Preserving Hudson Valley Bridges

THE CONDITION AND FUNDING NEEDS OF THE HUDSON VALLEY'S AGING BRIDGE SYSTEM

SEPTEMBER 2019

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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 Hudson Valley'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 Hudson Valley 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 HUDSON VALLEY AREA

The Hudson Valley 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.

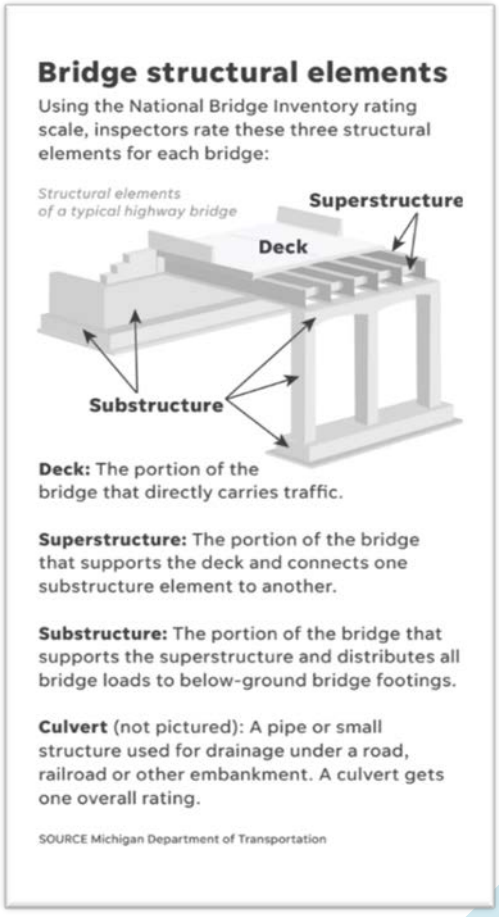
SCORE	CONDITION	DEFINITION
9	Excellent	No problems noted.
8	Very Good	No problems noted.
7	Good	Some minor problems.
6	Satisfactory	Minor deterioration to structural elements.
5	Fair	Primary structural elements are sound, but may have minor section loss, ceracking, spalling or scour.
4	Poor	Advance section 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.

Thirteen percent (329 of 2,551) of locally and state-maintained bridges in the Hudson Valley area - which includes Columbia, Dutchess, Orange, Putnam, Rockland, Ulster and Westchester 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 Hudson Valley area that are poor/structurally deficient carry approximately 2.6 million vehicles each day.[2]

Sixty-four percent (1,634 of 2,551) of locally and state-maintained bridges in the Hudson Valley 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 23 percent (588 of 2,551) 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 Hudson Valley area. ADT is average daily traffic.

Chart 2. Hudson Valley 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	Rockland	Clarkstown	PASCACK ROAD, PASCACK BR	RTE I87	0.9 MI E JCT RTS I87<45	1954	7	133,202	Open
2	Rockland	Nyack	RTE 59	RTE I87	0.2 MI S JCT RTS I87 & 9W	1953	9	131,991	Open
3	Rockland	Clarkstown	RTE 303	RTE I87	2.2 MI E INT I87 & PIP	1953	8	131,991	Open
4	Rockland	Chestnut Ridge	RTE 45	RTE I87	JCT OF RTS I87 & 45	1953	6	112,158	Open
5	Rockland	Ramapo	SPOOK ROCK RD	RTE I87	2.6 MI E JCT RTS I-87&202	1953	6	112,158	Open
6	Westchester	Mount Vernon	RTE 907G, BRONX RVR	RTE 907K	0.8 MI E INT & NYSTWAY87I	1983	2	77,826	Open
7	Westchester	Yonkers	RTE 907K	RTE 987D	JCT OF RTS SMRP + CCP	1940	6	75,986	Posted
8	Westchester	Dobbs Ferry	SAW MILL RIVER	RTE 987D	2.8 MI S JCT RTS SMRP<I87	1927	4	58,280	Open
9	Westchester	Yonkers	RTE I87, RTE 100	RTE 907K	JCT OF I87 & CCP	1954	6	55,259	Open
10	Orange	New Windsor	RTE I87	RTE 207	JCT OF I87 & S H 207	1953	4	51,718	Open
11	Rockland	Suffern	RTE 59, NJ TRANSIT RR	RTE I87	ORANGE AVE. RT.59 & NJ TR	1954	3	47,215	Open
12	Westchester	Mount Pleasant	RTE 987G	RTE 987F	0.2 MI S JCT RTS BRP+TSP	1972	3	44,475	Open
13	Ulster	Espous	RTE 213, WALLKILL RIVER	RTE I87	1.2 MI S OF TILLSON	1955	4	44,125	Open
14	Ulster	Rosendale	COUNTY ROAD 25	RTE I87	0.4 N JCT I-87< RONDOUT R	1955	4	44,125	Open
15	Ulster	Kingston	HURLEY AVE	RTE I87	0.4 MI SW JCT I-87 < 22	1953	4	44,125	Open
16	Westchester	Elmsford	RTE 119	RTE 987D	1.2 MI N JCT RTS SMRP&I87	1934	4	43,955	Open
17	Dutchess	Poughkeepsie	RTE 9	RAILROAD PLAZA	0.3 MI N JCT RTS 9+44+55	1966	4	35,377	Open
18	Westchester	Yonkers	SAW MILL RIVER, EX-NYCRR	RTE 987D	1.9 MI N JCT SMRP & CCP	1957	2	32,448	Open
19	Orange	Montgomery	RTE I84	NORFOLK SOUTHERN	1.1 MI E JCT I84 & SH 208	1968	2	26,859	Open
20	Dutchess	East Fishkill	RTE I84	HOSNER MOUNTAIN ROAD	.9 MI E JCT I84 & TSP	1968	2	26,344	Open
21	Orange	Wallkill	RTE I84	MNRR PJ LINE	3.4 MI E JCT SH 17 & I84	1969	2	23,963	Open
22	Orange	Montgomery	RTE I84	NORFOLK SOUTHERN RR	1.8 MI W JCT I84 & SH 208	1969	2	23,963	Open
23	Orange	Cornwall	RTE 9W	CR 107-QUAKER AVE	7 MI N JCT US 9W & SH 293	1941	4	23,898	Open
24	Orange	New Windsor	RTE 9W	MOODNA CREEK	2.1 MI S JCT RTS 9W+94	1932	3	23,898	Open
25	Westchester	Bedford	RTE I684	RTE 35	JCT RTS I684+35	1966	6	23,670	Open

Source: Federal Highway Administration National Bridge Inventory, 2018.

The following 25 poor/structurally deficient bridges in the Hudson Valley 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. Hudson Valley 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	Columbia	Hudson	CSX, LEASED AMTRA	FERRY STREET	IN HUDSON	1905	2	640	Closed
2	Orange	New Windsor	MILL STREET	QUASSAICK CREEK	IN NEWBURGH	1883	2	4,529	Closed
3	Westchester	Mount Vernon	UNIVERSAL MTL BLG	EAST 3RD STREET	1.3 MI NW OF PELHAM MANOI	1912	4	7,658	Open
4	Ulster	Kingston	DOCK STREET, RONDOU	RTE 984	12.5MI N JCT RTS 9W+299	1921	2	4,868	Posted
5	Westchester	Mamaroneck	MAMARONECK RIVER	TOMPKINS AVE	AT MAMARONECK	1900	2	3,286	Posted
6	Orange	Woodbury	PINE HILL ROAD	RTE I87	0.6 MI SE OF HIGHL. MILLS	1953	2	1,159	Open
7	Westchester	Greenburgh	RTE 9A	RTE 100C	JCT RTS 9A+100C	1936	3	12,610	Open
8	Rockland	Ramapo	RTE I87	COLLEGE ROAD CR81	3.1 MI E JCT RTS I87<202	1956	2	11,294	Open
9	Westchester	Mamaroneck	SHELDRAKE RIVER	WAVERLY AVENUE	AT MAMARONECK	1931	2	10,385	Posted
10	Westchester	Mount Vernon	BUILDING	SOUTH FULTON AVE	1.2 MI NW OF PELHAM MANOI	1912	4	8,933	Open
11	Columbia	Claverack	RTE 987G	RTE 23	JCT RT 23+TSP	1956	2	4,491	Posted
12	Orange	Warwick	SOUTH STREET	WAWAYANDA CREEK	IN THE VILLAGE OF WARWICK	1930	2	3,709	Posted
13	Ulster	Woodstock	SAW KILL	COUNTY ROAD 30	1.5 MI E OF WOODSTOCK	1931	2	2,280	Open
14	Dutchess	Pleasant Valley	RTE 115	LITTLE WAPPINGER CREEK	IN SALT POINT	1915	2	2,249	Posted
15	Putnam	Philipstown	CANOPUS CREEK	SPROUT BROOK ROAD	3.7 MI NE OF PEEKSKILL	1935	2	1,967	Posted
16	Westchester	Cortlandt	MNRR HU LINE	MONTROSE STA ROAD	IN MONTROSE	1937	2	1,894	Posted
17	Westchester	Mamaroneck	MAMARONECK RIVER	HILLSIDE AVENUE	AT MAMARONECK	1936	2	1,849	Posted
18	Westchester	Yonkers	RTE 907K	RTE 987D	JCT OF RTS SMRP + CCP	1940	6	75,986	Posted
19	Orange	New Windsor	RTE I87	RTE 207	JCT OF I87 & S H 207	1953	4	51,718	Open
20	Ulster	Ulster	ESOPUS CREEK	RTE 209	1.6 MI S JCT RTS 209+28	1962	2	12,896	Open
21	Rockland	Orangetown	CSX Transportation	ORANGEBURG ROAD	1.5 MI NW OF SPARKILL	2016	2	12,562	Open
22	Putnam	Brewster	MNRR HA LINE	RTE 6	0.9 MI W JCT RTS 6+22+202	1937	2	9,812	Open
23	Putnam	Putnam Valley	PEEKSKLL HOLLW CK	OSCAWANNA LAKE RD	2.9 MI W OF SHRUB OAK	1964	2	9,588	Open
24	Orange	Walden	RTE 52	TIN BROOK	0.4 MI E JCT RTS 52+208	1931	2	7,924	Open
25	Westchester	Cortlandt	CANOPUS(SPRT)BRK.	COUNTY ROAD 306	.2 MI E US209/ANNSVILLE	1929	2	7,882	Open

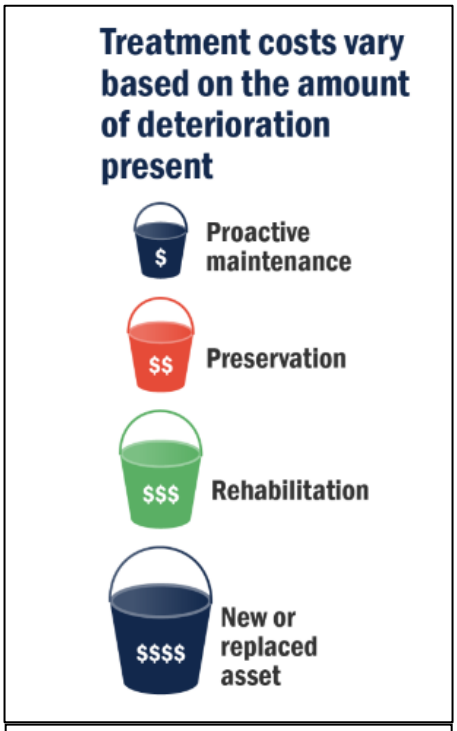
Source: Federal Highway Administration National Bridge Inventory, 2018.

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.

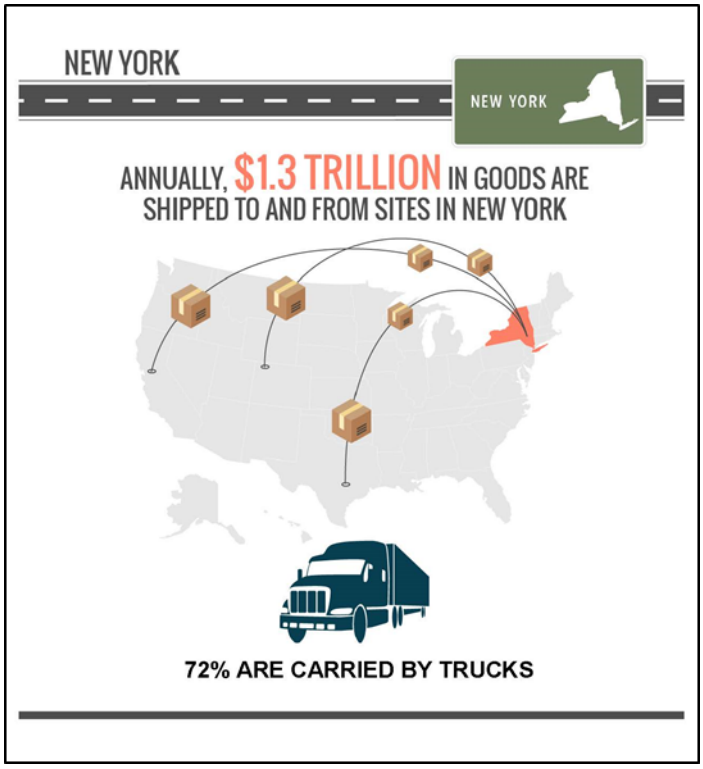
IMPORTANCE OF TRANSPORTATION TO ECONOMIC GROWTH

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.

# # #

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