Preserving Syracuse Bridges

THE CONDITION AND FUNDING NEEDS OF SYRACUSE'S AGING BRIDGE SYSTEM

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Founded in 1971, TRIP ® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway and transit engineering and construction; labor unions; and organizations concerned with efficient and safe surface transportation.

INTRODUCTION

New York's transportation system provides links for the state's residents, visitors and businesses, providing daily access to homes, jobs, shopping, natural resources and recreation. Modernizing New York's transportation system, including its bridges, is critical to fostering quality of life improvements and economic competitiveness in the Empire State.

The preservation and modernization of the Syracuse area's transportation system plays an important role in retaining economic competitiveness and improving economic well-being by providing jobs in the short term and by improving the productivity and competitiveness of the state's businesses in the long term. As the Syracuse area and the state of New York face the challenge of preserving and modernizing bridges, the level of federal, state and local transportation funding will be a critical factor in whether residents, visitors and businesses continue to enjoy access to a safe and efficient transportation network.

TRIP has prepared a statewide report on bridge conditions throughout New York as well as regional reports for the Albany-Schenectady-Troy, Binghamton, Buffalo, Hudson Valley, Long Island, New York City, Rochester, Syracuse and Utica areas. The reports include a list of bridges in each area with the lowest average rating for the condition of the deck, superstructure and substructure, and a list of each area's most heavily traveled poor/structurally deficient bridges.

Bridge condition data in this report is from the Federal Highway Administration's (FHWA) National Bridge Inventory (NBI), which was released on December 31, 2018. Specific conditions of bridges may have changed as a result of recent work.

BRIDGE CONDITIONS IN THE SYRACUSE AREA

The Syracuse area's bridges form key links in the state's highway system, providing communities and individuals access to employment, schools, shopping and medical facilities, and facilitating commerce and access for emergency vehicles.

Bridges are inspected on a regular basis by the organization responsible for their upkeep and maintenance. The components of the bridge are evaluated and given a score between zero and nine based on their condition. The overall condition of the bridge is determined by the lowest rating for the deck, superstructure, substructure or culvert. If the lowest rating for any of these components is less than or equal to four, the bridge is rated poor/structurally deficient; if it is five or six, the bridge is rated fair; and if it is greater than or equal to seven, the bridge is rated good.

Chart 1. Bridge ratings and definitions.

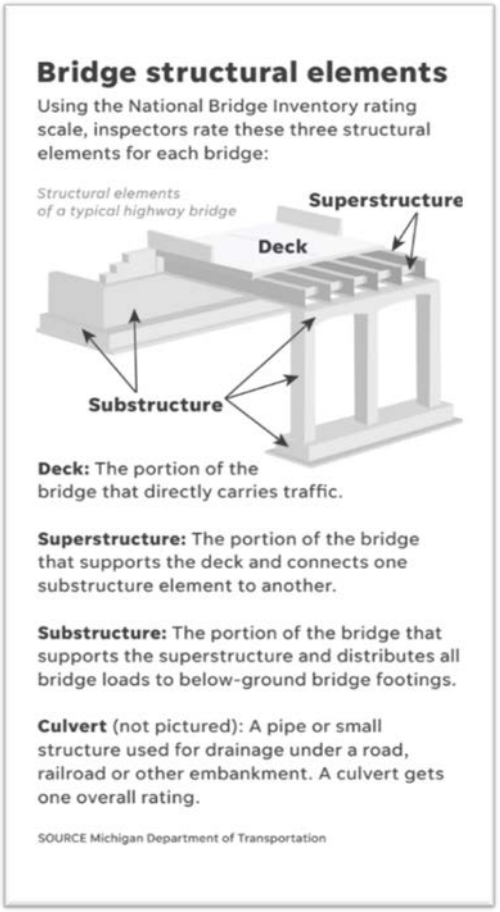
SCORE	CONDITION	DEFINITION
9	Excellent	No problems noted.
8	Very Good	No problems noted.
7	Good	Some minor problems.
6	Satisfactory	Minor deterioration to structural elements.
5	Fair	Primary structural elements are sound, but may have minor section loss, cracking, spalling or scour.
4	Poor	Advance section loss, deterioration, spalling or scour.
3	Serious	Loss of section, deterioration, spalling or scour have seriously affected primary components. Local failures possible, fatigue cracks in steel or concrete may be present.
2	Critical	Advanced deterioration of primary elements, cracks in steel or concrete. Requires close monitoring or closure until corrective action.
1	Imminent Failure	Major deterioration or section loss, obvious vertical or horizontal movement affecting structure stability. Closed to traffic but corrective action may put back in light service.
0	Failed	Out of service, beyond corrective action.

Source. Federal Highway Administration National Bridge Inventory.

Twelve percent (101 of 875) of locally and state-maintained bridges in the Syracuse area - which includes Madison, Onondaga and Oswego Counties- are rated as poor/structurally deficient. Bridges rated poor/structurally deficient may be posted for lower weight limits or closed if their condition warrants such action.[1]

Bridges in the Syracuse area that are poor/structurally deficient carry approximately 911,000 vehicles each day.[2]

Sixty percent (528 of 875) of locally and state-maintained bridges in the Syracuse area have been rated in fair condition.[3] A fair rating indicates that a bridge's structural elements are sound, but minor deterioration has occurred to the bridge's deck, substructure or superstructure. The remaining 28 percent (246 of 875) of the area's bridges are rated in good condition.



Statewide, ten percent (1,757 of 17,521) of bridges are rated poor/structurally deficient, while 53 percent are rated in fair condition and the remaining 37 percent are in good condition.[4]

Deteriorated bridges can have a significant impact on daily life. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid weight-restricted bridges. Redirected trips also lengthen travel time, waste fuel and reduce the efficiency of the local economy.

Each major component of a bridge is rated on a scale of zero to nine, with a score of four or below indicating poor condition. If a bridge receives a rating of four or below for its deck, substructure or superstructure, it is rated as poor/structurally deficient.

The list below details the 25 most heavily traveled poor/structurally deficient bridges in the Syracuse area. ADT is average daily traffic.

Chart 2. Syracuse area poor/structurally deficient bridges with highest average daily traffic.

Rank	County	City	Facility Carried	Feature Intersected	Location	Year Built	Lanes	ADT	Open, Closed, Posted
1	Onondaga	Syracuse	RTE I690	N TOWNSEND STREET	0.3MI E JCT 690I WB+ I-81	1968	3	68,620	Open
2	Onondaga	Syracuse	RTE I690	N CLINTON STREET	.8 MI E JCT I-690 + 298	1968	3	68,620	Open
3	Onondaga	Syracuse	RTE I690	RTE I81	JCT OF RTS I-690 WB +I-81	1968	2	68,620	Open
4	Onondaga	Geddes	RTE I690	RTE I90	JCT I90 & I690	1954	6	55,150	Open
5	Onondaga	Salina	RTE I81	RTE 11, S BAY RD - CR 20	JCT US 11 & I81	1989	3	51,033	Open
6	Madison	Canastota	RTE I90	CANASTOTA CREEK	0.7 MI W JCT I90<INT 34	1953	4	40,119	Open
7	Onondaga	Salina	RTE I90	CSX RR	1MI NW THRUWAY EXIT 35	1951	4	37,980	Open
8	Onondaga	Salina	RTE I90	VINE ST CR 51	2.1 MI NW JCT I90 & I81	1949	4	37,980	Open
9	Madison	Oneida	RTE I90	N LAKE ST	4 MI W EXIT 33 OF I90	1953	4	36,256	Open
10	Onondaga	Salina	RTE I90	ONONDAGA PARK RD	.6 MI W JCT370<90I ON 90I	1954	4	34,483	Open
11	Onondaga	Geddes	RTE I90	CSX TRANSPORTATIO	.5 MI E EXIT 39 ON I90	1954	4	34,483	Open
12	Onondaga	Syracuse	RTE I690	N.FRANKLIN STREET	.9 MI E JCT RTS 690I +298	1968	3	34,310	Open
13	Onondaga	Salina	RTE I90	BEAR TRAP CREEK	.1 MI E JCT I81 & I90	1946	5	32,326	Open
14	Onondaga	Clay	RTE 481	MUD CREEK	2.3 MI SE JCT RTS 481$ 31	1993	4	29,472	Open
15	Onondaga	De Witt	RTE I481	KIRKVILLE RD-CR53	.5 MI N JCT I481 SB & SH2	1972	3	22,378	Open
16	Onondaga	Manlius	RTE I90	CHITTENANGO CREEK	INT I90 < CHITTENANGO CRK	1953	2	20,263	Open
17	Onondaga	Manlius	RTE I90	LIMESTONE CREEK	2 MI E INTERCHANGE 34A	1950	2	20,263	Open
18	Madison	Lenox	RTE I90	COWASELON CREEK	.5 MI E JCT I90<INT 34	1953	2	18,128	Open
19	Onondaga	De Witt	RTE 290	BUTTERNUT CREEK	.1 MI E JCT SH 290 & I481	1984	2	17,544	Open
20	Onondaga	Cicero	TAFT ROAD	RTE I81	1.6 MI NE JCT RTS I-81+11	1959	4	16,071	Open
21	Onondaga	De Witt	RTE 298	RTE I90	JCT OF SH 298 & I90	1953	2	15,114	Open
22	Madison	Canastota	RTE 13	RTE I90	NORTH PETERBORO ST RT 13	1954	2	11,836	Open
23	Onondaga	Syracuse	E BRIGHTON AVE	NY S & W/ONTRACK	JUST N.OF I481 - EXIT 1	1985	4	11,242	Open
24	Oswego	West Monr	RTE 49	BIG BAY CREEK	1.8 MI E JCT SH 49 & I81	1941	2	10,667	Posted
25	Onondaga	Cicero	LAKESHORE ROAD	MAPLE CREEK	1.7 MI E OF CICERO CENTER	1965	2	8,803	Open

Source: Federal Highway Administration National Bridge Inventory, 2018.

The following 25 poor/structurally deficient bridges in the Syracuse area (carrying a minimum of 500 vehicles per day) have the lowest average rating for deck, substructure and superstructure. The Appendix includes the individual ratings for the deck, substructure and superstructure of each bridge listed below.

Chart 3. Syracuse area bridges with lowest average rating for deck, substructure and superstructure.

Rank	County	City	Facility Carried	Feature Intersected	Location	Year Built	Lanes	ADT	Open, Closed, Posted
1	Onondaga	Salina	RTE I90	CSX RR	1MI NW THRUWAY EXIT 35	1951	4	37,980	Open
2	Onondaga	Geddes	RTE I90	CSX TRANSPORTATIO	.5 MI E EXIT 39 ON I90	1954	4	34,483	Open
3	Onondaga	Onondaga	Rockwell Road	RTE I81	2.0 MI S JCT RTS I-81+173	1963	2	893	Open
4	Madison	Oneida	CR 13	OLD ERIE CANAL	AT CITY OF ONEIDA	1925	2	714	Posted
5	Madison	Sullivan	CANASERAGA RD	OLD ERIE CANAL	W CANASTOTA E CHITTENANGO	1927	2	515	Posted
6	Onondaga	Salina	RTE I90	VINE ST CR 51	2.1 MI NW JCT I90 & I81	1949	4	37,980	Open
7	Madison	Canastota	RTE 13	RTE I90	NORTH PETERBORO ST RT 13	1954	2	11,836	Open
8	Madison	Oneida	RTE 46	ONEIDA CREEK	0.1 MI N JCT RTS 46 & 316	1957	2	2,786	Open
9	Onondaga	Van Buren	CANTON STREET	RTE I90	3.5MI W INT 39 ON I90	1954	2	2,503	Open
10	Onondaga	Pompey	RTE 20	LIMESTONE CREEK	6.4 MI NE JCT RTS 20 + 91	1931	2	1,958	Open
11	Onondaga	Skaneateles	Kelley Street	Skaneateles Creek	N OF US20 IN SKANEATELES	1920	2	1,576	Posted
12	Madison	Cazenovia	CR65 MILL STREET	E BR LIMESTONE CREEK	AT EARLVILLE	1930	2	878	Open
13	Oswego	Sandy Creek	MILLER ROAD	RTE I81	RTE I-81 3. MI S JEFF. CL	1961	2	502	Open
14	Oswego	Granby	RTE 48	TANNERY CREEK	2.3 MI N JCT SH 48 & SH 3	1932	2	4,125	Open
15	Oswego	Mexico	RTE 69	LITT SALMON RIVER	.3 MI W JCT SH 69 & US 11	1934	2	2,705	Open
16	Onondaga	Syracuse	RTE I690	RTE I81	JCT OF RTS I-690 WB +I-81	1968	2	68,620	Open
17	Madison	Oneida	RTE I90	N LAKE ST	4 MI W EXIT 33 OF I90	1953	4	36,256	Open
18	Onondaga	Manlius	RTE I90	CHITTENANGO CREEK	INT I90 < CHITTENANGO CRK	1953	2	20,263	Open
19	Onondaga	Manlius	RTE I90	LIMESTONE CREEK	2 MI E INTERCHANGE 34A	1950	2	20,263	Open
20	Madison	Lenox	RTE I90	COWASELON CREEK	.5 MI E JCT I90<INT 34	1953	2	18,128	Open
21	Onondaga	Cicero	TAFT ROAD	RTE I81	1.6 MI NE JCT RTS I-81+11	1959	4	16,071	Open
22	Onondaga	De Witt	RTE 298	RTE I90	JCT OF SH 298 & I90	1953	2	15,114	Open
23	Oswego	West Monroe	RTE 49	BIG BAY CREEK	1.8 MI E JCT SH 49 & I81	1941	2	10,667	Posted
24	Madison	Oneida	RTE 46	RTE I90	0.3 MI S JCT RTS 316 + 46	1954	2	7,529	Open
25	Onondaga	Cicero	RTE 11	ONEIDA RIVER	JCT RTE 11 + ONEIDA LAKE	1932	2	6,884	Open

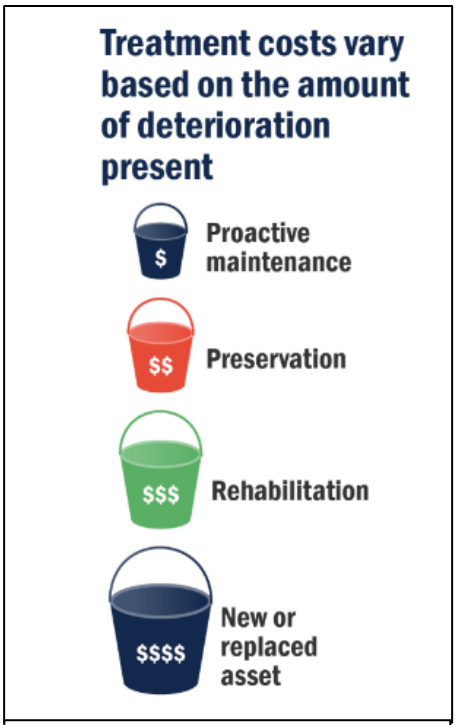
Source: Federal Highway Administration National Bridge Inventory, 2018.

TRANSPORTATION FUNDING AND PRESERVING NEW YORK'S BRIDGES

Investment in New York's roads, highways and bridges is funded by local, state and federal governments. A lack of sufficient funding at all levels will make it difficult to adequately maintain and improve the state's bridges.

The Federal Highway Administration estimates that it would cost $3.6 billion to replace or rehabilitate all poor/structurally deficient bridges in New York.[5]

Depending on the type of bridge, the condition and type of deterioration of the bridge, and typical traffic levels, one of the following types of improvements may be necessary. The cost of bridge improvements required increases based on the amount of deterioration present. The Illinois Department of Transportation has estimated the following statewide average costs for each type of improvement, including both preconstruction and construction items.[6]



Illinois DOT Transportation Asset Management Plan, 2018.

Construction/Reconstruction: Complete replacement of the bridge, typically ranges in price from $300 to $375 per square foot of deck area.

Rehabilitation: This includes rehabilitation to, or replacement of, one or more of the major bridge elements, such as deck replacement, superstructure replacement, or substructure rehabilitation, ranging in price from $185 to $233 per square foot of deck area.

Preservation: This includes low-cost treatments applied to bridges in relatively good condition to slow their rate of deterioration, including washing, deck sealing, concrete substructure sealing, and painting, ranging in price from $5 to $50 per square foot of deck area.

Maintenance: This include planned activities to a specific bridge component, such as expansion joint replacement, bearing replacement, steel repair, concrete repair, deck patching, and overlays. The average cost of these maintenance treatments is $30 per square foot of deck area.

A survey conducted for a report by the US. General Accountability Office (GAO) found that more than half of states surveyed (14 out of 24) indicated that inadequate funding was a challenge to their ability to maintain their bridges in a state of good repair.

The GAO report found that the increase in the number and size of bridges that are approaching the limits of their design life will likely place a greater demand on bridge owners in the near future, making it more difficult to mitigate issues in a cost-effective manner.[7] Current design guidelines and construction materials may raise the expected service life of new bridges to 75 years or longer.[8] The GAO report found that more than half of states surveyed (13 out of 24) indicated that aging bridges were a challenge to their ability to maintain their bridges in a state of good repair.[9]

State and local transportation agencies are increasingly taking an asset management approach to bridge preservation that emphasizes enhanced maintenance techniques, delaying the need for costly reconstruction or replacement. [10] Under pressure from fiscal constraints, aging bridges, and increased wear due to growing travel volume, particularly by large trucks, transportation agencies are adopting cost-effective strategies focused on keeping bridges in good condition as long as possible.[11] While this strategy requires increased initial investment, it saves money over the long run by extending the lifespan of bridges.

With limited funding available to address bridge deficiencies, transportation agencies need to extend the life of a bridge to defer higher replacement costs as long as possible. Bridge preservation is essentially any work that preserves or extends the useful life of a bridge and is part of achieving the 75-year design life target. Preservation may include washing, sealing deck joints, facilitating drainage, sealing concrete, painting steel, removing channel debris, and protecting against stream erosion. This

work keeps a bridge from prematurely deteriorating and extends the years before a bridge needs to be replaced.

Rehabilitation involves major work required to restore the structural integrity of a bridge and work necessary to correct major safety defects. Replacement projects include total replacements, superstructure replacements, and bridge widening. When a bridge deteriorates to the point that it is rated poor/structurally deficient, the cost to restore the bridge to good condition increases significantly. The need to repair or replace high priority bridges tends to create a funding cycle that makes it difficult to keep pace with the needed preservation activities.

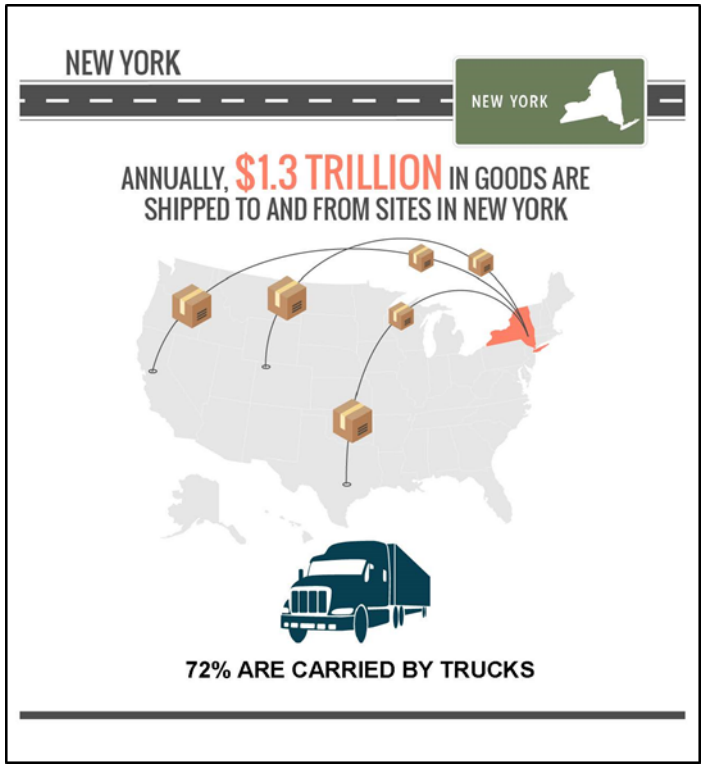
IMPORTANCE OF TRANSPORTATION TO ECONOMIC GROWTH

Today's culture of business demands that an area have well-maintained and efficient roads, highways and bridges if it is to remain economically competitive. Global communications and the impact of free trade in North America and elsewhere have resulted in a significant increase in freight movement, making the quality of a region's transportation system a key component in a business' ability to compete locally, nationally and internationally.

Businesses have responded to improved communications and the need to cut costs with a variety of innovations including just-in-time delivery, increased small package delivery, demand-side inventory management and e-commerce. The result of these changes has been a significant improvement in logistics efficiency as firms move from a push style distribution system, which relies on large-scale warehousing of materials, to a pull-style distribution system, which relies on smaller, more strategic movement of goods. These improvements have made mobile inventories the norm, resulting in the nation's trucks literally becoming rolling warehouses.

Bridges are vitally important to continued economic development in New York, particularly to the state's agriculture, industrial manufacturing and tourism industries. As the economy expands, creating more jobs and increasing consumer confidence, the demand for consumer and business products grows. In turn, manufacturers ship greater quantities of goods to market to meet this demand, a process that adds to truck traffic on the state's highways, bridges and major arterial roads.

Every year, $1.3 trillion in goods are shipped to and from sites in New York, mostly by truck.[12] Seventy-two percent of the goods shipped annually to and from sites in New York are carried by truck and another 17 percent are carried by courier services or multiple-mode deliveries, which include trucking.[13] From 2016 to 2045 the value of freight shipped to and from sites in New York, in inflation-adjusted dollars, is expected to increase 154 percent and by 108 percent for goods shipped by trucks.[14]



Local, regional and state economic performance is improved when a region's surface transportation system is expanded or repaired. This improvement comes as a result of the initial job creation and increased employment created over the long-term because of improved access, reduced transport costs and improved safety.

A report by the American Road & Transportation Builders Association found that the design, construction and maintenance of transportation infrastructure in New York play a critical role in the state's economy, supporting the equivalent of approximately 319,000 full-time jobs across all sectors of the state economy, earning these workers approximately $9.8 billion annually.[15] These jobs include 159,000 full-time jobs directly involved in transportation infrastructure construction and related activities as well as 160,000 full-time jobs as a result of spending by employees and companies in the transportation design and construction industry.[16] Transportation construction in New York annually contributes an estimated $1.8 billion in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.

Approximately 3.5 million full-time jobs in New York in key industries like tourism, retail sales, agriculture and manufacturing are dependent on the quality, safety and reliability of the state's transportation infrastructure network. These workers earn $145 billion in wages and contribute an estimated $26.4 billion in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.[17]

Increasingly, companies are looking at the quality of a region's transportation system when deciding where to re-locate or expand. Regions with congested or poorly maintained roads and bridges may see businesses relocate to areas with a smoother, more efficient and more modern transportation system. In a 2018 survey of corporate executives by Area Development Magazine highway accessibility was ranked the third highest site selection factor behind the availability of skilled labor and labor costs.[18]

CONCLUSION

It is critical New York provides a 21st century network of roads, highways and bridges that can accommodate the mobility demands of a modern society.

The state will need to modernize its transportation system by improving the physical condition of its bridges, which will enhance the system's ability to provide efficient and reliable mobility for motorists and businesses. Making needed improvements to New York's bridges could provide a significant boost to the state's economy by creating jobs in the short term and stimulating long-term economic growth as a result of enhanced mobility and access.

Without a substantial boost in federal, state and local funding, numerous projects to improve and preserve New York's bridges will not be able to proceed, hampering the state's ability to improve the condition of its transportation system and to support economic development opportunities.

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ENDNOTES

[1] Federal Highway Administration National Bridge Inventory, 2018.
[2] Ibid
[3] Ibid.
[4] Ibid
[5] Federal Highway Administration (2017). Bridge Replacement Unit Costs 2016. https://www.fhwa.dot.gov/bridge/nbi/sd2017.cfm TRIP estimate is based on 2/3 of structurally deficient bridges being rehabilitated and 1/3 being replaced.
[6] Illinois Department of Transportation. Transportation Asset Management Plan (2018). http://www.idot.illinois.gov/Assets/uploads/files/About-IDOT/Misc/IDOT_TAMP.pdf P. 44
[7] United States Government Accountability Office (2016). Highway Bridges: Linking Funding to Conditions May Help Demonstrate Impact of Federal Investment. P. 29.
[8] Ibid. P. 13.
[9] Ibid.
[10] Federal Highway Administration (2011). National Bridge Management, Inspection and Preservation Conference Proceedings: Beyond the Short Term. P. 3.
[11] Ibid.
[12] TRIP analysis of the Federal Highway Administration's Freight Analysis Framework. (2018). https://faf.ornl.gov/fafweb/
[13] Ibid.
[14] Ibid.
[15] American Road & Transportation Builders Association (2015). The 2015 U.S. Transportation Construction Industry Profile. https://www.transportationcreatesjobs.org/pdf/Economic_Profile.pdf
[16] Ibid.
[17] Ibid.
[18] Area Development Magazine (2019). 33rd Annual Corporate Survey & the 15th Annual Consultants Survey. http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2019/33nd-annual-corporate-survey-15th-annual-consultants-survey.shtml