%
Complete Priority Ripout/Rehab - \$300,000	\$300,000	1,11,12	1.00%	1.00%

\*NOACA counties within ODOT District 3 are Lorain and Medina Counties. NOACA Counties within ODOT District 12 are Cuyahoga, Geauga and Lake Counties.

The next step of this process was to calculate the number of lane miles by county that will need annual rehabilitation and maintenance. This information was further broken down by type of treatment needed. Specifically, the numbers of lane miles by type of paving category in Table 2 are multiplied by the annual percentages of pavements needing attention by ODOT in Table 3. Table 4 shows the estimated lane miles by county and by type of paving treatment that must be addressed annually to keep the system in a good state of repair.

**Table 4  
Approximate Amount of Lane Miles Where Annual  
Road Work is Needed to Keep the System Conditions in a Good State of Repair**

Type of Paving	FC Codes	FC names	Cuyahoga	Geauga	Lake	Lorain	Medina	Total Lane Miles
Rural 2-Lane Paving	2,6,7,8	Rural; Principal Arterial, Major Arterial, major & minor collectors	0.0	40.2	8.3	37.6	47.9	134.0
Rural 2-Ripout/Rehabilitation	2,6,7,8	Rural; Principal Arterial, Major Arterial, major & minor collectors	0.0	4.0	0.8	3.8	4.8	13.4
City Paving/Maintenance	14,16,17	Urban; Principal Arterials, Major Arterials, Collectors	253.5	20.4	56.1	75.7	25.8	431.6
City Ripout/Rehabilitation	14,16,17	Urban; Principal Arterials, Major Arterials, Collectors	30.4	2.4	6.7	8.3	2.8	50.8
Priority Minor	1,11,12	Urban & Rural Interstates, Urban Freeways/Expressways	98.2	2.4	25.5	26.9	19.4	172.4
Priority Major	1,11,12	Urban & Rural Interstates, Urban Freeways/Expressways	29.4	0.7	7.6	8.1	5.8	51.7
Complete Ripout/Rehabilitation	1,11,12	Urban & Rural Interstates, Urban Freeways/Expressways	9.8	0.2	2.5	2.7	1.9	17.2
<b>TOTAL</b>			<b>421.4</b>	<b>70.5</b>	<b>107.6</b>	<b>163.1</b>	<b>108.5</b>	<b>871.1</b>

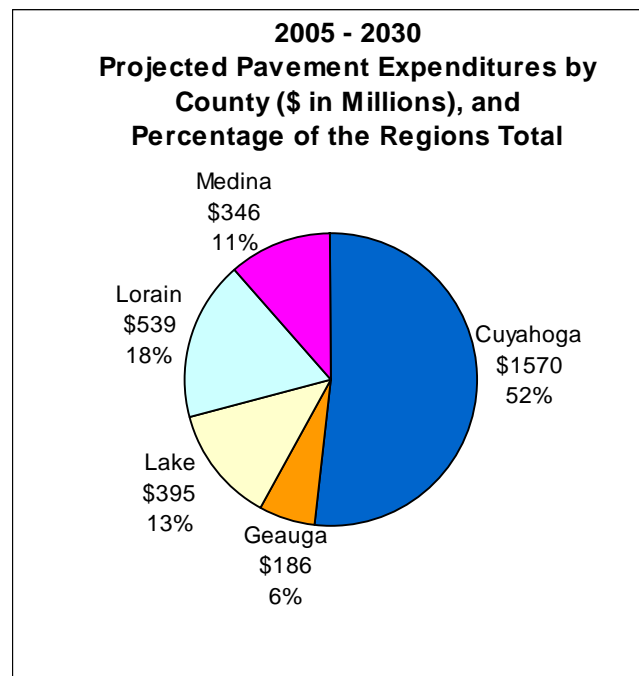
The last step of this process is to estimate the annual expense for the projected pavement treatments needed by each county. This was done by multiplying the results in Table 4 (number of lane miles needing road work) by the cost for each different paving treatment from Table 3. Table 5 shows the estimated annual expenses by county. Also included in Table 5 is the projected total cost to keep the pavement system in a good state of repair throughout the life of NOACA's Transportation Plan. Current projections show that over \$3 billion will be needed to maintain the roadway network from now until 2030.

**Table 5**  
**Approximate Cost of Road Work Needed**  
**to Keep the System Conditions in a Good State of Repair**  
**(Cost in Millions)**

Type of Paving	FC Codes	FC names	Cuyahoga	Geauga	Lake	Lorain	Medina	Total Cost
Rural 2-Lane Paving	2,6,7,8	Rural; Principal Arterial, Major Arterial,	\$0.00	\$3.62	\$0.74	\$3.39	\$4.31	\$12.06
Rural 2-Ripout/Rehabilitation	2,6,7,8	Rural; Principal Arterial, Major Arterial,	\$0.00	\$0.36	\$0.07	\$0.34	\$0.43	\$1.20
City Paving/Maintenance	14,16,17	Urban; Principal Arterials, Major Arteria	\$25.35	\$2.04	\$5.61	\$7.57	\$2.58	\$43.15
City Ripout/Rehabilitation	14,16,17	Urban; Principal Arterials, Major Arteria	\$8.52	\$0.69	\$1.89	\$2.33	\$0.80	\$14.23
Priority Minor	1,11,12	Urban & Rural Interstates, Urban Freev	\$18.65	\$0.47	\$4.84	\$5.10	\$3.69	\$32.75
Priority Major	1,11,12	Urban & Rural Interstates, Urban Freev	\$7.36	\$0.18	\$1.91	\$2.01	\$1.46	\$12.92
Complete Ripout/Rehabilitation	1,11,12	Urban & Rural Interstates, Urban Freev	\$2.94	\$0.07	\$0.76	\$0.81	\$0.58	\$5.16
TOTAL Annual Expnses			\$62.82	\$7.43	\$15.82	\$21.55	\$13.85	\$121.47
* TOTAL expenses for the life of NOACA's Transportation Plan			\$1,570.50	\$185.75	\$395.50	\$538.75	\$346.25	\$3,036.75

\* The total expenses are calculated by taking the annual expenses multiplied by 25.

Of the three billion dollars needed to maintain the highway system during the life of NOACA's Transportation Plan, over half of this amount is projected to be spent in Cuyahoga County. The graph below shows how the projected needs are distributed within the NOACA region.



## **Estimated Expenditures for Bridges**

ODOT maintains a database of all bridges/culverts in the state. The structures from this database within NOACA's region will be analyzed.

ODOT defines a bridge as *any structure, including supports, with 10 feet or more of clear span and 10 feet or more in diameter on, above, or below a highway*. According to state law all bridges must be inspected at least once a year by a qualified inspector.

From this database, staff from ODOT District 12 was able to retrieve the number of bridges, including deck area (in square feet), by county in the NOACA region. Within these totals are those that ODOT considers major bridges, which are extremely large or very complex. These bridges by nature are very expensive to construct and maintain. ODOT's central office is responsible for funding for construction, rehabilitation and maintenance on major bridges on interstate, U.S., and state routes. ODOT also offers financial assistance for major bridges on local roads (non-state roadways).

For the purpose of this technical memorandum, major bridges and non-major bridges will be handled in separate analyses.

## **Non-Major Bridges**

In NOACA's planning area there are 2,992 bridges. Of that number, 2,944 (or over 98 percent) fall into the non-major category.

Table 6 shows the number and area of all non-major bridges by county within the NOACA region. This information is from the ODOT database as of April 2005. The date of this information is significant because the bridge database is always being updated with new structures being added, or with old structures being retired from service.

**Table 6**  
Non-Major Bridges  
Number of Bridges & Area of Bridges by County

County	Number of structures	Total Sq/Ft	Average Sq/Ft per Structure
Cuyahoga	1,255	10,709,365	8,533
Geauga	279	422,703	1,515
Lake	278	1,906,332	6,857
Lorain	606	2,234,830	3,688
Medina	526	1,302,626	2,476
Total	2,944	16,575,856	5,630

ODOT also provided NOACA with expected degradation rates for the region’s bridges. ODOT uses the area of bridge deck surface to predict annual bridge deficiencies, which is similar to their method for predicting distresses on roadways by lane mile. These rates were developed from years of monitoring bridges. This information is shown in Table 7. Also on this table are unit costs to repair or maintain the predicted deficiencies.

**Table 7  
Deficiencies and Expected Annual Degradation Rates  
and Unit Costs**

Deficiency or maintenance activity	Recommended Treatment	Degradation Rates	Unit costs per Sq./Ft
Wearing Surface Problem	Replace wearing surface with 1"-3" of concrete	0.14%	\$15.00
Major Floor Problem	Replace the Bridge Deck	0.07%	\$65.00
Structural Problem	Replace the Bridge	0.48%	\$150.00
Bridge Maintenance	Annual preventative Maintenance cost per Sq./Ft.	all bridges	\$0.50

The next step in this process is to estimate the area in square feet of bridge deck surface that needs to be addressed on an annual basis. To accomplish this, the bridge deck areas in Table 6 are multiplied by the degradation rates for the given deficiencies in Table 7. The results are shown in Table 8.

**Table 8  
Total Bridge Deck Area Needing Repair, Replacement and Maintenance Annually**

Deficiency or Maintenance Activity	Recommended Treatment	Cuyahoga Sq./Ft.	Geauga Sq./Ft.	Lake Sq./Ft.	Lorain Sq./Ft.	Medina Sq./Ft.	Total Sq./Ft.
Wearing Surface Problem	Replace wearing surface with 1"-3" of concrete	14,993	592	2,669	3,129	1,824	23,206
Major Floor Problem	Replace the Bridge Deck	7,497	296	1,334	1,564	912	11,603
Structural Problem	Replace the Bridge	51,405	2,029	9,150	10,727	6,253	79,564
Bridge Maintenance	Annual preventative Maintenance	10,709,365	422,703	1,906,332	2,234,830	1,302,626	16,575,856

**Table 9**  
**Approximate Cost of Bridge Work Needed to Keep the Bridge System in a Good State of Repair by Repair Type**  
**(Cost in Millions)**

Deficiency or Maintenance Aactivity	Recommended Treatment	Cuyahoga	Geauga	Lake	Lorain	Medina	Total
Wearing Surface Problem	Replace wearing surface with 1"-3" of concrete	\$0.225	\$0.009	\$0.040	\$0.047	\$0.027	\$0.348
Major Floor Problem	Replace the Bridge Deck	\$0.487	\$0.019	\$0.087	\$0.102	\$0.059	\$0.754
Structural Problem	Replace the Bridge	\$7.711	\$0.304	\$1.373	\$1.609	\$0.938	\$11.935
Bridge Maintenance	Annual preventative Maintenance	\$5.355	\$0.211	\$0.953	\$1.117	\$0.651	\$8.288
Total Annual Expenses		\$13.778	\$0.544	\$2.452	\$2.875	\$1.676	\$21.325
*Total for the life of NOACA's Transportation Plan		\$344.44	\$13.60	\$61.31	\$71.88	\$41.90	\$533.121

\* Total expenses are calculated by taking the annual expenses multiplied by 25

The last step of this process is to estimate the annual expense for the projected bridge treatments needed by county. This was done by multiplying the results in Table 8, deck area for bridges where work is needed on an annual basis, by the cost for each treatment in Table 7. The results are shown in Table 9, which lists the cost for each predicted bridge deficiency on an annual basis. Also included on Table 9 is the projected total cost to keep the non-major bridge system in good repair throughout the life of NOACA's Transportation Plan. Current projections show that over \$533 million will be needed to maintain the non-major bridge network.

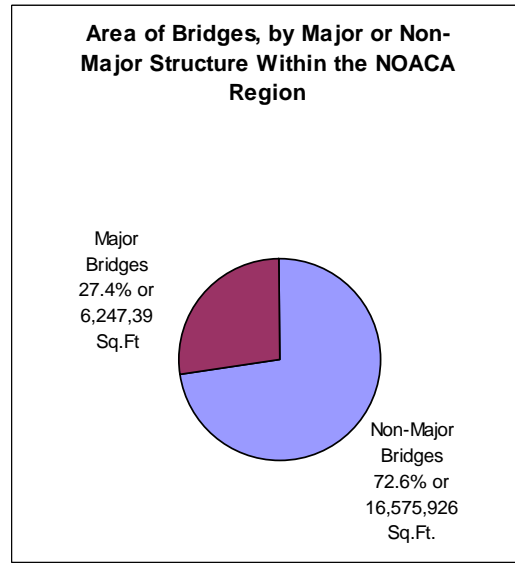
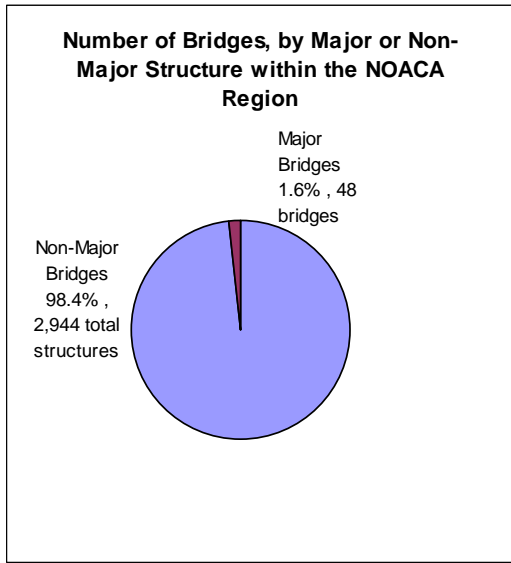
### **Major Bridges**

Due to the high cost and infrequent scheduling of major bridge projects, a fund managed by ODOT Central Office has been created to fund these projects. On state, U.S. and interstate routes, ODOT defines a major bridge as *any bridge greater than 1,000 feet long, single bridges of greater than 81,000 square feet of deck area, and twin bridges of greater than 135,000 square feet of deck area. Bridges are also eligible if they are mechanically complex, such as moveable bridges, suspension bridges, or continuous, cantilever truss bridges. In addition all Ohio River crossings are included as major bridges.* Using this definition, there are 30 major bridges on state, U.S. and interstate routes within NOACA's region. Of the 30 major bridges, 24 are in Cuyahoga County, four are in Lorain County and two are in Lake County. There are no major bridges in either Geauga or Medina Counties.

ODOT will also financially assist with bridges on the local system that meet major bridge criteria. A major bridge on the local system is defined by ODOT as *a moveable bridge or having a deck area greater than 35,000 square feet. Also, the bridge must carry vehicular traffic.* There are eighteen bridges in the NOACA region that meet these criteria, all of which are in Cuyahoga County.

As was previously mentioned, 2,944 or 98.4 percent of all bridges in the NOACA region are classified as non-major bridges. There are 48 bridges, or 1.6 percent, that meet one of ODOT's definitions of a major bridge. The non-major bridges account for 72.6 percent of the deck area of all the bridges, while

the 48 major bridges in NOACA’s region account for 27.4 percent of the entire bridge deck surface area in our region. The graphs below show this relationship.



In discussions with ODOT District 12, NOACA staff decided to handle financial forecasts for major bridge expenses on a bridge-by-bridge basis. ODOT District 12 staff was able to forecast projected needs and expenses for all major bridges in the region throughout the life of NOACA’s Transportation Plan using their Progressive Bridge-Planning Program<sup>1</sup>. This program is based upon historical monitoring of bridge repairs and expenses. Within the 25 years of the Transportation Plan, expenses such as annual maintenance, painting, wearing surface replacements, deck replacements and complete rebuilding of a the structure are provided. Table 10 on the next page shows a listing of bridges that meet ODOT’s definition of a major bridge. Listed below is a description of information that is available in Table 10.

Field Name	Description
System	Either state or local roadway system
Structure File Number	A unique seven digit number to identify the bridge
Deck Area sq.ft.	Area of the bridge deck
County	County abbreviation on where the bridge resides
Street Name or Route	Route or street the bridge is on
Feature Intersected	The name of the feature intersected at the structure
Year Built	The year the bridge was completed if known.
Replacement Year	Projected year the bridge will be replaced if any during NOACA’s TP
Total Projected Expenses	Sum of all projected expenses during the life of the NOACA’s TP

<sup>1</sup> ODOT District 12 maintains a Progressive Bridge Planning Program that estimates when certain types of maintenance that will be needed to be performed based upon historical data.

**Table 10  
Projected Expenses on Major Bridges Within NOACA's Planning Area \***

System	Structural File Number	Deck Area Sq.Ft.	County	Route/Street Name	Feature Intersected	Year Built	Replacement Year *	Total Projected Expenses *
State	1800930	226,292	CUY	Detroit-Superior	(1499)CUY. RIVER & RTA	1917		\$5,317,862
State	1801805	84,713	CUY	Broadway Ave.	NSC,W&LE RR @ HENRY ST.	1929		\$6,908,345
State	1801503	272,652	CUY	Lorain-Carnegie	CUY RIVER VALLEY & FI RR	1932	2023	\$45,669,210
State	1802046	123,775	CUY	Brookpark Rd.	ROCKY RIVER	1933	2029	\$20,732,313
State	1801325	79,578	CUY	Lorain Rd.	VALLEY PKWY/ROCKY RIVER	1935	2030	\$13,329,315
State	4700813	65,284	LOR	Erie Ave.	OVER CSX RR & BLACK RIVER	1939	2028	\$12,244,014
State	4707443	84,863	LOR	Henderson Dr.	BLACK RIVER SHIP CHANNEL	1939	2029	\$15,916,056
State	1800035	562,591	CUY	Main Avenue	(1476)CUY RIVER,RTA,FLATS	1940		\$11,977,588
State	1809393	590,739	CUY	I-90	CUY. RIV VALLEY-RTA45	1959		\$54,629,810
State	4304985	38,234	LAK	I-90	GRAND RIVER @ MP 209.5	1960		\$2,771,965
State	4304950	38,234	LAK	I-90	GRAND RIVER @ MP 209.5	1960		\$3,117,983
State	1800639	82,011	CUY	Lake Rd.	(OLD0740) ROCKY RIVER	1964		\$7,750,040
State	1806726	202,503	CUY	I-77	KNGSBRY RUN&RTA38&NSC RR	1964		\$16,909,001
State	1810774	54,950	CUY	I-271	TNKRS CR&WLE RR& SOLON RD	1964		\$5,085,623
State	1810715	62,829	CUY	I-271	TNKRS CR&WLE RR&SOLON RD	1964		\$785,363
State	1805436	57,943	CUY	SR-176 (Jennings Freeway)	IR-71NB (CUY-71-1791R)	1968		\$4,838,241
State	1805371	115,907	CUY	I-71	SR 176(1328)JENNINGS FWY	1969		\$10,727,193
State	1804650	59,008	CUY	I-71	NSC,RTA91, AIRPT FRWY	1969		\$737,600
State	1804685	49,880	CUY	I-71	NSC RR & RTA91	1969		\$623,500
State	1812831	226,227	CUY	I-480	ROCKY RIVER	1970		\$20,937,309
State	1808567	120,815	CUY	I-90	ROCKY RIVER VALLEY	1971		\$11,277,901
State	1807870	89,040	CUY	I-90	NSC RR & TRAIN AVE	1975		\$9,220,092
State	1812521	303,308	CUY	I-480	CUYAHOGA RIVER-OHIO CANAL	1975		\$25,326,218
State	1812548	303,308	CUY	I-480	CUYAHOGA RIVER-OHIO CANAL	1975		\$25,326,218
State	1806173	347,031	CUY	I-77	CUY RVR&SR17&CANAL RD&CSX	1976		\$25,159,748
State	1801244	106,553	CUY	Northfield Rd.	SR-14&TNKRS CREEK&WLE RR	1985		\$1,331,913
State	1811991	478,632	CUY	I-490	CUYAHOGA RIVER	1990		\$10,314,520
State	1810189	137,542	CUY	SR-176 (Jennings Freeway)	VALLY RD&BIG CR&NSC&CSX	1997		\$1,719,275
State	4706250	89,524	LOR	North Ridge Rd.	BLACK RIVER AND METROPRK	2001		\$1,929,242
State	4702832	49,288	LOR	JFK memorial Parkway	BLACK RIVER	2004		\$1,062,156
Local	1830147	64,498	CUY	Hilliard Rd.	ROCKY RVR/HILLIARD #65	1925	2023	\$10,803,415
Local	1832042	57,437	CUY	Rockside Rd.	CONRAIL/ROCKSIDE RD #215	1981		\$717,963
Local	1832344	195,474	CUY	Harvard-Denison	CR122CUYRR/HRVD-DEN #83	1977		\$2,443,425
Local	1833405	44,111	CUY	W.150th	CONRAILRTA/W150 ST #152	1967		\$551,388
Local	1833421	54,853	CUY	W.140th	CONRAILRTA/W 140 ST #208	1959		\$685,663
Local	1833758	21,033	CUY	Columbus Ave.	CUY RVR/COLUMBUS RD 1:007	1939		\$262,913
Local	1869264	32,970	CUY	Carter Rd.	LIME STCUY RVR & B&O RR	1939		\$412,125
Local	1869280	51,979	CUY	Clark-Quigley ramp	INDUSTRIAL FLATS WEST	1917	2027	\$8,706,483
Local	1869345	13,799	CUY	Center St.	CUYAHOGA RIVER	1901	2029	\$2,311,333
Local	1869434	97,629	CUY	Fulton Rd.	METRO PARK ZOO BIG CREEK	1932	2026	\$16,352,858
Local	1869442	205,603	CUY	Huron Rd.	CUT CANAL ROAD-RTA 49	1930	2026	\$34,438,503
Local	1869604	14,801	CUY	Eagle Ave.	CUYAHOGA RIVER (FLATS)	1930		\$185,013
Local	1869728	16,813	CUY	W.3rd.	CUYAHOGA RIVER	1940		\$210,163
Local	1869817	40,602	CUY	E.55th	N&S RR GCRTA36-MAINT YARD	1914	2030	\$6,800,835
Local	1869981	16,803	CUY	Willow St.	CUYAHOGA RIVER	1965	2027	\$2,814,503
Local	1870025	121,999	CUY	Prospect Ave.	PROSPECT CUT TRKS RTA 48	1930	2026	\$20,434,833
Local	1870084	47,017	CUY	Abbey Ave.	SCRANTON RD CONRL N&S RRS	1991		\$587,713
Local	1870157	46,716	CUY	Eagle Ave.	RTACANAL RDSTONES LEVEE	1930		\$583,950
<b>TOTALS</b>		<b>6,247,391</b>						<b>\$482,978,680</b>

\* Major bridges are identified by ODOT's definition.

\* Replacement year - A major bridge is scheduled for replacement 40 years after it has had a major rehabilitation.

\* Projected expenses are generated using ODOT District 12 Progressive Bridge Planning Program.

Table 10 shows our projection that during the course of NOACA’s Transportation Plan more than \$482 million will be needed to keep the 48 major bridges in our region in acceptable condition. This allows for 13 major bridge replacements plus annual maintenance on all bridges.

Table 11 shows a summary of all projected bridge expenses on both major and non-major structures within NOACA’s region.

**Table 11**  
**Summary of Major and Non-Major Bridge expenses during the life of NOACA's Transportation Plan**  
**(Cost in millions)**

Bridge Expenses	Cuyahoga	Geauga	Lake	Lorain	Medina	TotalCost
Projected Expenses for <b>Non-Major</b> Bridges 2005-2030	\$344.44	\$13.60	\$61.31	\$71.88	\$41.90	\$533.12
Projected Expenses for <b>Major</b> Bridges 2005-2030	\$445.94	\$0.00	\$5.89	\$31.15	\$0.00	\$482.98
* Estimated cost per year	\$31.62	\$0.54	\$2.69	\$4.12	\$1.68	\$40.64
Total expenses for the life of NOACA's Transportation Plan	\$790.38	\$13.60	\$67.20	\$103.03	\$41.90	\$1,016.10

\*Annual expenses are calculated by taking the total expenses divided by 25

The estimates show that approximately \$40 million per year or over a billion dollars during the life of NOACA’s Transportation Plan will be needed to maintain our region’s bridges in an acceptable state of repair.