MERCATUS CENTER
George Mason University

POLICY BRIEF

Recent Trends in US Highway and Bridge Conditions

Robert Krol

September 2020

The current transportation funding legislation, the Fixing America's Surface Transportation (FAST) Act, is set to expire at the end of September 2020.[1] On July 1, 2020, the House of Representatives approved a bill to continue federal funding for highways and bridges—one headline read "House Approves $1.5 Trillion Plan to Fix Crumbling Infrastructure"—but the Senate has yet to take action.[2] Debates over the current condition of major US highways, roads, and bridges are often based on the premise that they are in poor shape—crumbling—and getting worse.[3] Although there is work to be done, the headline overstates the problems with America's highways, roads, and bridges. The condition of major highways and roads is stable. Furthermore, there are fewer bridges in poor condition today than there were five years ago.

This policy brief uses US Department of Transportation (DOT) state-level highway, road, and bridge data to evaluate current conditions in surface transportation infrastructure. The brief updates a Mercatus on Policy report published in 2017.[4] At that time, the percentage of poor-quality highways and roads had not changed much between 2005 and 2014. There were fewer bridges in poor shape in 2014 than in 2005. However, there was considerable variation in highway, road, and bridge conditions across states. This update for the period from 2014 to 2018 (2014 to 2019 for bridges) draws similar conclusions.

HIGHWAY AND ROAD CONDITIONS

States measure the condition of their highways and roads using the International Roughness Index (IRI). The data are reported annually to the DOT.[5] The DOT reports the number of road miles for different ranges of the IRI in a state-by-type-of-road classification. Roads are classified into interstate highways, freeways, and arterial roads.[6] They are also divided into urban and rural regions.[7]

Table 1. Highways and Roads in Poor Condition (50 US States, IRI > 170), 2014 and 2018

CATEGORY	2018				2014				STATES THAT IMPROVED (PERCENTAGE)
	AVERAGE (PERCENTAGE)	STANDARD DEVIATION	WORST STATE (PERCENTAGE)	BEST STATE (PERCENTAGE)	AVERAGE (PERCENTAGE)	STANDARD DEVIATION	WORST STATE (PERCENTAGE)	BEST STATE (PERCENTAGE)	
Rural interstates	0.019	0.020	0.012	0.000	0.020	0.029	0.163	0.000	0.404
Rural freeways	0.036	0.055	0.033	0.000	0.032	0.046	0.214	0.000	0.306
Rural principal arterials	0.058	0.071	0.037	0.004	0.053	0.066	0.335	0.003	0.347
Rural minor Arterials	0.099	0.097	0.572	0.014	0.084	0.074	0.328	0.002	0.375
Urban interstates	0.045	0.034	0.193	0.002	0.046	0.043	0.222	0.000	0.449
Urban freeways	0.078	0.072	0.312	0.008	0.074	0.068	0.331	0.003	0.386
Urban principal arterials	0.227	0.114	0.560	0.060	0.232	0.121	0.561	0.046	0.592

Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018" (database), accessed July 21, 2020, https://www.fhwa.dot.gov/policyinformation/statistics/2018/, table HM-64 and US Department of Transportation, "Highway Statistics 2014" (database), accessed July 21, 2020, https://www.fhwa.dot.gov/policyinformation/statistics/2014/, table HM-64.

The IRI is an objective measure of the condition of a highway or road. A spring-mounted laser that measures vertical movement is pulled along each state's highways and roads. The accumulated vertical movement is expressed on an inches-per-mile basis. A higher IRI indicates a decline in road quality. For safety, lower values are needed where vehicles move quickly across the surface of the road. For speeds greater than US limits or those used on airport runways, the index should be between 25 and 100. For speeds on US highways, an index between 100 and 200 is acceptable. Index values greater than 200 are considered an indicator of poor quality but are adequate where traffic moves well below highway speeds. In the tables included in this brief, IRI values above 170 are considered an indicator of a poor-quality road or highway.

The indicator that measures the percentage of a state's highways or roads that are in poor condition is calculated by taking a state's highway or road mileage with an IRI greater than 170 and dividing it by the total mileage in a rural or urban category. Table 1 reports the percentage of highways and roads in poor condition in the 50 US states for the years 2014 and 2018.

Over the four-year period, the average percentage of highways or roads in poor condition has been fairly stable. Of the seven categories, three (rural interstates, urban interstates, and urban principle arterials) showed modest improvement. The remainder showed modest declines. The percentage of states that experienced an improvement in highway and road condition is reported in the last column of table 1. For each category except rural freeways, at least one-third of the states experienced an improvement in highways and roads.

The dispersion in road conditions across states, as measured by the standard deviation, is like that seen in the 2005–2014 data. For the recent period, there was a narrowing of the dispersion in interstate highway conditions across states in both rural and urban areas, suggesting that poor-quality stretches of roads were improved. This result, along with the decline in the percentage of interstate highways in poor condition, indicates a modest improvement in the quality of the Interstate Highway System between 2014 and 2018. All state-by-state performances are shown in the appendix (tables A1 and A2).

Tables 2 and 3 show the top 10 and bottom 10 state performances with respect to highway and road conditions in 2018.

Table 2. Top 10 and Bottom 10 Rural State Rankings of Highways and Roads in Poor Condition for 2018

	INTERSTATES	FREEWAYS	PRINCIPAL ARTERIALS	MINOR ARTERIALS
BEST STATES				
1.	NH	AZ	NV	FI
2.	VA	NH	DE	GA
3.	UT	TN	FL	NV
4.	ND	VT	KS	AL
5.	KS	KS	GA	VA
6.	FL	MO	KY	KS
7.	TN	VA	AL	OH
8.	MO	KY	MO	DE
9.	OR	SC	ID	WY
10.	SD	FL	TN	OR
WORST STATES				
1.	AK	OK	RI	RI
2.	CO	LA	HI	AK
3.	WA	AK	NJ	NM
4.	IN	WA	ME	NH
5.	WI	ME	LA	CA
6.	MI	DE	VT	HI
7.	LA	NE	IA	TN
8.	CA	PA	WV	CO
9.	NY	WI	OK	WA
10.	WV	IN	CT	WI

Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018," and US Department of Transportation, "Highway Statistics 2014."

Table 3. Top 10 and Bottom 10 Urban State Rankings of Highways and Roads in Poor Condition for 2018

	INTERSTATES	FREEWAYS	PRINCIPAL ARTERIALS
BEST STATES			
1.	NH	NH	FL
2.	VT	UT	GA
3.	ME	VT	AL
4.	ID	AZ	UT
5.	SD	CT	MN
6.	AZ	FL	NV
7.	NC	VA	TN
8.	TN	DE	KY

Table 3 (continued)			
	INTERSTATES	FREEWAYS	PRINCIPAL ARTERIALS
9.	ND	OR	ID
10.	UT	ID	IN
WORST STATES			
1.	HI	WV	RI
2.	LA	LA	CA
3.	DE	HI	NE
4.	MI	NY	MA
5.	NJ	NE	NJ
6.	CA	ME	NY
7.	IN	IL	WA
8.	NY	AK	WI
9.	MD	RI	MI
10.	PA	ID	LA

Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018," and US Department of Transportation, "Highway Statistics 2014."

Comparison to Other Countries

How does the United States compare to other industrialized countries? While there is no comparable IRI data for these countries, survey data can offer a perspective on the relative status of US roads. The World Economic Forum conducts a survey of 14,000 business leaders, asking them to rate roads in their home countries.[8] They rate the roads on a one-to-seven scale, with seven being best. The G-7 average score in 2018 was 5.5. The United States ranked 10 in the world with a score of 5.7. The only G7 countries ahead of the United States were Japan and France with scores of 6.1 and 6.0 respectively. It appears that the condition of US highways and roads is comparable to that of other industrialized countries.

BRIDGE CONDITIONS

Each state conducts a survey of bridges and reports the results to the DOT. These results are reported in the annual *Survey of Bridges*.[9] Since 2017, the condition of a bridge is classified as good, fair, or poor based on inspections. A rating of seven or more results in the bridge being classified as good. Bridge ratings less than or equal to four are classified as Poor. Bridges with a score greater than four or five are classified as fair.[10]

For each state, the percentage of bridges in poor condition is calculated by dividing the square meters of bridge span rated in poor condition by the total square meters of bridges in the state. The results are reported in table 4. The average percentage of bridges in poor condition declined from 7.3 percent in 2014 to 6.1 percent in 2019. The dispersion of bridges in poor condition

Table 4. Bridges in Poor Condition (50 US States), 2019 and 2014				
	AVERAGE (PERCENTAGE)	STANDARD DEVIATION	WORST STATE (PERCENTAGE)	BEST STATE (PERCENTAGE)
2019	0.061	0.040	0.230	0.008
2014	0.073	0.042	0.207	0.009

Source: Author's calculations based on US Department of Transportation, "National Bridge Inventory" (database), accessed July 21, 2020, https://www.fhwa.dot.gov/bridge/nbi.cfm.

declined slightly from 4.2 percent in 2014 to 4 percent in 2019, suggesting that there is slightly less diversity in bridge condition across the states. This improvement continues the trend that occurred between 2005 and 2014. All state-by-state bridge conditions are shown in table A3 for 2014 and 2019. Eighty-two percent of the states experienced a decline in square meters of bridge surface classified as being in poor condition between 2014 and 2019. Table 5 shows the top 10 and bottom 10 state rankings of bridges in poor condition in 2019.

Table 5. Top 10 and Bottom 10 State Rankings of Bridges in Poor Condition for 2019	
BEST STATES	
1.	UT
2.	NV
3.	TX
4.	AZ
5.	FL
6.	GA
7.	HI
8.	AL
9.	KS
10.	MN
WORST STATES	
1.	RI
2.	WV
3.	IL
4.	MA
5.	CT
6.	NY
7.	IA
8.	SD
9.	LA
10.	MO

Source: Author's calculations based on US Department of Transportation, "National Bridge Inventory" (database), accessed July 21, 2020, https://www.fhwa.dot.gov/bridge/nbi.cfm.

CONCLUSIONS

This brief examines the recent trends in major highway, road, and bridge conditions in the United States from 2014 to 2018 (2014 to 2019 for bridges). The results indicate that the average condition of major US highways and roads has not changed much. While all the changes are small, improvements appear in rural interstates, urban interstates, and urban principal arterial roads. On the other hand, modest declines occur in road quality for freeways and rural arterials. Over the four-year period, the dispersion in quality has increased for each category except rural interstates and rural principal arterials.

The percentage of bridges in poor condition has declined between 2014 and 2019. Eighty-two percent of the states experienced some improvement over this time period. It appears that states have made a concerted effort to improve bridges since 2005.

These results show that the condition of US highways and roads is stable. The condition of US bridges has improved. It is not accurate to describe US highways, roads, and bridges as crumbling.

ABOUT THE AUTHOR

Robert Krol is an emeritus professor of economics at California State University, Northridge; a senior affiliated scholar at the Mercatus Center at George Mason University; and a member of the Heartland Institute's board of policy advisers. He also worked as an economist at Security Pacific National Bank in Los Angeles and the Milken Institute in Santa Monica, California. He received his PhD in economics from Southern Illinois University, Carbondale in 1982. His current research focuses on regulation, transportation infrastructure issues, international trade and investment, and the impact of economic policy uncertainty on the economy.

APPENDIX

Table A1. Percentage of Rural Highways and Roads in Poor Condition by State

	INTERSTATES		FREEWAYS		OTHER ARTERIALS		MINOR ARTERIALS	
STATE	2018	2014	2018	2014	2018	2014	2018	2014
Alabama	0.013	0.016			0.016	0.018	0.017	0.024
Alaska	0.117	0.100			0.368	0.335	0.344	0.328
Arizona	0.023	0.017	0.000	0.004	0.049	0.024	0.075	0.046
Arkansas	0.020	0.024	0.076	0.048	0.049	0.041	0.088	0.065
California	0.030	0.060	0.034	0.121	0.053	0.077	0.198	0.250
Colorado	0.067	0.056	0.013	0.027	0.037	0.047	0.157	0.140
Connecticut	0.011	0.024	0.019	0.008	0.069	0.087	0.132	0.174
Delaware			0.064	0.009	0.006	0.003	0.024	0.019
Florida	0.005	0.002	0.010	0.003	0.007	0.006	0.014	0.014
Georgia	0.019	0.015			0.013	0.013	0.014	0.015
Hawaii					0.204	0.194	0.183	0.168
Idaho	0.011	0.015	0.016		0.019	0.021	0.037	0.047
Illinois	0.011	0.000	0.040	0.000	0.067	0.018	0.043	0.006
Indiana	0.044	0.038	0.047	0.009	0.044	0.031	0.036	0.049
Iowa	0.011	0.026			0.074	0.124		0.196
Kansas	0.005	0.003	0.005	0.004	0.013	0.009	0.019	0.014
Kentucky	0.010	0.004	0.010	0.008	0.015	0.012	0.041	0.041
Louisiana	0.034	0.028	0.111		0.094	0.074	0.103	0.074
Maine	0.013	0.001	0.065		0.109	0.036	0.140	0.065
Maryland	0.011	0.018	0.021		0.029	0.026	0.040	0.013
Massachusetts	0.018		0.029		0.047		0.121	
Michigan	0.034	0.038	0.023	0.021	0.023	0.023	0.038	0.084
Minnesota	0.019	0.025	0.018	0.214	0.043	0.047	0.101	0.165
Mississippi	0.018	0.021			0.045	0.032	0.111	0.071
Missouri	0.006	0.007	0.005	0.005	0.017	0.035	0.079	0.068
Montana	0.012	0.006			0.040	0.035	0.051	0.044
Nebraska	0.010	0.000	0.052	0.045	0.039	0.034	0.051	0.058
Nevada	0.011	0.163			0.004	0.036	0.015	0.009
New Hampshire	0.000	0.007	0.000	0.082	0.034	0.084	0.218	0.127
New Jersey	0.019	0.013	0.014	0.016	0.134	0.168	0.105	0.109
New Mexico	0.012	0.007			0.041	0.025	0.253	0.111
New York	0.028	0.031	0.042	0.053	0.064	0.047	0.097	0.096
North Carolina	0.011	0.006	0.013	0.002	0.028	0.026	0.087	0.068
North Dakota	0.005	0.001			0.022	0.035	0.038	0.062
Ohio	0.016	0.003	0.013	0.003	0.024	0.010	0.019	0.002

Table A1 (continued)								
	INTERSTATES		FREEWAYS		OTHER ARTERIALS		MINOR ARTERIALS	
STATE	2018	2014	2018	2014	2018	2014	2018	2014
Oklahoma	0.021	0.013	0.333		0.070	0.039	0.122	0.041
Oregon	0.006	0.009			0.021	0.029	0.032	0.054
Pennsylvania	0.023	0.016	0.049	0.047	0.050	0.052	0.104	0.088
Rhode Island	0.007	0.006	0.028		0.350	0.300	0.572	0.327
South Carolina	0.007	0.001	0.010	0.000	0.052	0.017	0.042	0.013
South Dakota	0.006	0.002	0.015	0.000	0.055	0.023	0.065	0.047
Tennessee	0.006	0.005	0.000		0.020	0.014	0.166	0.036
Texas	0.007	0.010	0.016	0.062	0.021	0.028	0.061	0.049
Utah	0.004	0.000	0.022	0.000	0.030	0.014	0.080	0.088
Vermont	0.004	0.000	0.000	0.000	0.075	0.050	0.068	0.160
Virginia	0.003	0.006	0.005	0.008	0.024	0.015	0.019	0.022
Washington	0.062	0.051	0.065	0.060	0.042	0.036	0.154	0.102
West Virginia	0.025	0.000	0.039		0.073	0.044	0.096	0.101
Wisconsin	0.035	0.045	0.047	0.059	0.063	0.088	0.152	0.102
Wyoming	0.013	0.016			0.020	0.024	0.024	0.050

Source: Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018," and US Department of Transportation, "Highway Statistics 2014." Blank cells mean the state did not report data for that year.

Table A2. Percentage of Urban Highways and Roads in Poor Condition by State						
	INTERSTATES		FREEWAYS		OTHER ARTERIALS	
STATE	2018	2014	2018	2014	2018	2014
Alabama	0.053	0.056	0.049	0.028	0.069	0.071
Alaska	0.027	0.045			0.182	0.229
Arizona	0.018	0.013	0.017	0.013	0.184	0.159
Arkansas	0.051	0.087	0.141	0.146	0.168	0.151
California	0.084	0.157	0.076	0.152	0.508	0.561
Colorado	0.048	0.055	0.059	0.095	0.247	0.296
Connecticut	0.021	0.039	0.021	0.042	0.260	0.322
Delaware	0.105	0.103	0.028	0.021	0.142	0.157
Florida	0.023	0.011	0.022	0.021	0.060	0.054
Georgia	0.024	0.031	0.040	0.058	0.068	0.083
Hawaii	0.193	0.222	0.263	0.331	0.318	0.291
Idaho	0.013	0.026	0.037		0.126	0.199
Illinois	0.049	0.009	0.146	0.088	0.241	0.201
Indiana	0.076	0.070	0.087	0.082	0.126	0.227
Iowa	0.036	0.068			0.233	0.234

Table A2 (continued)

STATE	INTERSTATES		FREEWAYS		OTHER ARTERIALS	
	2018	2014	2018	2014	2018	2014
Kansas	0.028	0.032	0.047	0.027	0.142	0.208
Kentucky	0.027	0.012	0.044	0.026	0.120	0.112
Louisiana	0.126	0.122	0.309	0.189	0.321	0.329
Maine	0.008	0.000	0.152	0.014	0.229	0.150
Maryland	0.069	0.071	0.059	0.067	0.261	0.237
Massachusetts	0.034		0.052		0.422	
Michigan	0.092	0.086	0.053	0.051	0.325	0.340
Minnesota	0.053	0.060	0.046	0.088	0.091	0.132
Mississippi	0.032	0.043	0.056	0.043	0.205	0.220
Missouri	0.025	0.031	0.044	0.035	0.182	0.127
Montana	0.020	0.018			0.286	0.242
Nebraska	0.042	0.019	0.195	0.194	0.442	0.510
Nevada	0.035	0.032	0.038	0.029	0.096	0.070
New Hampshire	0.002	0.005	0.008	0.013	0.158	0.198
New Jersey	0.091	0.096	0.074	0.098	0.392	0.395
New Mexico	0.024	0.019	0.047		0.249	0.215
New York	0.073	0.113	0.212	0.230	0.381	0.418
North Carolina	0.019	0.017	0.039	0.023	0.141	0.131
North Dakota	0.020	0.003			0.216	0.235
Ohio	0.040	0.013	0.053	0.021	0.300	0.290
Oklahoma	0.064	0.046	0.063	0.038	0.198	0.351
Oregon	0.033	0.033	0.035	0.045	0.167	0.177
Pennsylvania	0.066	0.046	0.086	0.086	0.267	0.291
Rhode Island	0.023	0.014	0.094	0.077	0.560	0.527
South Carolina	0.026	0.007	0.053	0.034	0.132	0.068
South Dakota	0.018	0.000	0.067	0.038	0.241	0.184
Tennessee	0.020	0.021	0.055	0.041	0.105	0.107
Texas	0.038	0.046	0.062	0.067	0.289	0.280
Utah	0.021	0.001	0.008	0.003	0.086	0.046
Vermont	0.004	0.002	0.011	0.067	0.176	0.210
Virginia	0.029	0.055	0.028	0.038	0.187	0.224
Washington	0.064	0.052	0.068	0.057	0.368	0.428
West Virginia	0.042	0.028	0.312	0.208	0.132	0.154
Wisconsin	0.059	0.055	0.071	0.077	0.354	0.324
Wyoming	0.056	0.058	0.037	0.091	0.174	0.192

Source: Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018," and US Department of Transportation, "Highway Statistics 2014." Blank cells mean the state did not report data for that year.

Table A3. Percentage of Bridges in Poor Condition by State		
STATE	2019	2014
Alabama	0.025	0.029
Alaska	0.077	0.107
Arizona	0.014	0.039
Arkansas	0.045	0.052
California	0.072	0.112
Colorado	0.052	0.047
Connecticut	0.102	0.182
Delaware	0.054	0.057
Florida	0.018	0.022
Georgia	0.020	0.028
Hawaii	0.024	0.013
Idaho	0.050	0.071
Illinois	0.123	0.097
Indiana	0.039	0.079
Iowa	0.098	0.106
Kansas	0.028	0.033
Kentucky	0.050	0.047
Louisiana	0.090	0.091
Maine	0.074	0.094
Maryland	0.034	0.035
Massachusetts	0.115	0.128
Michigan	0.076	0.088
Minnesota	0.033	0.048
Mississippi	0.040	0.047
Missouri	0.090	0.081
Montana	0.078	0.071
Nebraska	0.053	0.064
Nevada	0.010	0.009
New Hampshire	0.069	0.086
New Jersey	0.074	0.086
New Mexico	0.047	0.060
New York	0.100	0.124
North Carolina	0.084	0.107
North Dakota	0.046	0.053
Ohio	0.036	0.055
Oklahoma	0.053	0.101
Oregon	0.033	0.040

Table A3 (continued)		
STATE	2019	2014
Pennsylvania	0.082	0.128
Rhode Island	0.230	0.207
South Carolina	0.067	0.071
South Dakota	0.094	0.109
Tennessee	0.042	0.049
Texas	0.011	0.015
Utah	0.008	0.015
Vermont	0.040	0.053
Virginia	0.037	0.049
Washington	0.061	0.079
West Virginia	0.161	0.074
Wisconsin	0.040	0.042
Wyoming	0.074	0.154

Source: Source: Author's calculations based on US Department of Transportation, "Highway Statistics 2018," and US Department of Transportation, "Highway Statistics 2014."

NOTES

1. Fixing America's Surface Transportation Act, Pub. L. 114-94, 129 Stat. 1312 (2015).
2. Associated Press, "House Approves $1.5 Trillion Plan to Fix Crumbling Infrastructure," *Los Angeles Daily News*, July 1, 2020.
3. American Society of Civil Engineers, *2017 Infrastructure Report Card*, 2019. However, some disagree. See Debra Knopman et al., *Not Everything Is Broken: The Future of U.S. Transportation and Water Infrastructure Funding and Financing* (Santa Monica, CA: Rand Corporation, 2017).
4. Robert Krol, 2017, "America's Infrastructure Isn't Crumbling: Some Facts on Highway, Road, and Bridge Conditions in the United States" (Mercatus on Policy, Mercatus Center at George Mason University, Arlington, VA, May 2017).
5. Michael W. Sayers, Thomas D. Gillespie, and William D. O. Paterson, "Guidelines for Conducting and Calibrating Road Roughness Measurements" (World Bank Technical Paper No. 46, World Bank, Washington, DC, January 1986). The data are reported in the "Highway Statistics" database and can be found at https://www.fhwa.dot.gov/policyinformation/statistics.cfm.
6. Arterial roads typically have high traffic volumes and connect collector roads to highways.
7. The reader should keep in mind that that local, urban minor arterial, and collector roads are not evaluated using the IRI. Measured in terms of miles, the excluded roads make up more than 90 percent of urban and rural roads. But in terms of vehicle miles traveled, the highways and roads evaluated using the IRI make up 65 percent and 58 percent of rural and urban travel respectively. These calculations are based on data from "Highway Statistics" for 2018.
8. World Economic Forum, *Global Competitiveness Report 2017–2018*, 2017, http://reports.weforum.org/pdf/gci-2017-2018-scorecard/WEF_GCI_2017_2018_Scorecard_EOSQ057.pdf.
9. "Tables of Frequently Requested NBI Information," US Department of Transportation, accessed July 21, 2020, https://www.fhwa.dot.gov/bridge/britab.cfm.
10. Bridges are evaluated on the deck, superstructure, substructure, and culvert. The bridge rating is based on the lowest score of these four characteristics. Before 2017, the poor rating was called "structurally deficient or functionally obsolete." See "Tables of Frequently Requested NBI Information."