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28TH ANNUAL HIGHWAY REPORT

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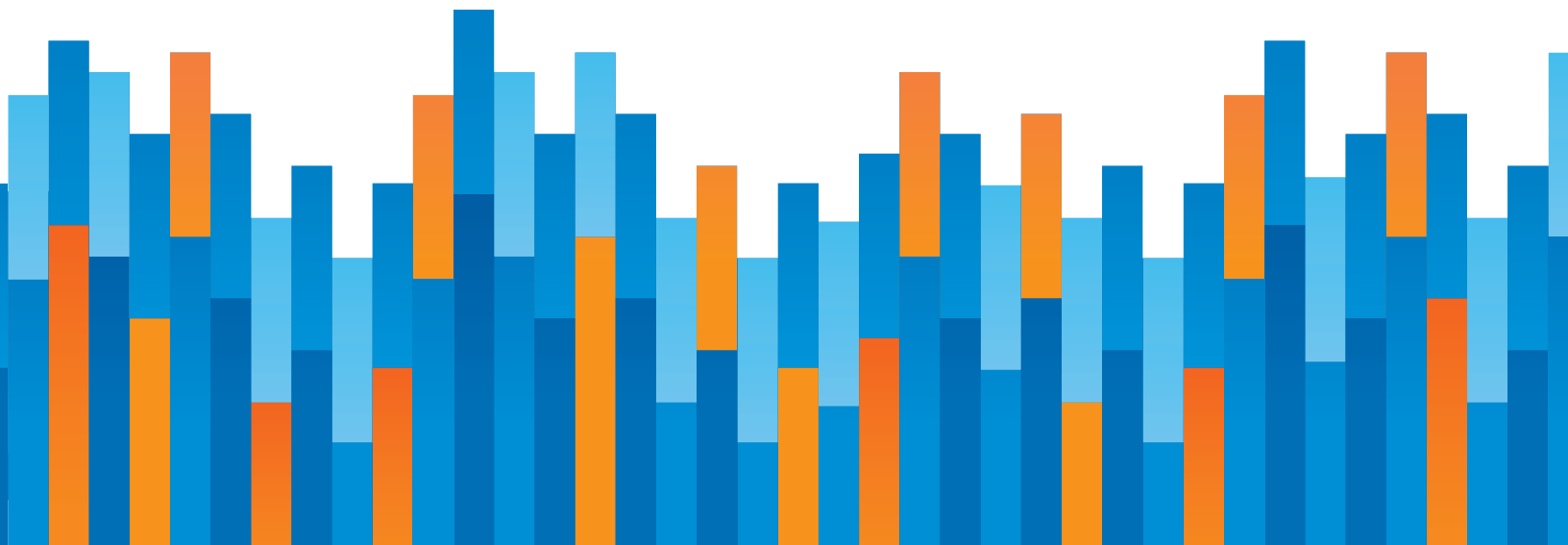

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PART 1

STATE HIGHWAY PERFORMANCE RANKINGS

Reason Foundation's *28th Annual Highway Report* evaluates state highway systems on cost versus quality using a method developed in the early 1990s by David T. Hartgen, Ph.D., emeritus professor at the University of North Carolina at Charlotte. This method has since been refined by Hartgen, M. Gregory Fields, Baruch Feigenbaum, and Truong Bui. Since states have different budgets, system sizes, and traffic and geographic circumstances, their comparative performance depends on both system performance and the resources available. To determine relative performance across the country, state highway system budgets (per mile of responsibility) are compared with system performance, state by state. States with high rankings typically have better-than-average system conditions (good for road users) along with relatively low per-mile expenditures (also good for taxpayers).

The following table shows the overall highway performance of the state highway systems using 2022 data. This year's leading states are North Carolina, South Carolina, North Dakota, Virginia, and Tennessee**.** At the other end of the rankings are Alaska, California, Hawaii, Washington, and Louisiana.

Similar to last year, the top-performing states are a mix of large and small states as well as states that are more urban and more rural. (Tables 1, 2, 3, 4, and Figure 1). Five large-population (more than seven million people) states place in the top 10 of the overall rankings: North Carolina (2nd), Virginia (4th), Tennessee (5th), Georgia (6th), and Ohio (10th). Numerous factors—terrain, climate, truck volumes, urbanization, system age, budget priorities, unit cost differences, state budget circumstances, and management/maintenance philosophies—all affect overall performance. The remainder of this report reviews the statistics underlying these overall rankings in more detail.

TABLE 1: OVERALL HIGHWAY PERFORMANCE RANKINGS, 2022

Overall	State
1	North Carolina
2	South Carolina
3	North Dakota
4	Virginia
5	Tennessee
6	Georgia
7	Minnesota
8	Utah
9	Missouri
10	Ohio
11	Kentucky
12	Wyoming
13	Connecticut
14	Florida
15	Idaho
16	Montana
17	Alabama
18	Mississippi
19	New Hampshire
20	Indiana
21	Maine
22	Kansas
23	Michigan
24	Nevada
25	Texas
26	Wisconsin
27	South Dakota
28	Arkansas
29	Arizona
30	Nebraska
31	Iowa
32	Maryland
33	West Virginia
34	New Jersey
35	Oregon
36	Illinois
37	Pennsylvania
38	New Mexico
39	Oklahoma
40	Massachusetts
41	Delaware
42	Rhode Island
43	Colorado
44	Vermont
45	New York
46	Louisiana
47	Washington
48	Hawaii
49	California
50	Alaska

TABLE 2: OVERALL HIGHWAY PERFORMANCE RANKINGS IN ALPHABETICAL ORDER, 2022

State	Overall
Alabama	17
Alaska	50
Arizona	29
Arkansas	28
California	49
Colorado	43
Connecticut	13
Delaware	41
Florida	14
Georgia	6
Hawaii	48
Idaho	15
Illinois	36
Indiana	20
Iowa	31
Kansas	22
Kentucky	11
Louisiana	46
Maine	21
Maryland	32
Massachusetts	40
Michigan	23
Minnesota	7
Mississippi	18
Missouri	9
Montana	16
Nebraska	30
Nevada	24
New Hampshire	19
New Jersey	34
New Mexico	38
New York	45
North Carolina	1
North Dakota	3
Ohio	10
Oklahoma	39
Oregon	35
Pennsylvania	37
Rhode Island	42
South Carolina	2
South Dakota	27
Tennessee	5
Texas	25
Utah	8
Vermont	44
Virginia	4
Washington	47
West Virginia	33
Wisconsin	26
Wyoming	12

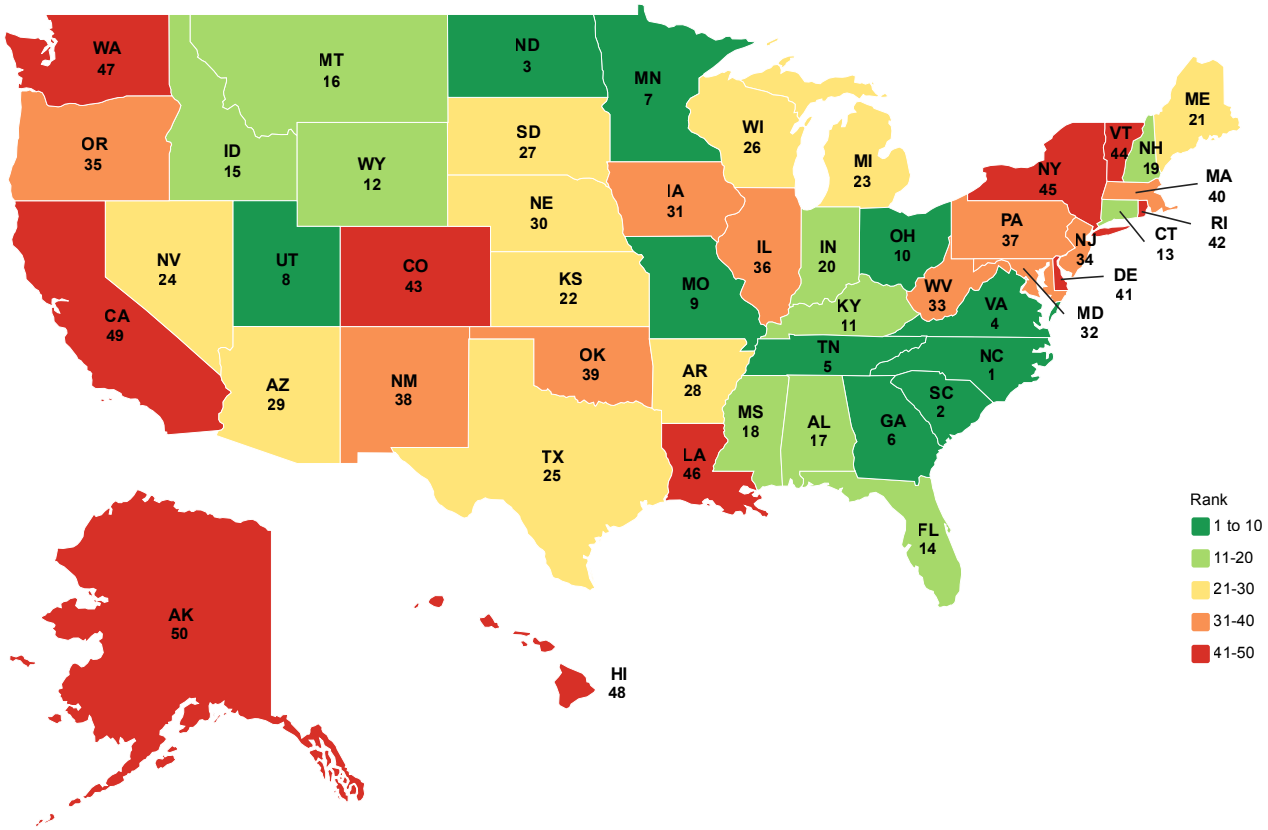
TABLE 3: HIGHWAY PERFORMANCE RANKINGS BY CATEGORY, 2022

State	Overall	Capital & Bridge Disbursements Ratio	Maintenance Disbursements Ratio	Admin Disbursements Ratio	Other Disbursements Ratio	Rural Interstate Pavement Condition	Urban Interstate Pavement Condition	Rural Arterial Pavement Condition	Urban Arterial Pavement Condition	Urbanized Area Congestion	Structurally Deficient Bridges	Rural Fatality Rate	Urban Fatality Rate	Other Fatality Rate
Alabama	17	22	1	42	46	33	29	4	1	17	8	33	29	26
Alaska	50	48	40	21	28	48	8	50	19	13	35	48	49	3
Arizona	29	27	7	41	30	41	12	30	20	30	1	45	38	41
Arkansas	28	25	6	3	21	39	40	36	30	4	23	43	46	36
California	49	43	44	35	43	46	47	41	50	44	25	28	33	45
Colorado	43	42	45	26	13	47	45	37	35	36	19	32	40	32
Connecticut	13	18	9	14	20	9	15	32	28	32	21	30	26	21
Delaware	41	4	46	48	10	N/A	46	21	16	48	4	49	36	38
Florida	14	40	25	23	23	4	9	5	5	39	10	38	48	27
Georgia	6	8	15	32	22	14	13	2	3	43	5	25	39	29
Hawaii	48	20	8	25	14	N/A	50	47	40	19	26	50	47	1
Idaho	15	49	33	17	40	23	7	12	12	7	20	23	5	15
Illinois	36	45	24	30	29	29	37	42	34	46	38	16	21	28
Indiana	20	46	49	16	6	34	22	3	4	28	24	14	45	5
Iowa	31	44	21	33	17	28	24	40	26	3	49	6	11	18
Kansas	22	38	23	34	49	15	21	13	21	5	22	11	19	35
Kentucky	11	15	17	2	31	24	30	7	14	22	33	17	22	47
Louisiana	46	14	19	4	45	45	49	46	42	34	44	13	37	46
Maine	21	21	35	11	24	3	6	44	29	2	46	15	4	23
Maryland	32	19	31	22	47	25	44	27	45	45	14	1	28	11
Massachusetts	40	12	41	43	18	43	28	33	46	49	37	24	8	4
Michigan	23	33	22	13	15	38	41	16	33	26	43	3	24	19
Minnesota	7	29	36	36	36	8	14	17	2	29	12	2	1	6
Mississippi	18	13	2	8	9	32	35	38	32	6	28	40	42	30
Missouri	9	3	11	5	27	18	23	14	22	20	39	26	32	17
Montana	16	16	38	19	25	13	2	24	27	18	32	41	44	24
Nebraska	30	28	32	29	16	16	25	35	49	15	36	20	31	12
Nevada	24	36	26	49	34	5	20	1	11	35	3	47	25	37
New Hampshire	19	9	28	46	44	2	1	19	8	33	34	19	3	20
New Jersey	34	39	16	10	38	12	43	29	41	50	30	5	16	8
New Mexico	38	10	3	44	35	40	36	34	39	25	16	42	50	34
New York	45	41	42	40	41	42	48	28	47	47	40	4	18	13
North Carolina	1	7	5	1	3	20	17	15	10	21	31	39	9	39
North Dakota	3	26	14	15	11	6	3	20	25	1	42	29	6	7
Ohio	10	6	20	18	26	26	32	9	36	14	13	9	12	31
Oklahoma	39	37	43	37	42	36	38	43	31	12	41	22	30	49
Oregon	35	34	47	39	37	17	19	26	23	41	15	46	35	44
Pennsylvania	37	17	37	31	33	37	39	31	37	42	45	12	20	25
Rhode Island	42	30	30	20	7	1	4	49	48	38	47	31	2	2
South Carolina	2	2	4	6	1	27	10	22	7	23	18	44	41	48
South Dakota	27	31	39	45	12	7	11	23	15	11	48	21	15	40
Tennessee	5	11	13	28	2	19	16	18	9	27	11	27	43	42
Texas	25	32	18	38	19	22	34	11	38	40	2	37	34	43
Utah	8	47	34	27	32	10	18	10	6	16	6	10	17	9
Vermont	44	35	48	50	48	31	5	48	24	9	7	8	7	14
Virginia	4	1	29	12	5	11	26	8	17	37	9	35	23	16
Washington	47	50	50	47	50	44	27	25	43	31	17	18	27	33
West Virginia	33	5	12	7	4	35	31	45	13	10	50	34	13	50
Wisconsin	26	24	10	24	39	30	33	39	44	24	27	7	10	10
Wyoming	12	23	27	9	8	21	42	6	18	8	29	36	14	22

TABLE 4: OVERALL HIGHWAY PERFORMANCE RANKING TRENDS, 2019-2022

State	Year			Change in Rank	
	2019	2020	2022	2020-2022	2019-2022
Alabama	28	15	17	-2	11
Alaska	48	50	50	0	-2
Arizona	29	30	29	1	0
Arkansas	17	13	28	-15	-11
California	45	47	49	-2	-4
Colorado	37	43	43	0	-6
Connecticut	31	5	13	-8	18
Delaware	44	35	41	-6	3
Florida	41	8	14	-6	27
Georgia	14	4	6	-2	8
Hawaii	47	48	48	0	-1
Idaho	8	34	15	19	-7
Illinois	40	29	36	-7	4
Indiana	32	23	20	3	12
Iowa	22	31	31	0	-9
Kansas	7	22	22	0	-15
Kentucky	4	7	11	-4	-7
Louisiana	35	40	46	-6	-11
Maine	33	32	21	11	12
Maryland	38	24	32	-8	6
Massachusetts	43	20	40	-20	3
Michigan	34	27	23	4	11
Minnesota	18	12	7	5	11
Mississippi	15	18	18	0	-3
Missouri	3	11	9	2	-6
Montana	11	25	16	9	-5
Nebraska	21	26	30	-4	-9
Nevada	20	21	24	-3	-4
New Hampshire	19	14	19	-5	0
New Jersey	50	44	34	10	16
New Mexico	27	36	38	-2	-11
New York	46	49	45	4	1
North Carolina	5	2	1	1	4
North Dakota	1	9	3	6	-2
Ohio	24	17	10	7	14
Oklahoma	36	45	39	6	-3
Oregon	25	37	35	2	-10
Pennsylvania	39	41	37	4	2
Rhode Island	49	42	42	0	7
South Carolina	23	6	2	4	21
South Dakota	9	28	27	1	-18
Tennessee	10	3	5	-2	5
Texas	16	19	25	-6	-9
Utah	6	10	8	2	-2
Vermont	13	38	44	-6	-31
Virginia	2	1	4	-3	-2
Washington	42	46	47	-1	-5
West Virginia	30	39	33	6	-3
Wisconsin	26	33	26	7	0
Wyoming	12	16	12	4	0

FIGURE 1: OVERALL HIGHWAY PERFORMANCE RANK, 2020



The overall rankings are not dramatically different from the previous version of the *Annual Highway Report*. However, three states' overall ranking improved by double digits, while two states' overall rankings declined by 10 or more spots:

- **Idaho improved 19 positions from 34th to 15th in the overall rankings,** as rural Interstate condition improved by 34 positions and urban Interstate condition improved by 22 positions. In addition the rural fatality rate improved by 20 positions.
- **Maine improved 11 positions from 32nd to 21st in the overall rankings,** as rural Interstate condition improved by 24 positions. Capital disbursements also improved by 12 positions.
- **New Jersey improved 10 positions from 44th to 34th in the overall rankings,** as administrative and maintenance disbursements improved by 15 and 25 positions respectively. Rural Interstate condition improved by 12 positions.

- **Massachusetts declined 20 positions from 20th to 40th in the overall rankings**, as rural Interstate condition declined by 23 positions. The state also fared poorly in disbursements. Administrative disbursements worsened by 19 positions and maintenance disbursements declined by 26 positions.
- **Arkansas declined 15 positions from 13th to 28th in the overall rankings**, as rural fatalities declined by 25 positions and urban fatalities worsened by 39 positions. Capital disbursements also declined by 10 positions.

PART 2

METHODOLOGICAL CHANGE

Some years, based on data availability, we need to make changes to the methodology we use for certain categories.

This year, the one major change relates to the source of transportation congestion data. Last year, we developed a method that used the annual delay in hours data from Texas A&M Transportation Institute's Urban Mobility Report (UMR), combined with the daily vehicle-miles traveled data (also from the UMR) to allocate the commuter number for multi-state areas.

However, since the TTI report is published every other year, this year we needed to use a different method. Therefore, we chose the method that used INRIX data that we selected two years ago. We calculated the congestion rankings based on the annual peak hours lost in congestion per commuter collected from publicly available INRIX data. We used the Census Bureau's American Community Survey to obtain the number of commuters for metro areas. We also estimated congestion hours for non-INRIX cities, since INRIX includes data on a smaller number of cities.

Given the very small difference in results from using the two different methods, this year's results are similar to last year's, and readers can make accurate comparisons between the congestion data used in the two most recent reports.

PART 3

BACKGROUND DATA

State highway system sizes range from fewer than 2,500 lane-miles to almost 200,000 lane-miles. States with larger geographic areas and larger populations tend to have larger systems. Some states, such as North Carolina, maintain all of their roads, except for subdivision streets, on the state level. Other states, such as Florida, have robust county road systems. The width of state-controlled highway mileage is not included in the rankings. It is included in this report as background information and is used to weight the financial data.

STATE-CONTROLLED MILES

State-controlled mileage encompasses the state highway systems, state-agency toll roads, some ferry services, and smaller systems serving universities and state-owned properties. It includes the Interstate System, the National Highway System, and most federal-aid system roads. A few states also manage major portions of the rural road system (collectors and local roads). Nationally, the average number of lanes *per mile* is 2.42 lanes, but some states (Florida, New Jersey, California, and Massachusetts) manage significantly wider roads, averaging more than three lanes per mile.

Nationwide in 2022, there were 1,893,422 lane-miles under state control (Table 5, State-Controlled Highway Mileage by Lane-Miles), which is 5,841 more lane-miles than in 2020 (1,887,581), the last time this assessment was completed. We don't rank highway systems based on their size. But we use the underlying data to help calculate the categorical rankings. The size of state-controlled systems increases as states build more roadways and decreases as urbanized areas expand, and ownership and control of some state highways is transferred to county or city governments. Hawaii (2,491 miles) and Rhode Island (2,782 miles) have the fewest lane-miles under state control. Texas (200,262 miles) and North Carolina (174,088 miles) have the most.

TABLE 5: STATE-CONTROLLED HIGHWAY MILES, 2022

2022 Size	State	Lane-Miles
1	Texas	200,262
2	North Carolina	174,088
3	Virginia	129,519
4	South Carolina	90,529
5	Pennsylvania	88,249
6	Missouri	77,642
7	West Virginia	71,078
8	Kentucky	62,420
9	California	52,016
10	Ohio	49,765
11	Georgia	49,570
12	Florida	45,439
13	Illinois	42,212
14	Louisiana	40,045
15	Arkansas	38,160
16	New York	38,044
17	Tennessee	37,849
18	Oklahoma	32,085
19	Wisconsin	29,934
20	Alabama	29,843
21	New Mexico	29,442
22	Minnesota	29,239
23	Indiana	28,596
24	Mississippi	28,326
25	Michigan	27,386
26	Montana	25,245
27	Kansas	24,049
28	Colorado	23,187
29	Iowa	23,131
30	Nebraska	22,596
31	Arizona	20,050
32	Washington	18,471
33	Oregon	18,440
34	South Dakota	17,928
35	Maine	17,455
36	North Dakota	17,261
37	Utah	16,084
38	Wyoming	15,787
39	Maryland	14,961
40	Nevada	13,531
41	Idaho	12,223
42	Delaware	12,035
43	Alaska	11,858
44	Connecticut	9,825
45	Massachusetts	9,279
46	New Jersey	8,562
47	New Hampshire	8,454
48	Vermont	5,999
49	Rhode Island	2,782
50	Hawaii	2,491
	U.S. Total	1,893,422

As a result of overall population density and the geographic area of the state, some states have wider highways than others. To treat all states equally we use lane-miles as opposed to center-line miles in our calculations. (A highway that is six miles from end to end and four lanes wide is six centerline miles and 24 lane-miles). In 2022, there were 1,893,422 lane-miles under state control (Table 6, State-Controlled Highway Mileage by System Width). The widest systems are Florida's (3.74 average lanes) and New Jersey's (3.67 average lanes). The narrowest systems are West Virginia's (2.07 lanes) and Alaska's (2.09 lanes).

TABLE 6: STATE-CONTROLLED HIGHWAY MILEAGE BY SYSTEM WIDTH, 2022

2022 Size	State	Ratio	Lane-Miles	Centerline Mileage
1	Florida	3.74	45,439	12,158
2	New Jersey	3.67	8,562	2,330
3	California	3.46	52,016	15,017
4	Massachusetts	3.19	9,279	2,909
5	Arizona	2.92	20,050	6,864
6	Maryland	2.87	14,961	5,210
7	Michigan	2.83	27,386	9,664
8	Georgia	2.77	49,570	17,906
9	Utah	2.72	16,084	5,905
10	Alabama	2.72	29,843	10,962
11	Tennessee	2.69	37,849	14,064
12	Illinois	2.66	42,212	15,890
13	Connecticut	2.64	9,825	3,715
14	Washington	2.62	18,471	7,052
15	Hawaii	2.62	2,491	952
16	Iowa	2.60	23,131	8,895
17	Mississippi	2.59	28,326	10,948
18	Ohio	2.58	49,765	19,275
19	Indiana	2.58	28,596	11,078
20	Colorado	2.57	23,187	9,029
21	Wisconsin	2.55	29,934	11,746
22	Oklahoma	2.53	32,085	12,664
23	New York	2.53	38,044	15,056
24	Nevada	2.53	13,531	5,356
25	Minnesota	2.50	29,239	11,717
26	Rhode Island	2.48	2,782	1,120
27	Texas	2.47	200,262	80,997
28	New Mexico	2.47	29,442	11,914
29	Idaho	2.46	12,223	4,961
30	Oregon	2.43	18,440	7,591
31	Louisiana	2.35	40,045	17,042
32	Wyoming	2.35	15,787	6,732
33	Kansas	2.34	24,049	10,297
34	North Dakota	2.33	17,261	7,415
35	Arkansas	2.32	38,160	16,436
36	South Dakota	2.32	17,928	7,744
37	Missouri	2.30	77,642	33,809
38	Montana	2.29	25,245	11,041
39	Vermont	2.28	5,999	2,629
40	Nebraska	2.27	22,596	9,937
41	Kentucky	2.25	62,420	27,707
42	Pennsylvania	2.22	88,249	39,700
43	South Carolina	2.19	90,529	41,254
44	Delaware	2.19	12,035	5,486
45	Virginia	2.18	129,519	59,467
46	New Hampshire	2.17	8,454	3,891
47	North Carolina	2.17	174,088	80,384
48	Maine	2.10	17,455	8,327
49	Alaska	2.09	11,858	5,683
50	West Virginia	2.07	71,078	34,375
	U.S. Total		1,896,522	783,674
	Average		37,868	15,646

PART 4

PERFORMANCE INDICATORS

The *Annual Highway Report* ranks each state in 13 categories. Four of the categories measure **spending**: Capital and Bridge Disbursements, Maintenance Disbursements, Administrative Disbursements, and Other Disbursements. The remaining nine categories measure **performance**. Four of the performance categories measure pavement quality: Rural Interstate Pavement Condition, Urban Interstate Pavement Condition, Rural Other Principal Arterial Pavement Condition, and Urban Other Principal Arterial Pavement Condition. One of the performance categories measures traffic congestion: Urban Area Congestion. The four remaining categories measure safety: Structurally Deficient Bridges, Rural Fatality Rate, Urban Fatality Rate, and Other Fatality Rate.

The performance ratio for each of the 13 categories is calculated individually (pages 14-40, Tables 7-19, Figures 2-14) for each state by dividing the actual measure by the expected measure. For the four spending categories, the expected measure is determined by a LOESS regression that incorporates urbanization as explained in the Appendix. For the other nine categories, the expected measure is the national weighted average. States are ranked in each category based on the performance ratios they attain, with higher ratios indicating worse performance. For all categories, 1 is the best ranking and 50 is the worst. To determine the total ranking, each state's categorical rankings are added together, weighted equally, and then averaged to get one overall final ratio. Each measure, whether spending efficiency or system performance, is weighted equally, so each categorical score makes up

1/13 of the total score. Additional details on how the rankings are calculated are in the Appendix on page 43.

This part of the report includes detailed data and trends for each category. Rankings include a table showing the state, the ranking, and a score. Each ranking also includes a color-coded map with the score for each state.

CAPITAL AND BRIDGE DISBURSEMENTS

Capital and bridge disbursements are the costs to build new, and widen existing, highways and bridges. Capital and bridge disbursements for state-owned roads equal 51.2% of total disbursements, totaling $78.68 billion in 2022, 0.2% less than what was spent in 2020.

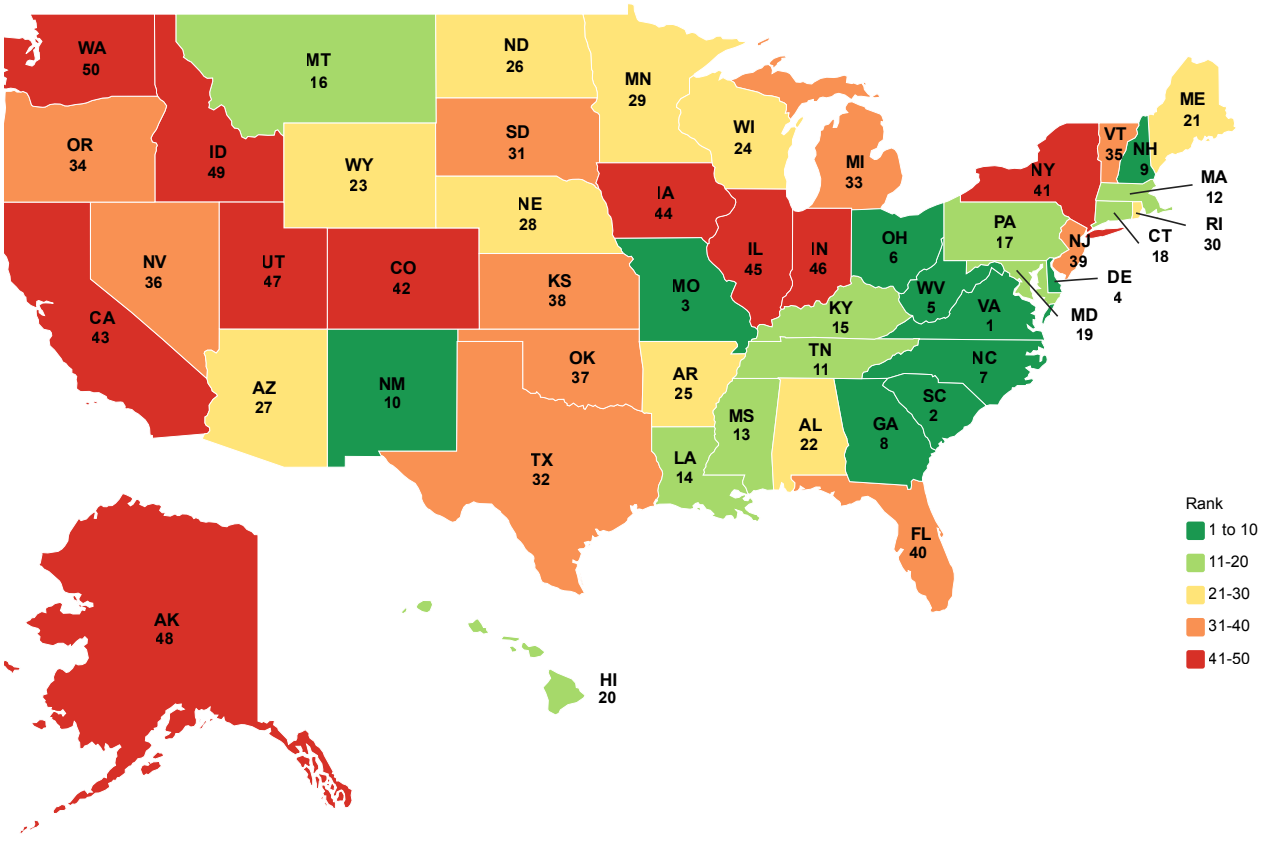
In 2019, we measured capital and bridge disbursements per lane-mile. For 2018, we measured capital and bridge disbursements per centerline-mile, lane-mile, and vehicle-miles traveled (VMT) per lane-mile. This year we measured disbursements per lane-mile adjusted for urbanization, the same process that we used last year. For this year's calculations, we take the disbursement per lane-mile and divide it by the expected disbursement per lane-mile to get a ratio. The average 2022 lane-mile disbursement is $43,674, a 4.5% increase from 2020's $41,783 (Table 7, Capital and Bridge Disbursements, 2022, Figure 2). This increase continues a decade-long trend of steady increases in spending. Since 2012, total capital and bridge disbursements have increased about 26.1%, similar to the Consumer Price Index (CPI), which has increased about 27.4%.

TABLE 7: CAPITAL & BRIDGE DISBURSEMENTS, 2022

2022 Rank	State	Disbursement Per Lane-Mile	Expected Disbursement per Lane-Mile	Adjusted Ratio
1	Virginia	$15,981	$43,388	0.37
2	South Carolina	$17,706	$44,976	0.39
3	Missouri	$14,177	$35,048	0.40
4	West Virginia	$12,820	$28,193	0.45
5	Delaware	$41,505	$85,806	0.48
6	Ohio	$33,467	$60,795	0.55
7	North Carolina	$25,292	$44,168	0.57
8	Georgia	$36,376	$60,186	0.60
9	New Hampshire	$24,247	$39,829	0.61
10	New Mexico	$20,630	$32,109	0.64
11	Tennessee	$36,203	$56,072	0.65
12	Massachusetts	$105,038	$161,416	0.65
13	Mississippi	$24,601	$37,224	0.66
14	Louisiana	$29,723	$44,275	0.67
15	Kentucky	$24,297	$35,328	0.69
16	Montana	$18,046	$25,861	0.70
17	Pennsylvania	$35,221	$47,980	0.73
18	Connecticut	$104,189	$129,548	0.80
19	Maryland	$82,833	$95,568	0.87
20	Hawaii	$89,740	$101,487	0.88
21	Maine	$30,576	$34,241	0.89
22	Alabama	$42,424	$46,315	0.92
23	Wyoming	$28,080	$29,735	0.94
24	Wisconsin	$42,314	$44,115	0.96
25	Arkansas	$36,710	$38,170	0.96
26	North Dakota	$24,849	$24,515	1.01
27	Arizona	$45,242	$44,257	1.02
28	Nebraska	$29,593	$28,602	1.03
29	Minnesota	$41,462	$39,143	1.06
30	Rhode Island	$131,248	$121,112	1.08
31	South Dakota	$27,338	$24,973	1.09
32	Texas	$49,221	$44,365	1.11
33	Michigan	$72,443	$65,194	1.11
34	Oregon	$46,644	$40,291	1.16
35	Vermont	$38,140	$32,293	1.18
36	Nevada	$47,977	$39,432	1.22
37	Oklahoma	$48,326	$37,662	1.28
38	Kansas	$43,114	$33,239	1.30
39	New Jersey	$223,423	$170,211	1.31
40	Florida	$143,152	$106,406	1.35
41	New York	$94,539	$70,194	1.35
42	Colorado	$60,442	$44,024	1.37
43	California	$105,493	$75,858	1.39
44	Iowa	$52,199	$36,803	1.42
45	Illinois	$98,386	$68,213	1.44
46	Indiana	$69,843	$44,339	1.58
47	Utah	$73,090	$45,128	1.62
48	Alaska	$59,277	$35,592	1.67
49	Idaho	$59,478	$32,148	1.85
50	Washington	$94,654	$47,474	1.99

In 2022, Virginia, South Carolina, Missouri, West Virginia, and Delaware reported the lowest capital and bridge expenditure ratios, after adjusting for urbanization. Washington, Idaho, Alaska, Utah, and Indiana reported the highest expenditure ratios. Compared to 2020, the states whose ratio increased by the highest percentage were Kansas, South Dakota, Arkansas, Louisiana, and Colorado (97%, 44%, 39%, 34%, and 30% respectively). The states that improved the most were Montana (37%), Arizona (34%), New Hampshire (29%), Ohio (21%), and Alaska (20%). The disbursements per state-controlled lane-mile can vary widely from year to year reflecting funding actions and project schedules.

FIGURE 2: CAPITAL AND BRIDGE DISBURSEMENTS PER STATE-CONTROLLED LANE-MILE, 2022



MAINTENANCE DISBURSEMENTS

Maintenance disbursements are the costs to perform routine roadway upkeep, such as filling in potholes and repaving roads. Maintenance disbursements comprise about 17.4% of total disbursements, totaling $28.06 billion in 2022, about the same as in 2020, the last time this assessment was completed.

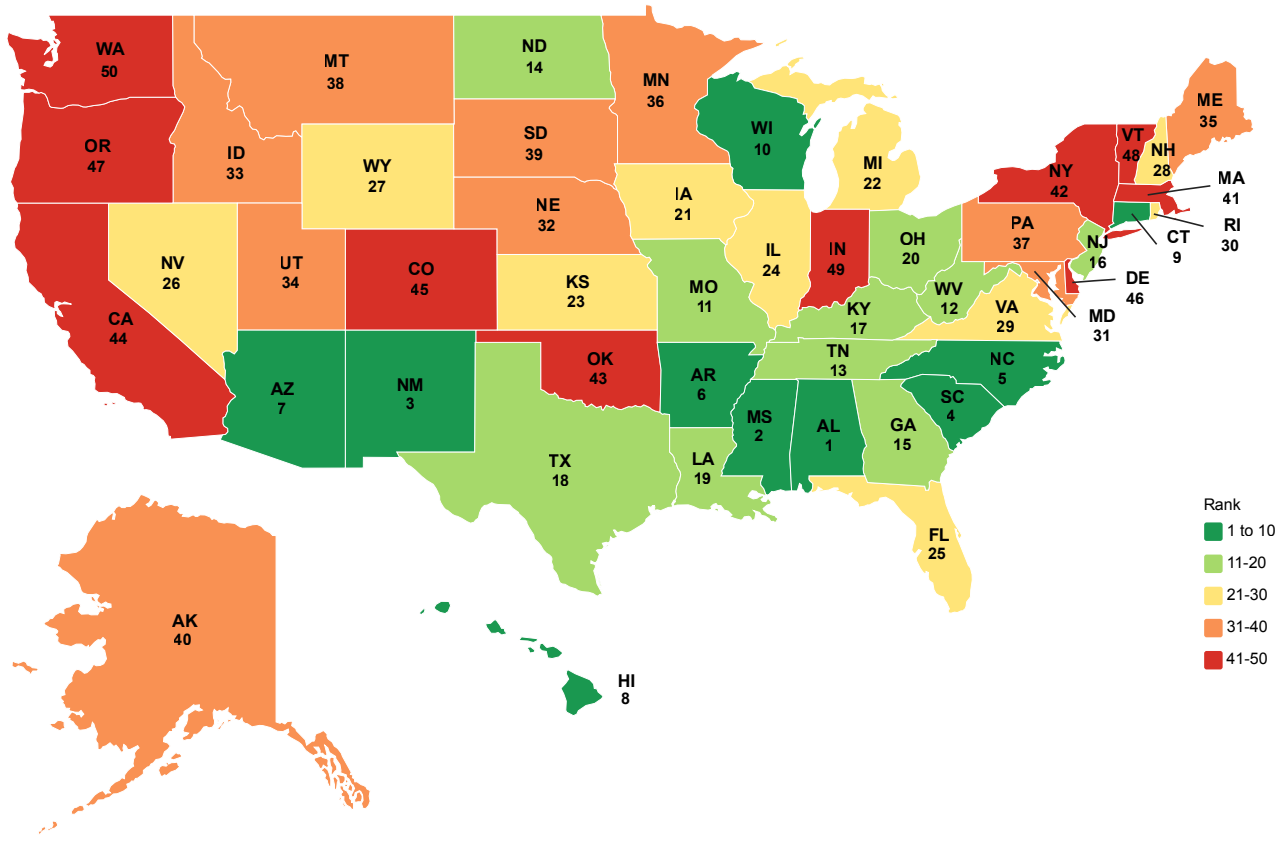
In 2019, we measured maintenance disbursements per lane-mile. For 2018, we measured maintenance disbursements per centerline-mile, lane-mile, and vehicle-miles traveled (VMT) per lane-mile. This year, we measured disbursements per lane-mile adjusted for urbanization, the same process that we used last year. For this year's process, we take the disbursement per lane-mile and divide it by the expected disbursement per lane-mile to calculate a ratio. The average 2022 per-mile disbursement is $14,819 (Table 8, Maintenance Disbursements, 2022, Figure 3), an increase of 1.9% compared with $14,546 in 2020. This increase continues a significant increase in spending over the last 15 years. Since 2007, total maintenance disbursements have increased 37.3%, while the Consumer Price Index (CPI) has increased about 27.4%.

TABLE 8: MAINTENANCE DISBURSEMENTS, 2022

2022 Rank	State	Disbursement Per Lane-Mile	Expected Disbursement per Lane-Mile	Adjusted Ratio
1	Alabama	$14,825	$16,021	0.07
2	Mississippi	$5,944	$15,217	0.32
3	New Mexico	$7,138	$11,670	0.35
4	South Carolina	$50,705	$29,883	0.39
5	North Carolina	$6,451	$10,463	0.40
6	Arkansas	$15,097	$19,838	0.41
7	Arizona	$6,227	$15,428	0.49
8	Hawaii	$13,013	$19,481	0.53
9	Connecticut	$13,518	$15,208	0.59
10	Wisconsin	$3,308	$9,369	0.61
11	Missouri	$11,402	$17,764	0.61
12	West Virginia	$101,373	$64,474	0.62
13	Tennessee	$4,336	$13,454	0.64
14	North Dakota	$11,909	$15,745	0.65
15	Georgia	$8,338	$11,871	0.67
16	New Jersey	$5,655	$4,472	0.70
17	Kentucky	$19,779	$15,753	0.70
18	Texas	$29,001	$48,769	0.74
19	Louisiana	$33,404	$33,458	0.76
20	Ohio	$18,948	$35,980	0.76
21	Iowa	$13,632	$11,055	0.76
22	Michigan	$1,152	$15,446	0.80
23	Kansas	$6,588	$7,524	0.81
24	Illinois	$9,790	$16,112	0.82
25	Florida	$5,816	$14,267	0.83
26	Nevada	$2,193	$3,391	0.83
27	Wyoming	$7,483	$15,250	0.88
28	New Hampshire	$6,770	$6,639	0.89
29	Virginia	$18,505	$14,904	0.93
30	Rhode Island	$42,922	$44,800	0.96
31	Maryland	$5,127	$3,760	1.00
32	Nebraska	$11,908	$15,991	1.02
33	Idaho	$17,741	$22,308	1.08
34	Utah	$26,481	$15,368	1.11
35	Maine	$20,332	$9,590	1.23
36	Minnesota	$12,492	$15,044	1.24
37	Pennsylvania	$22,006	$13,844	1.26
38	Montana	$8,276	$10,261	1.26
39	South Dakota	$48,352	$68,968	1.36
40	Alaska	$31,633	$38,128	1.52
41	Massachusetts	$38,726	$24,561	1.57
42	New York	$26,353	$16,101	1.58
43	Oklahoma	$43,328	$26,652	1.59
44	California	$9,951	$13,076	1.63
45	Colorado	$19,359	$23,726	1.64
46	Delaware	$35,838	$15,891	1.70
47	Oregon	$16,893	$15,241	1.72
48	Vermont	$18,374	$12,069	2.12
49	Indiana	$10,123	$9,399	2.26
50	Washington	$35,623	$15,657	2.28

In 2022, Alabama, Mississippi, New Mexico, South Carolina, and North Carolina reported the lowest overall maintenance expenditure ratios, after adjusting for urbanization. Washington, Indiana, Vermont, Oregon, and Delaware reported the highest overall expenditure ratios. Compared to 2020, the states whose ratio worsened by the highest percentage were Massachusetts, New Mexico, Ohio, North Dakota, and Oregon (166%, 86%, 73%, 54%, and 51% respectively). The states that improved the most were Alabama (82%), New Jersey (52%), Washington (32%), Nebraska (30%), and Hawaii (27%). The disbursements per state-controlled lane-mile can vary widely from year to year reflecting funding actions and project schedules.

FIGURE 3: MAINTENANCE DISBURSEMENTS PER STATE-CONTROLLED LANE-MILE, 2022



ADMINISTRATIVE DISBURSEMENTS

Administrative disbursements typically include general and main-office expenditures in support of state-administered highways. They do not include project-related costs but occasionally include "parked" funds, which are funds from bond sales or asset sales awaiting later expenditure. Therefore, they can vary widely from year to year. Administrative disbursements comprise about 7.4% of total disbursements, totaling $11.94 billion in 2022, an 18.4% increase from 2020, the last time this assessment was completed.

In 2019, we measured administrative disbursements per lane-mile. For 2018, we measured administrative disbursements per centerline-mile, lane-mile, and vehicle-miles traveled (VMT) per lane-mile. This year, we measured administrative disbursements per lane-mile adjusted for urbanization, the same process that we used last year. For this process, we take the administrative disbursement per lane-mile and divide it by the expected administrative disbursement per lane-mile to get a ratio.

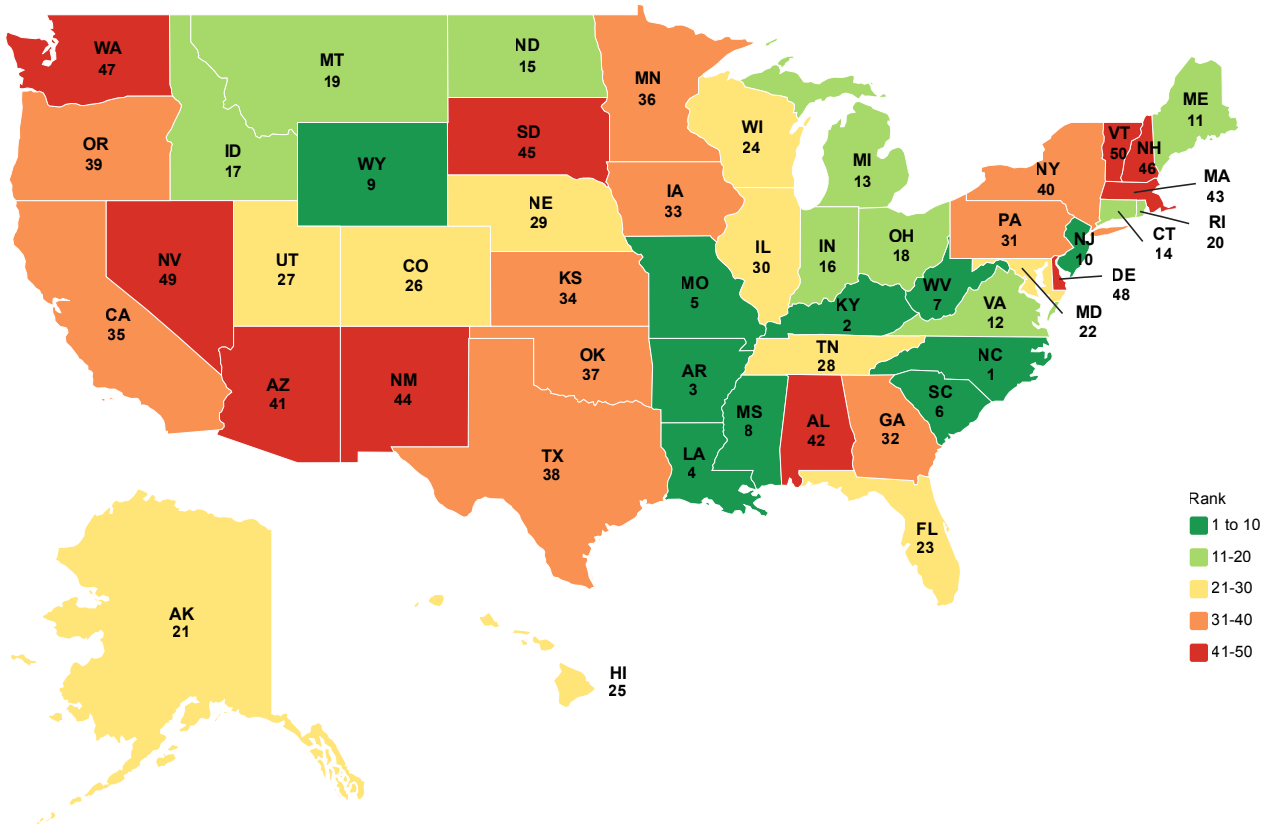
TABLE 9: ADMINISTRATIVE DISBURSEMENTS, 2022

2022 Rank	State	Disbursement Per Lane-Mile	Expected Disbursement per Lane-Mile	Adjusted Ratio
1	North Carolina	$712	$7,758	0.09
2	Kentucky	$637	$5,712	0.11
3	Arkansas	$1,083	$6,444	0.17
4	Louisiana	$1,360	$7,830	0.17
5	Missouri	$1,040	$5,648	0.18
6	South Carolina	$1,557	$7,710	0.20
7	West Virginia	$1,893	$5,269	0.36
8	Mississippi	$2,235	$6,192	0.36
9	Wyoming	$1,645	$4,414	0.37
10	New Jersey	$9,515	$19,595	0.49
11	Maine	$2,652	$5,453	0.49
12	Virginia	$3,787	$7,671	0.49
13	Michigan	$5,279	$9,967	0.53
14	Connecticut	$8,281	$15,561	0.53
15	North Dakota	$1,825	$3,328	0.55
16	Indiana	$4,671	$7,857	0.59
17	Idaho	$3,031	$4,948	0.61
18	Ohio	$5,618	$9,072	0.62
19	Montana	$2,239	$3,603	0.62
20	Rhode Island	$9,368	$14,789	0.63
21	Alaska	$3,683	$5,775	0.64
22	Maryland	$9,100	$12,612	0.72
23	Florida	$9,990	$13,505	0.74
24	Wisconsin	$5,956	$7,827	0.76
25	Hawaii	$10,054	$13,094	0.77
26	Colorado	$6,368	$7,809	0.82
27	Utah	$6,435	$7,718	0.83
28	Tennessee	$7,021	$8,371	0.84
29	Nebraska	$3,555	$4,172	0.85
30	Illinois	$8,965	$10,441	0.86
31	Pennsylvania	$6,784	$7,850	0.86
32	Georgia	$7,744	$8,940	0.87
33	Iowa	$5,640	$6,079	0.93
34	Kansas	$5,457	$5,207	1.05
35	California	$13,031	$11,280	1.16
36	Minnesota	$7,733	$6,680	1.16
37	Oklahoma	$7,470	$6,310	1.18
38	Texas	$11,195	$7,870	1.42
39	Oregon	$10,056	$6,945	1.45
40	New York	$15,902	$10,702	1.49
41	Arizona	$13,442	$7,713	1.74
42	Alabama	$14,078	$7,776	1.81
43	Massachusetts	$36,698	$18,682	1.96
44	New Mexico	$9,768	$4,939	1.98
45	South Dakota	$6,988	$3,421	2.04
46	New Hampshire	$15,603	$6,837	2.28
47	Washington	$18,771	$7,827	2.40
48	Delaware	$28,951	$11,959	2.42
49	Nevada	$16,942	$6,745	2.51
50	Vermont	$16,404	$5,005	3.28

The average 2022 per lane-mile disbursement is $6,308 (Table 9, Administrative Disbursements, 2022, Figure 4). The average disbursement per lane-mile increased 16.4% from 2020 ($5,432 disbursement per lane-mile), the last time this assessment was completed. This change is in line with an increasing spending trend over the last decade. Since 2007, total administrative disbursements have increased about 27.4%, the same amount as the Consumer Price Index (CPI), which has also increased about 27.4%.

In 2022, North Carolina, Kentucky, Arkansas, Louisiana, and Missouri reported the lowest administrative expenditure ratios, after adjusting for urbanization. Vermont, Nevada, Delaware, Washington, New Hampshire, and South Dakota reported the highest expenditure ratios. Compared to 2020, the states whose ratio worsened by the largest percentages were Texas, Nebraska, Illinois, Massachusetts, and Maine (345%, 241%, 100%, 87%, and 74% respectively). The states that improved the most were North Carolina (70%), Missouri (62%), New Jersey (58%), Ohio (56%), and Wyoming (51%). The disbursements per state-controlled lane-mile can vary widely from year to year reflecting funding actions and project schedules.

FIGURE 4: ADMINISTRATIVE DISBURSEMENTS PER STATE-CONTROLLED LANE-MILE, 2022



The Difference Between Maintenance and Administrative Disbursements

Some disbursement data can be counted in one of several categories. One example is benefits (vacation, health care, etc.) of state department of transportation maintenance workers. Certain states such as Vermont count the benefits as a maintenance disbursement since the employees are conducting routine highway maintenance. Other states, such as Delaware, count the benefits as an administrative disbursement since benefits are an administrative expense. Not surprisingly, Vermont ranks in the bottom 10 in Maintenance Disbursements, and Delaware has a bottom 10 ranking in Administrative Disbursements. As a result, it is important to look at both the individual disbursement categories and disbursements as a whole**,** as states have some leeway in their classification of certain expenditures.

OTHER DISBURSEMENTS

Other disbursements include funds for law enforcement, safety, bonds, and interest payments. Since they include interest payments, they can vary widely from year to year. For 2022, other disbursements make up 24% of total funding. For 2022, other disbursements were 2% higher (26.2% of the total spending) than the last time this assessment was completed. In 2019, we measured other disbursements per lane-mile. For 2018, we measured other disbursements per centerline-mile, lane-mile, and vehicle-miles traveled (VMT) per lane-mile. This year, we measured other disbursements per lane-mile adjusted for urbanization, the same process that we used last year. For this process, we take the disbursement per lane-mile and divide it by the expected disbursement per lane-mile to calculate a ratio.

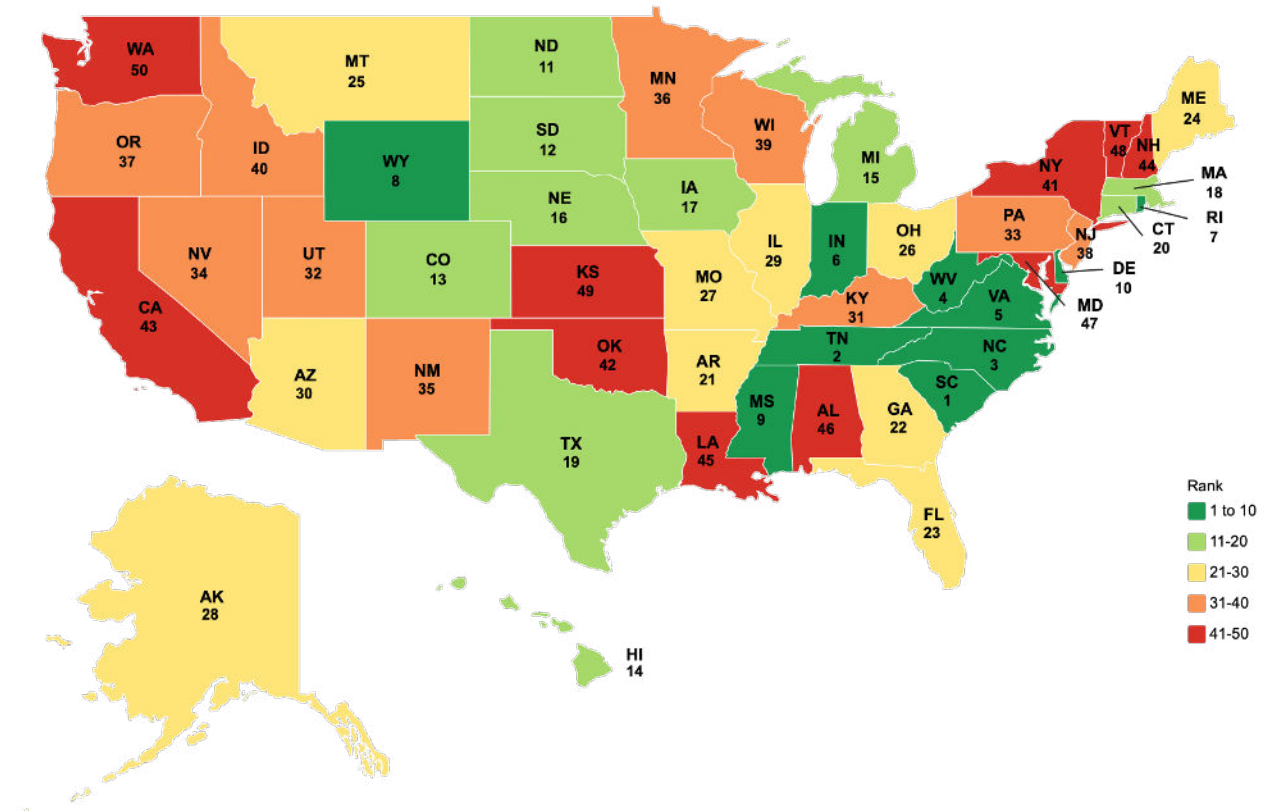
TABLE 10: OTHER DISBURSEMENTS, 2022

2022 Rank	State	Disbursement Per Lane-Mile	Expected Disbursement per Lane-Mile	Adjusted Ratio
1	South Carolina	$386	$24,670	0.02
2	Tennessee	$1,106	$29,828	0.04
3	North Carolina	$3,377	$22,952	0.15
4	West Virginia	$2,257	$7,498	0.30
5	Virginia	$7,160	$18,435	0.39
6	Indiana	$10,125	$21,468	0.47
7	Rhode Island	$54,663	$109,921	0.50
8	Wyoming	$2,748	$5,464	0.50
9	Mississippi	$5,052	$10,032	0.50
10	Delaware	$20,990	$40,994	0.51
11	North Dakota	$1,807	$3,285	0.55
12	South Dakota	$2,001	$3,450	0.58
13	Colorado	$11,473	$19,649	0.58
14	Hawaii	$37,332	$62,890	0.59
15	Michigan	$22,115	$34,592	0.64
16	Nebraska	$3,158	$4,932	0.64
17	Iowa	$6,409	$9,739	0.66
18	Massachusetts	$163,596	$242,064	0.68
19	Texas	$14,352	$21,067	0.68
20	Connecticut	$94,223	$134,307	0.70
21	Arkansas	$7,943	$10,792	0.74
22	Georgia	$24,391	$31,940	0.76
23	Florida	$57,004	$73,182	0.78
24	Maine	$6,261	$7,963	0.79
25	Montana	$3,039	$3,783	0.80
26	Ohio	$26,132	$32,338	0.81
27	Missouri	$7,294	$8,508	0.86
28	Alaska	$7,797	$8,903	0.88
29	Illinois	$32,436	$35,486	0.91
30	Arizona	$22,829	$23,662	0.96
31	Kentucky	$8,559	$8,707	0.98
32	Utah	$26,483	$24,787	1.07
33	Pennsylvania	$29,681	$26,364	1.13
34	Nevada	$14,273	$12,174	1.17
35	New Mexico	$8,062	$6,700	1.20
36	Minnesota	$14,268	$11,817	1.21
37	Oregon	$16,400	$13,355	1.23
38	New Jersey	$377,917	$275,160	1.37
39	Wisconsin	$27,673	$19,834	1.40
40	Idaho	$9,865	$6,723	1.47
41	New York	$53,694	$35,908	1.50
42	Oklahoma	$15,519	$10,361	1.50
43	California	$61,783	$36,942	1.67
44	New Hampshire	$22,084	$12,701	1.74
45	Louisiana	$39,344	$21,960	1.79
46	Alabama	$47,857	$25,526	1.87
47	Maryland	$100,531	$52,123	1.93
48	Vermont	$16,837	$6,860	2.45
49	Kansas	$18,529	$7,347	2.52
50	Washington	$81,028	$26,123	3.10

The average 2022 per lane-mile disbursement is $20,430. (Table 10, Other Disbursements, 2022, Figure 5). This equals a 6% decrease from $21,908 in 2020, the last time this assessment was completed. This change is in contrast with a sharply increasing spending trend over the last decade. Since 2007, total other disbursements have increased about 79%, a far higher amount than the Consumer Price Index (CPI), which has increased about 27.4%. This is likely the result of some states reclassifying certain types of disbursements. For example, administrative support for research projects, which was classified as an administrative disbursement, is now classified as an other disbursement.

In 2022, South Carolina, Tennessee, North Carolina, West Virginia, and Virginia reported the lowest other expenditure disbursement ratios, after adjusting for urbanization. Washington, Kansas, Vermont, Maryland, and Alabama reported the highest expenditure ratios. Compared to 2020, the states whose ratio worsened by the highest percent were Louisiana, Alabama, Georgia, Connecticut, and Illinois (244%, 188%, 111%, 75%, and 72% respectively). The states that improved the most were South Carolina (71%), New York (70%), Oregon (57%), North Carolina (53%), and North Dakota (52%). The disbursements per state-controlled lane-mile can vary widely from year to year reflecting funding actions and project schedules.

FIGURE 5: OTHER DISBURSEMENTS PER STATE-CONTROLLED LANE-MILE, 2022



RURAL INTERSTATE PAVEMENT CONDITION

Rural Interstates are typically four- to six-lane highways connecting urban areas. One measurement of roadway condition is pavement condition. In most states, road pavement condition is measured using special machines that determine the roughness of road surfaces. A few states continue to use visual ratings, which are then converted to roughness. In 2022, about 2.03% of U.S. rural Interstates—594 miles out of 29,311—were reported to be in poor condition. (Table 11, Percent Rural Interstate Mileage in Poor Condition, 2022, Figure 6). This is similar to 2020, the last time this assessment was completed, when 609 miles out of 29,199 (2.09%) of rural Interstate pavement was rated poor.

Between 2020 and 2022, the percentage of poor rural Interstate mileage decreased in 23 states, increased in 20 states, and remained about the same in five states. The percentage of poor mileage changed by less than one percentage point in 44 of the states. West Virginia (1.55 points) and Maine (1.27 points) and Colorado (1.21 points) led the states in decreasing poor-condition mileage while Massachusetts, Louisiana, and Arizona led the states in increasing poor-condition mileage (by 2.59, 1.19, and 1.15 points, respectively).

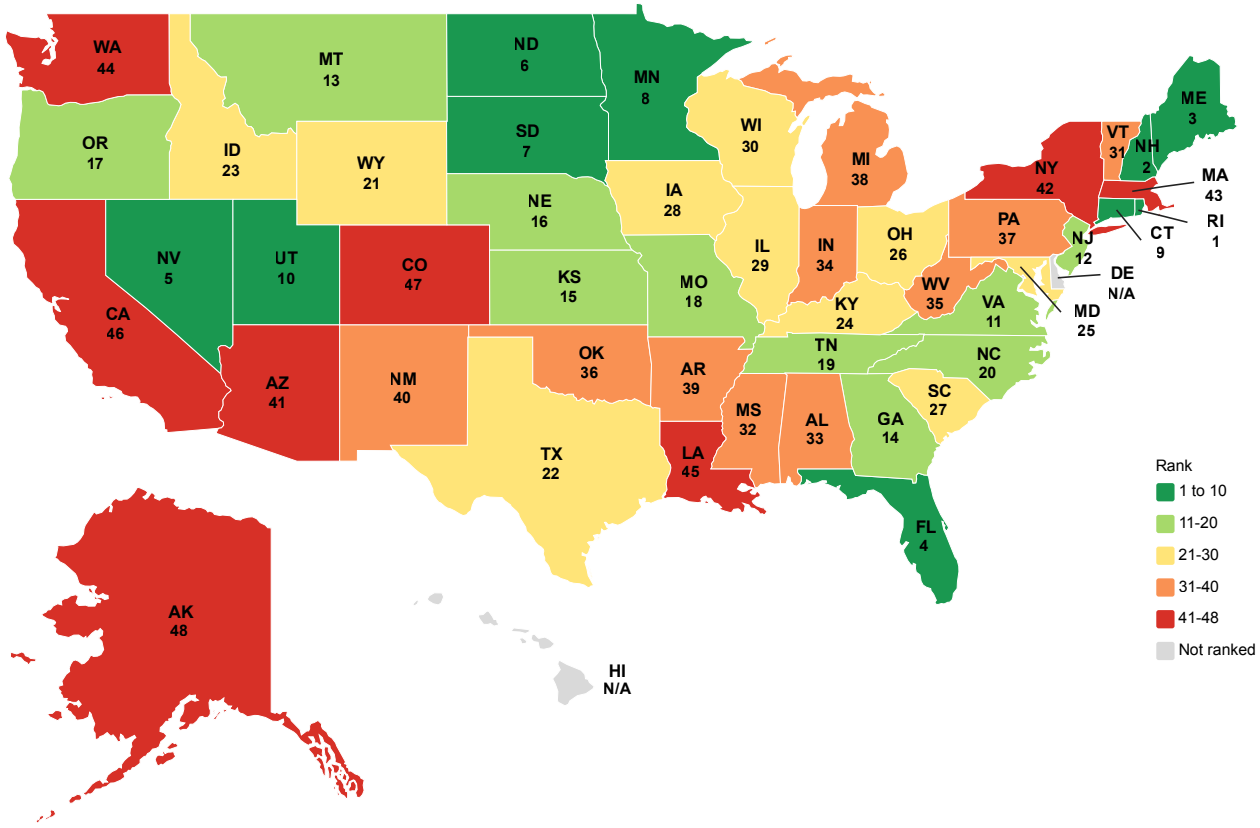
TABLE 11: PERCENT RURAL INTERSTATE MILEAGE IN POOR CONDITION, 2022

2022 Rank	State	Percent Rural Interstate Mileage in Poor Condition
1	Rhode Island	0.00
2	New Hampshire	0.07
3	Maine	0.12
4	Florida	0.24
5	Nevada	0.27
6	North Dakota	0.32
7	South Dakota	0.35
8	Minnesota	0.37
9	Connecticut	0.38
10	Utah	0.41
11	Virginia	0.44
12	New Jersey	0.51
13	Montana	0.52
14	Georgia	0.59
15	Kansas	0.62
16	Nebraska	0.72
17	Oregon	0.79
18	Missouri	0.84
19	Tennessee	0.84
20	North Carolina	0.92
21	Wyoming	1.03
22	Texas	1.07
23	Idaho	1.09
24	Kentucky	1.19
25	Maryland	1.23
26	Ohio	1.26
27	South Carolina	1.49
28	Iowa	1.53
29	Illinois	1.53
30	Wisconsin	1.61
31	Vermont	1.73
32	Mississippi	1.73
33	Alabama	1.80
34	Indiana	1.86
35	West Virginia	1.89
36	Oklahoma	2.02
37	Pennsylvania	2.66
38	Michigan	2.88
39	Arkansas	2.97
40	New Mexico	3.31
41	Arizona	3.37
42	New York	3.41
43	Massachusetts	3.63
44	Washington	4.04
45	Louisiana	4.46
46	California	4.89
47	Colorado	7.11
48	Alaska	9.30
	Delaware	N/A
	Hawaii	N/A
	Average	2.03

Rural Interstate mileage in poor condition varies widely by state. In 2022, one state—Rhode Island—reported zero poor mileage, as opposed to 2020 when all states reported at least some poor mileage. Twenty states reported less than 1% poor mileage. On the other hand, two states (Alaska and Colorado) continued to report more than 5% poor mileage. The two states together have about 5.6% of U.S. rural Interstate mileage (1,649 miles out of 29,310) but have 23.38% of the poor-condition mileage.

Delaware and Hawaii are the only states with no rural mileage in their Interstate systems.

FIGURE 6: PERCENT OF RURAL INTERSTATES IN POOR CONDITION, 2022



URBAN INTERSTATE PAVEMENT CONDITION

Urban Interstates are major multi-lane highways in urbanized areas. The pavement condition of the urban Interstate system improved from 2020 to 2022, decreasing from 4.77% in poor condition to 4.55% (Table 12, Percent Urban Interstate Mileage in Poor Condition, 2022, Figure 7). In 2022, 869 of 19,089 miles of urban Interstate highways were rated as poor, the exact same numbers as in 2020, the last time this assessment was completed. (The percentage poor Interstate mileage decreased even as the number of poor Interstate miles stayed the same because the overall urban Interstate mileage increased.)

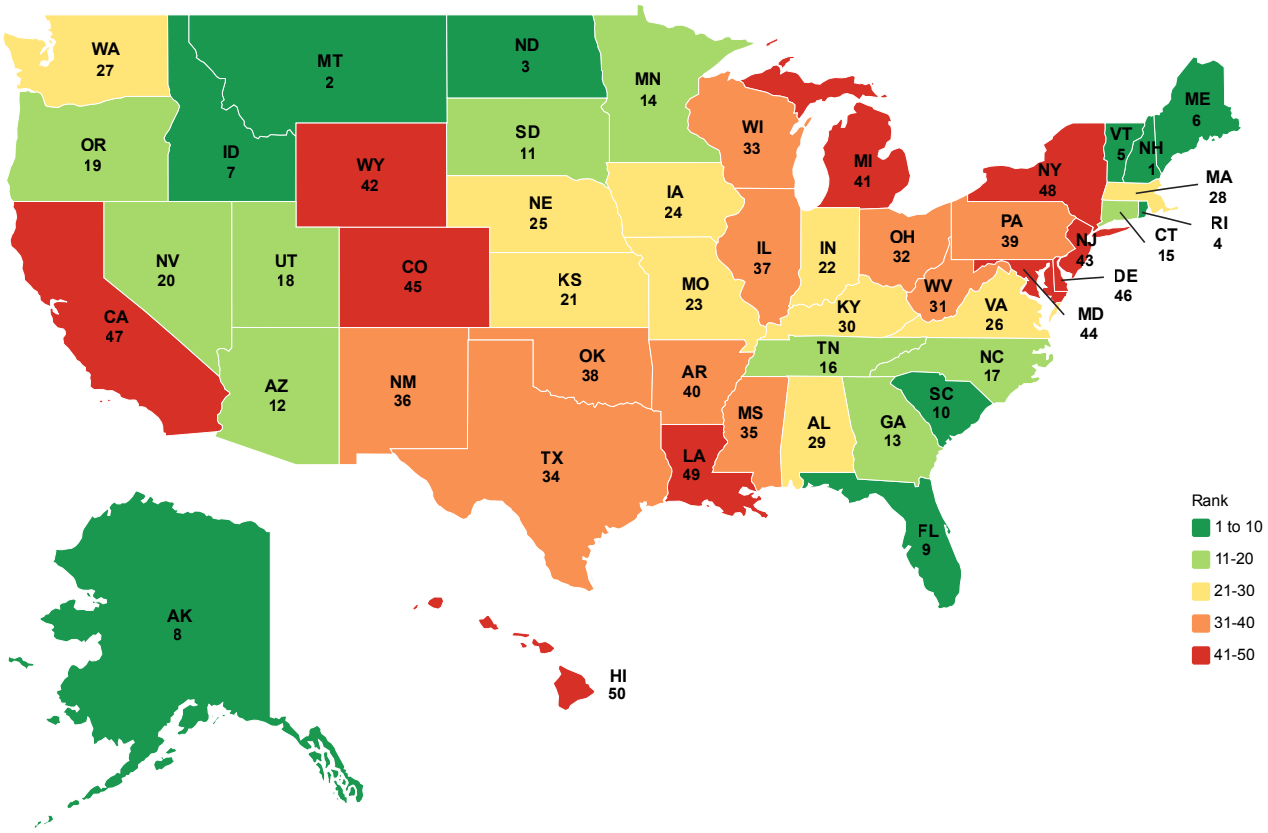
Between 2020 and 2022, the percentage of poor urban Interstate mileage increased in 19 states and decreased in 31 states. The percentage of poor mileage changed by less than one percentage point in 34 of the states. Despite Hawaii and New Jersey ranking in the bottom 10 of the list, they, alongside West Virginia, led the states in reducing poor-condition mileage (6.33 points for Hawaii, 4.94 points for West Virginia, and 2.76 points for New Jersey), while Louisiana and Kentucky led the states in increasing poor-condition mileage (by 1.82 and 1.65 points, respectively).

TABLE 12: PERCENT URBAN INTERSTATE MILEAGE IN POOR CONDITION, 2022

2022 Rank	State	Percent Urban Interstate Mileage in Poor Condition
1	New Hampshire	0.00
2	Montana	0.31
3	North Dakota	0.49
4	Rhode Island	0.58
5	Vermont	0.59
6	Maine	0.76
7	Idaho	0.86
8	Alaska	0.95
9	Florida	1.02
10	South Carolina	1.11
11	South Dakota	1.15
12	Arizona	1.47
13	Georgia	1.53
14	Minnesota	1.66
15	Connecticut	1.83
16	Tennessee	1.97
17	North Carolina	2.20
18	Utah	2.26
19	Oregon	2.74
20	Nevada	2.75
21	Kansas	2.79
22	Indiana	2.92
23	Missouri	3.17
24	Iowa	3.22
25	Nebraska	3.31
26	Virginia	3.52
27	Washington	3.59
28	Massachusetts	3.62
29	Alabama	3.87
30	Kentucky	3.97
31	West Virginia	4.05
32	Ohio	4.15
33	Wisconsin	4.19
34	Texas	4.20
35	Mississippi	4.49
36	New Mexico	4.68
37	Illinois	4.76
38	Oklahoma	5.18
39	Pennsylvania	5.36
40	Arkansas	6.04
41	Michigan	6.17
42	Wyoming	6.37
43	New Jersey	6.56
44	Maryland	6.92
45	Colorado	7.98
46	Delaware	9.35
47	California	9.39
48	New York	9.65
49	Louisiana	13.81
50	Hawaii	19.55
	Average	4.55

The condition of urban Interstate highways also varies widely by state. In 2022, New Hampshire was the only state to report no mileage in poor condition. The bottom two states (Hawaii and Louisiana) continued to report more than 10% of their mileage to be in poor condition. These two states, collectively, only have 2.45% of the urban Interstate mileage in the U.S. (468 of 19,089 miles) but have over 7.8% of the mileage in poor condition (68 of 869 miles).

FIGURE 7: PERCENT OF URBAN INTERSTATES IN POOR CONDITION, 2022



RURAL OTHER PRINCIPAL ARTERIAL PAVEMENT CONDITION

Rural other principal arterials (ROPA) are two- to four-lane highways connecting different cities or regions. The condition of major rural arterials improved slightly from 2020 to 2022, by about 0.13 percentage points. Overall, about 1% of the ROPA system—906 miles out of 90,315—was reported to be in poor condition (Table 13, Percent Rural Other Principal Arterial Mileage in Poor Condition, 2022, Figure 8). This compares with about 1.13% (1,016 of 89,778 miles) in 2020, the last time this assessment was completed. (It should be noted that as cities grow, the urbanized area around them grows as well. As this occurs, highways near cities are often reclassified from rural to urban. If these highways were in good condition already, their reclassification has the effect of increasing the percentage of rural roads in poor condition.)

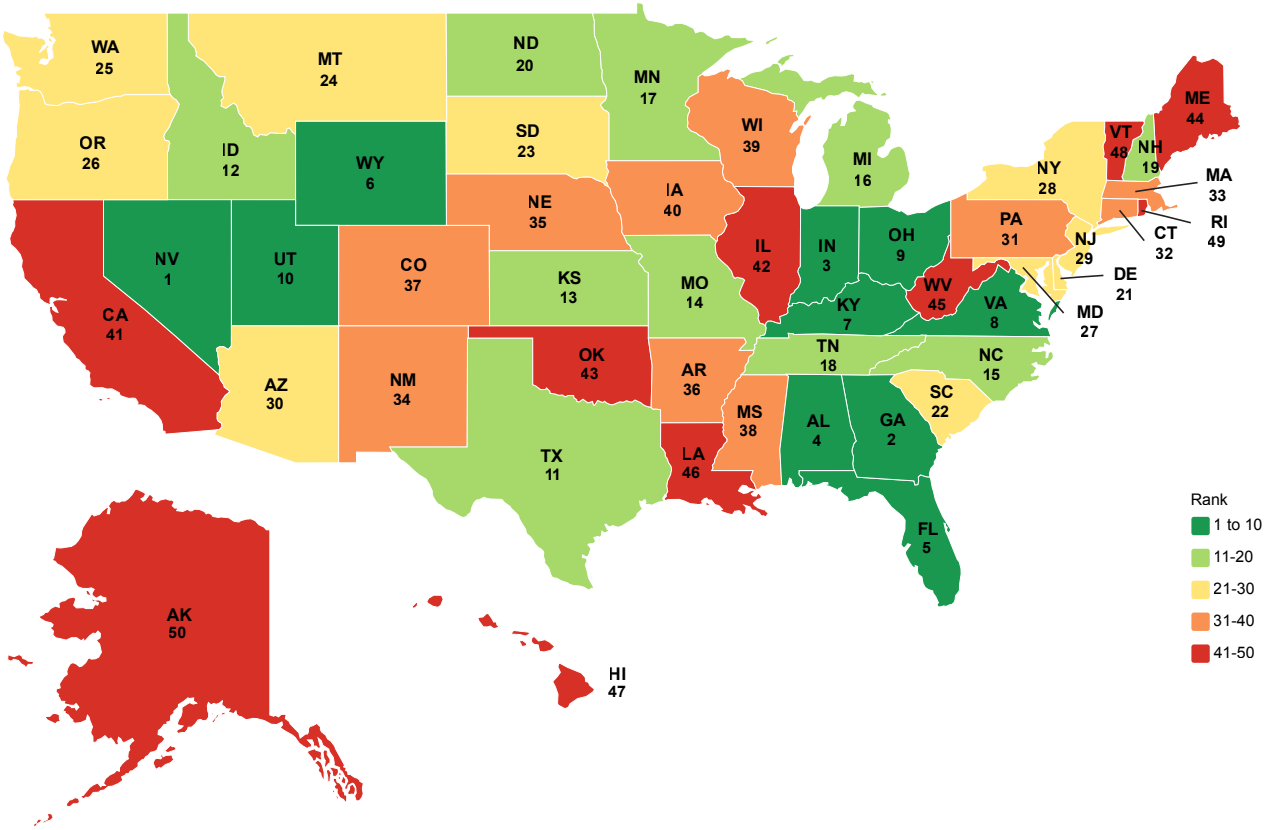
Between 2020 and 2022, the percentage of ROPA increased in 22 states and decreased in 28 states. The percent of poor mileage changed less than one percentage point in 44 of the states. Idaho (2.75 points) and Alaska (1.79 points) led the states in decreasing poor condition mileage while Vermont and Rhode Island (by 2.78 points and 2.28 points respectively) led the states in increasing poor condition mileage.

TABLE 13: PERCENT RURAL OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2022

2022 Rank	State	Percent Rural Other Principal Arterial Mileage in Poor Condition
1	Nevada	0.09
2	Georgia	0.21
3	Indiana	0.22
4	Alabama	0.25
5	Florida	0.26
6	Wyoming	0.26
7	Kentucky	0.28
8	Virginia	0.32
9	Ohio	0.36
10	Utah	0.36
11	Texas	0.41
12	Idaho	0.46
13	Kansas	0.48
14	Missouri	0.49
15	North Carolina	0.50
16	Michigan	0.51
17	Minnesota	0.52
18	Tennessee	0.58
19	New Hampshire	0.64
20	North Dakota	0.66
21	Delaware	0.67
22	South Carolina	0.68
23	South Dakota	0.74
24	Montana	0.76
25	Washington	0.82
26	Oregon	0.88
27	Maryland	1.02
28	New York	1.05
29	New Jersey	1.06
30	Arizona	1.08
31	Pennsylvania	1.29
32	Connecticut	1.37
33	Massachusetts	1.43
34	New Mexico	1.46
35	Nebraska	1.47
36	Arkansas	1.51
37	Colorado	1.52
38	Mississippi	1.53
39	Wisconsin	1.56
40	Iowa	1.69
41	California	1.92
42	Illinois	2.09
43	Oklahoma	2.15
44	Maine	2.20
45	West Virginia	2.56
46	Louisiana	2.86
47	Hawaii	4.02
48	Vermont	4.08
49	Rhode Island	6.04
50	Alaska	11.99
	Average	1.00

The condition of ROPA miles varies widely by state. In 2022, all states reported at least some poor ROPA mileage. Twenty-six states reported 1% or less of their ROPA mileage was in poor condition. On the other hand, Alaska reported 12% of its ROPA mileage was in poor condition. Alaska has only 0.58% of the U.S. ROPA mileage, but 6.9% of the mileage that is in poor condition.

FIGURE 8: PERCENT OF RURAL OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2022



URBAN OTHER PRINCIPAL ARTERIAL PAVEMENT CONDITION

Urban other principal arterials (UOPA) are four- to eight-lane highways connecting different parts of an urban region. Overall, about 12.95% of the UOPA system—8,091 miles out of 62,483—was reported to be in poor condition (Table 13, Percent Urban Other Principal Arterial Mileage in Poor Condition, 2022, Figure 9). This is a 1.24-point decrease from 2019 when 14.19% or 9,105 miles out of 64,183 miles were in poor condition. Overall urban arterials are in much worse condition than rural arterials, rural Interstates, or urban Interstates with the percentage in poor condition at 1.00%, 2.03%, and 4.55% respectively.

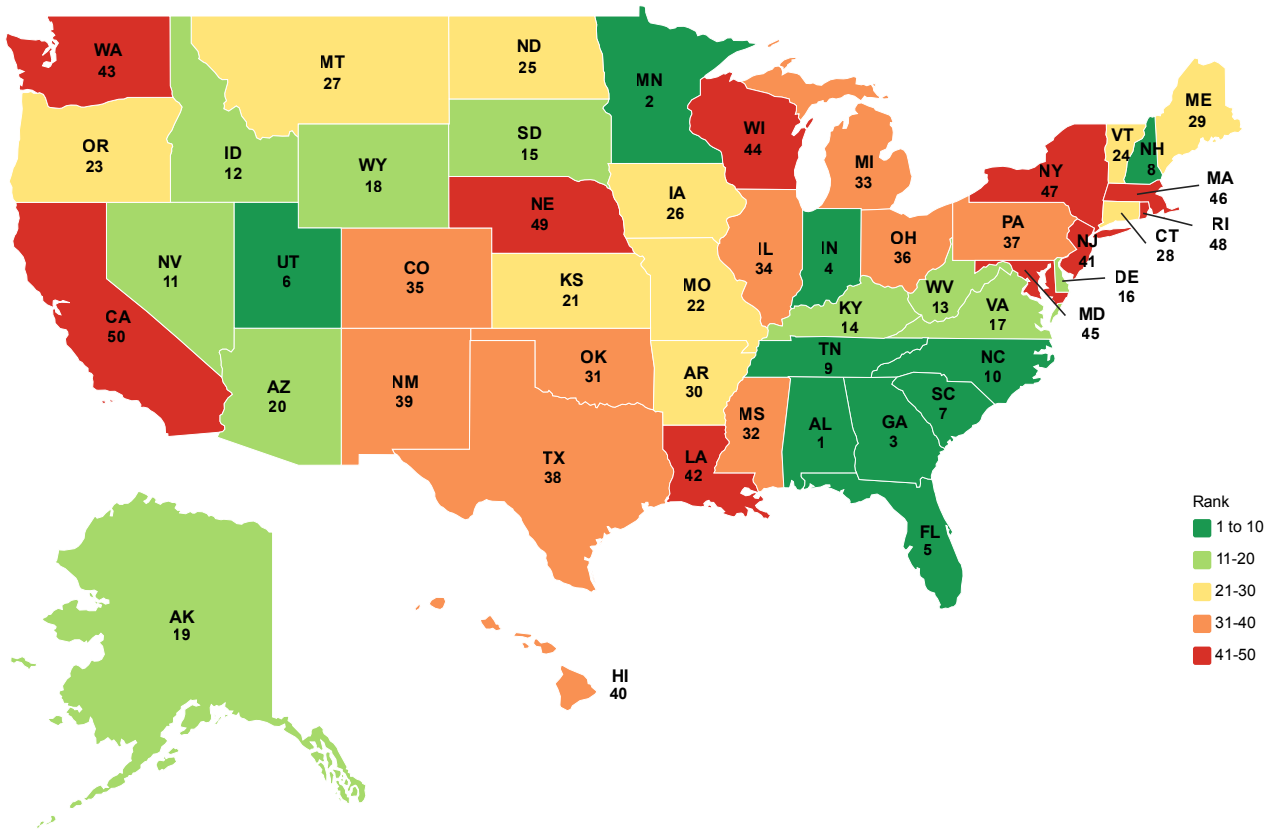
The percentage of UOPA mileage in poor condition varies drastically by state, ranging from Alabama with 1.04% to California with 31.17%. Thirteen states reported less than 5% of UOPA miles in poor condition. On the other hand, five states (Massachusetts, New York, Rhode Island, Nebraska, and California) reported more than 20% of their UOPA mileage was in poor condition. These five states have 18.82% of the U.S. ROPA mileage, but 40.31% of the mileage that is in poor condition.

TABLE 14: PERCENT URBAN OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2022

2022 Rank	State	Percent Urban Other Principal Arterial Mileage in Poor Condition
1	Alabama	1.04
2	Minnesota	1.37
3	Georgia	2.00
4	Indiana	2.03
5	Florida	2.64
6	Utah	2.77
7	South Carolina	3.03
8	New Hampshire	4.39
9	Tennessee	4.67
10	North Carolina	4.81
11	Nevada	4.82
12	Idaho	4.89
13	West Virginia	4.91
14	Kentucky	5.92
15	South Dakota	5.96
16	Delaware	6.30
17	Virginia	6.36
18	Wyoming	6.53
19	Alaska	6.70
20	Arizona	7.05
21	Kansas	7.64
22	Missouri	8.16
23	Oregon	8.27
24	Vermont	8.65
25	North Dakota	8.80
26	Iowa	9.04
27	Montana	9.32
28	Connecticut	9.46
29	Maine	9.47
30	Arkansas	10.38
31	Oklahoma	10.45
32	Mississippi	10.74
33	Michigan	10.90
34	Illinois	11.55
35	Colorado	12.08
36	Ohio	12.88
37	Pennsylvania	13.43
38	Texas	13.46
39	New Mexico	14.01
40	Hawaii	14.22
41	New Jersey	15.36
42	Louisiana	17.50
43	Washington	18.21
44	Wisconsin	18.46
45	Maryland	19.12
46	Massachusetts	23.01
47	New York	23.80
48	Rhode Island	25.28
49	Nebraska	30.15
50	California	31.17
	Average	12.95

Between 2020 and 2022, 27 states saw minor changes (<1%) in UOPA pavement condition. Thirteen states had more than a 1% decrease of poor mileage, and 10 states saw an increase of poor mileage. The percentage of the UOPA system in poor condition in California (8.63), Idaho (8.34), and Michigan (6.05) decreased, while the poor mileage in Kentucky, Maryland, and Alaska increased (by 2.36, 2.31, and 2.22 points, respectively).

FIGURE 9: PERCENT OF URBAN OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2022



URBANIZED AREA CONGESTION

There is no universally accepted definition of traffic congestion. In reporting to the federal government, the states have in the past used peak-hour traffic volume-to-capacity (V/C) ratios, as calculated in the Transportation Research Board's Highway Capacity Manual, as a congestion measure. Through 2009, the Federal Highway Administration (FHWA) summed these V/C calculations to determine the state mileage in various V/C categories. Since 2009, however, these tables have not been published by FHWA. Instead, FHWA has been reporting periodic statistics based on travel delays from mobile devices, but only for selected regions and roads, not for states.

This year, the *Annual Highway Report* uses data from INRIX's 2023 Global Traffic Scorecard, which uses 2022 congestion data. The metric selected was the "annual hours of delay per auto commuter." INRIX defines annual delay per auto commuter as "a measure of the extra travel time endured throughout the year by auto commuters who make trips during the peak period." The INRIX data, which are computed for urbanized areas, are aggregated by state. See the Appendix for details.

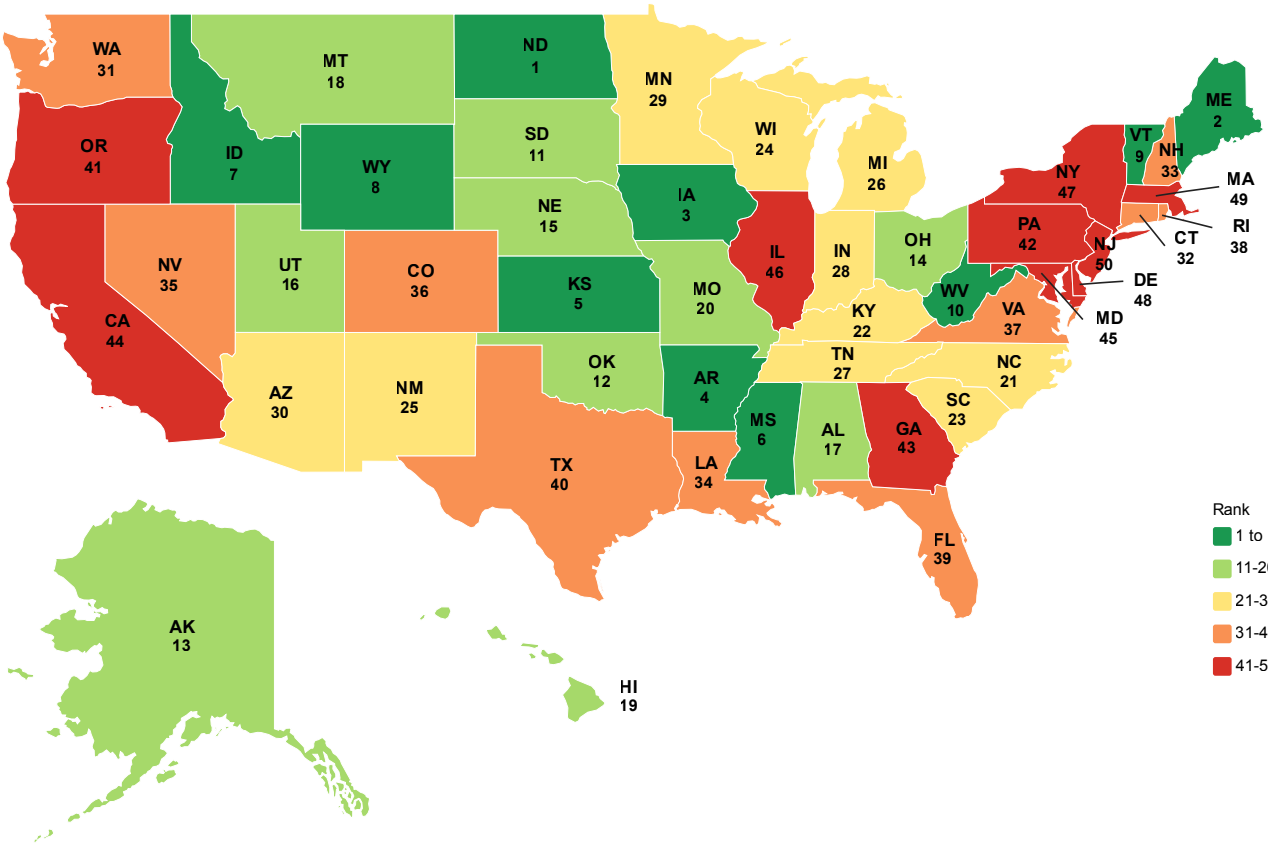
TABLE 15: ANNUAL PEAK HOURS SPENT IN CONGESTION PER AUTO COMMUTER, 2022

2022 Rank	State	Peak Hours Spent in Congestion per Auto Commuter
1	North Dakota	4.23
2	Maine	6.65
3	Iowa	6.73
4	Arkansas	6.93
5	Kansas	7.10
6	Mississippi	7.30
7	Idaho	7.45
8	Wyoming	7.74
9	Vermont	9.15
10	West Virginia	9.20
11	South Dakota	9.62
12	Oklahoma	10.12
13	Alaska	10.16
14	Ohio	11.53
15	Nebraska	11.68
16	Utah	12.50
17	Alabama	13.48
18	Montana	13.65
19	Hawaii	14.86
20	Missouri	15.16
21	North Carolina	15.28
22	Kentucky	16.23
23	South Carolina	16.64
24	Wisconsin	16.72
25	New Mexico	16.80
26	Michigan	16.80
27	Tennessee	20.16
28	Indiana	22.38
29	Minnesota	22.48
30	Arizona	23.36
31	Washington	27.76
32	Connecticut	28.58
33	New Hampshire	32.91
34	Louisiana	34.27
35	Nevada	36.06
36	Colorado	36.21
37	Virginia	39.18
38	Rhode Island	41.51
39	Florida	44.95
40	Texas	45.91
41	Oregon	47.22
42	Pennsylvania	47.28
43	Georgia	53.83
44	California	60.27
45	Maryland	61.77
46	Illinois	64.60
47	New York	67.92
48	Delaware	82.79
49	Massachusetts	94.71
50	New Jersey	103.92
	Average	41.33

In 2022, the average annual hours of delay per auto commuter in urbanized areas was 41.33 hours (see Table 15, Annual Hours of Delay per Auto Commuter, Figure 10). Annual hours of delay range from 4.23 in North Dakota to 103.92 in New Jersey. The congestion problem is primarily concentrated in the major cities of about 10 states.

In 2022, commuters in 11 states spent fewer than 10 hours of delay sitting in peak-hour congestion. Commuters in the top five states (North Dakota, Maine, Iowa, Arkansas, Kansas) spent less than seven and a half hours of delay per year in traffic congestion. Commuters in 37 other states spent less than 40 hours of delay sitting in peak-hour congestion. Commuters in the bottom three states (Delaware, Massachusetts, New Jersey) spent more than 80 hours of delay per year in traffic congestion. Dramatic rises in congestion can be attributed to commuters returning to the office after COVID-19, additional midday and weekend traffic, and the limited number of roadway widenings.

FIGURE 10: PEAK HOURS SPENT IN AUTO CONGESTION PER COMMUTER, 2022



STRUCTURALLY DEFICIENT BRIDGES

Federal law mandates the uniform inspection of all bridges for structural adequacy at least every two years; bridges rated "deficient" are eligible for federal repair dollars. The National Bridge Inventory (NBI) is the source of the bridge data in the table and figure following, which is provided in summary form in *Better Roads* (see Appendix). Since the NBI contains some recent inspections and some as old as two years, the age of the "average" inspection is about one year old. So, a "December 2023" summary from the NBI would represent, on average, bridge condition as of December 2022.

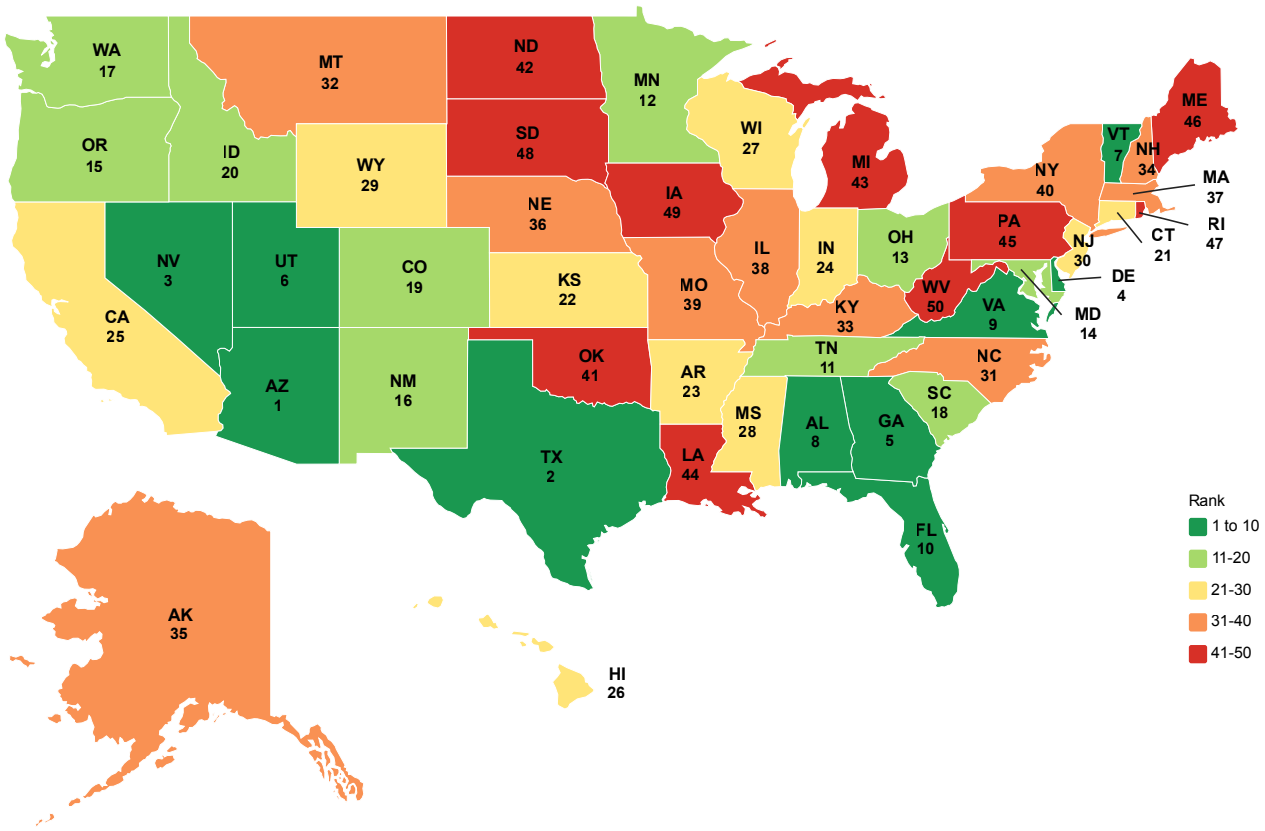
The condition of the nation's highway bridges in 2022 improved slightly from 2021, the last time this assessment was completed. Of the 618,005 highway bridges reported, 42,635 (6.9%) were rated structurally deficient for 2022 (Table 16, Percent of Structurally Deficient Bridges, 2022, Figure 11). This represents a 0.12% improvement over 2021 when (7.02%) were rated as structurally deficient.

Arizona, Texas, Nevada, Delaware, and Georgia reported less than 2% of their bridges as structurally deficient (1.26%, 1.39%, 1.40%, 1.61%, and 1.95% respectively). On the other hand West Virginia (19.97%), Iowa (19.32%), South Dakota (16.89%), Rhode Island (16.58%), and Maine (14.17%) all have more than 14% of their bridges as structurally deficient. All states reported a decrease in the percentage of structurally deficient bridges between 2021 and 2022, with Arizona and Texas seeing the smallest decrease (1.06 and 1.18 percentage points, respectively) and West Virgina, Iowa, and South Dakota seeing the largest decrease (17.06, 16.67, and 14.42 respectively).

TABLE 16: PERCENT STRUCTURALLY DEFICIENT BRIDGES, 2022

2022 Rank	State	Percent Structurally Deficient Bridges
1	Arizona	1.26
2	Texas	1.39
3	Nevada	1.40
4	Delaware	1.61
5	Georgia	1.95
6	Utah	2.08
7	Vermont	2.49
8	Alabama	3.56
9	Virginia	3.57
10	Florida	3.57
11	Tennessee	4.32
12	Minnesota	4.46
13	Ohio	4.53
14	Maryland	4.60
15	Oregon	4.80
16	New Mexico	4.93
17	Washington	5.04
18	South Carolina	5.06
19	Colorado	5.07
20	Idaho	5.11
21	Connecticut	5.17
22	Kansas	5.19
23	Arkansas	5.20
24	Indiana	5.37
25	California	5.99
26	Hawaii	6.29
27	Wisconsin	6.43
28	Mississippi	6.54
29	Wyoming	6.57
30	New Jersey	6.69
31	North Carolina	6.92
32	Montana	6.95
33	Kentucky	6.99
34	New Hampshire	7.51
35	Alaska	7.75
36	Nebraska	7.96
37	Massachusetts	8.45
38	Illinois	9.02
39	Missouri	9.08
40	New York	9.18
41	Oklahoma	9.51
42	North Dakota	10.49
43	Michigan	11.22
44	Louisiana	12.34
45	Pennsylvania	13.41
46	Maine	14.17
47	Rhode Island	16.58
48	South Dakota	16.89
49	Iowa	19.32
50	West Virginia	19.97
	Average	6.90

FIGURE 11: PERCENT STRUCTURALLY DEFICIENT BRIDGES, 2022



RURAL FATALITY RATE

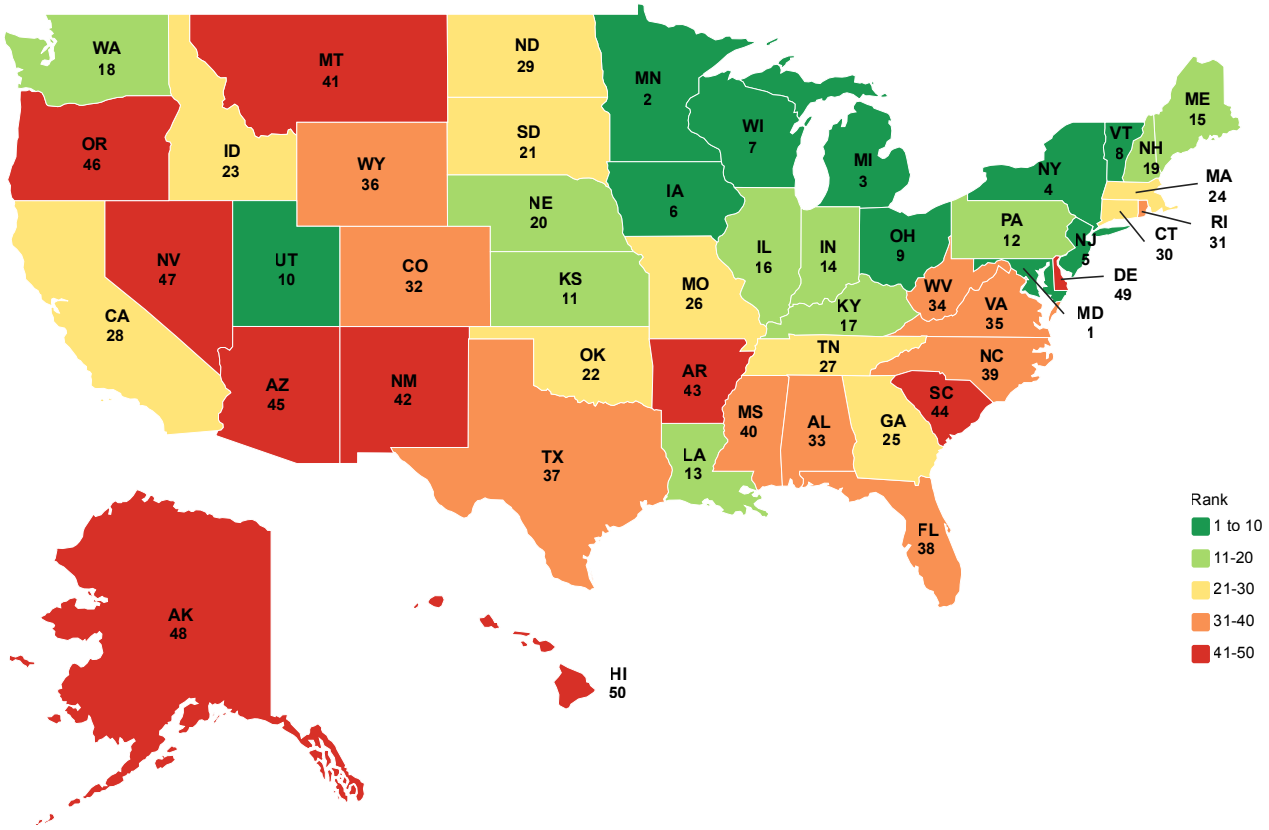
The rural fatality rate measures fatalities on all rural arterials in the state. The nation's rural highway fatality rate improved from 1.30 in 2020 to 1.25 in 2022 (Table 18, Rural Fatality Rate per 100 Million Vehicle-Miles, 2022, Figure 12). In 2022, 6,466 rural fatalities were reported, more than the 5,822 rural fatalities reported in 2020, as rural VMT (vehicle-miles of travel) increased from 0.45 trillion miles in 2020 to 0.51 trillion miles in 2022, partly due to the economic recovery from COVID-19. (The increase in fatalities is a consequence of the significant increase in vehicle-miles driven, even as the overall rate decreased.)

For 2022, Maryland reported the lowest rural fatality rate, 0.13, while Hawaii reported the highest, 4.04. Forty-four states reported an increase in their rural fatality rate compared to 2020, led by Delaware (1.81 points), Hawaii (1.81 points), and Alaska (1.36 points). No states had rates that remained the same. Six states saw their fatality rate decrease, led by South Carolina, Maryland, and Indiana (at 0.46, 0.31, and 0.17 points, respectively.)

TABLE 17: FATALITY RATE PER 100 MILLION RURAL VEHICLE-MILES, 2022

2022 Rank	State	Fatality Rate Per 100 Million Rural Vehicle-Miles
1	Maryland	0.13
2	Minnesota	0.60
3	Michigan	0.61
4	New York	0.67
5	New Jersey	0.73
6	Iowa	0.74
7	Wisconsin	0.74
8	Vermont	0.79
9	Ohio	0.86
10	Utah	0.89
11	Kansas	0.91
12	Pennsylvania	0.92
13	Louisiana	0.95
14	Indiana	0.95
15	Maine	1.01
16	Illinois	1.04
17	Kentucky	1.04
18	Washington	1.05
19	New Hampshire	1.07
20	Nebraska	1.12
21	South Dakota	1.13
22	Oklahoma	1.16
23	Idaho	1.17
24	Massachusetts	1.19
25	Georgia	1.21
26	Missouri	1.21
27	Tennessee	1.23
28	California	1.27
29	North Dakota	1.31
30	Connecticut	1.37
31	Rhode Island	1.38
32	Colorado	1.45
33	Alabama	1.47
34	West Virginia	1.50
35	Virginia	1.52
36	Wyoming	1.54
37	Texas	1.56
38	Florida	1.59
39	North Carolina	1.64
40	Mississippi	1.66
41	Montana	1.69
42	New Mexico	1.73
43	Arkansas	1.75
44	South Carolina	1.78
45	Arizona	1.80
46	Oregon	1.84
47	Nevada	1.96
48	Alaska	2.68
49	Delaware	2.99
50	Hawaii	4.04
	Average	1.25

FIGURE 12: FATALITY RATE PER 100 MILLION RURAL VEHICLE-MILES, 2022



URBAN FATALITY RATE

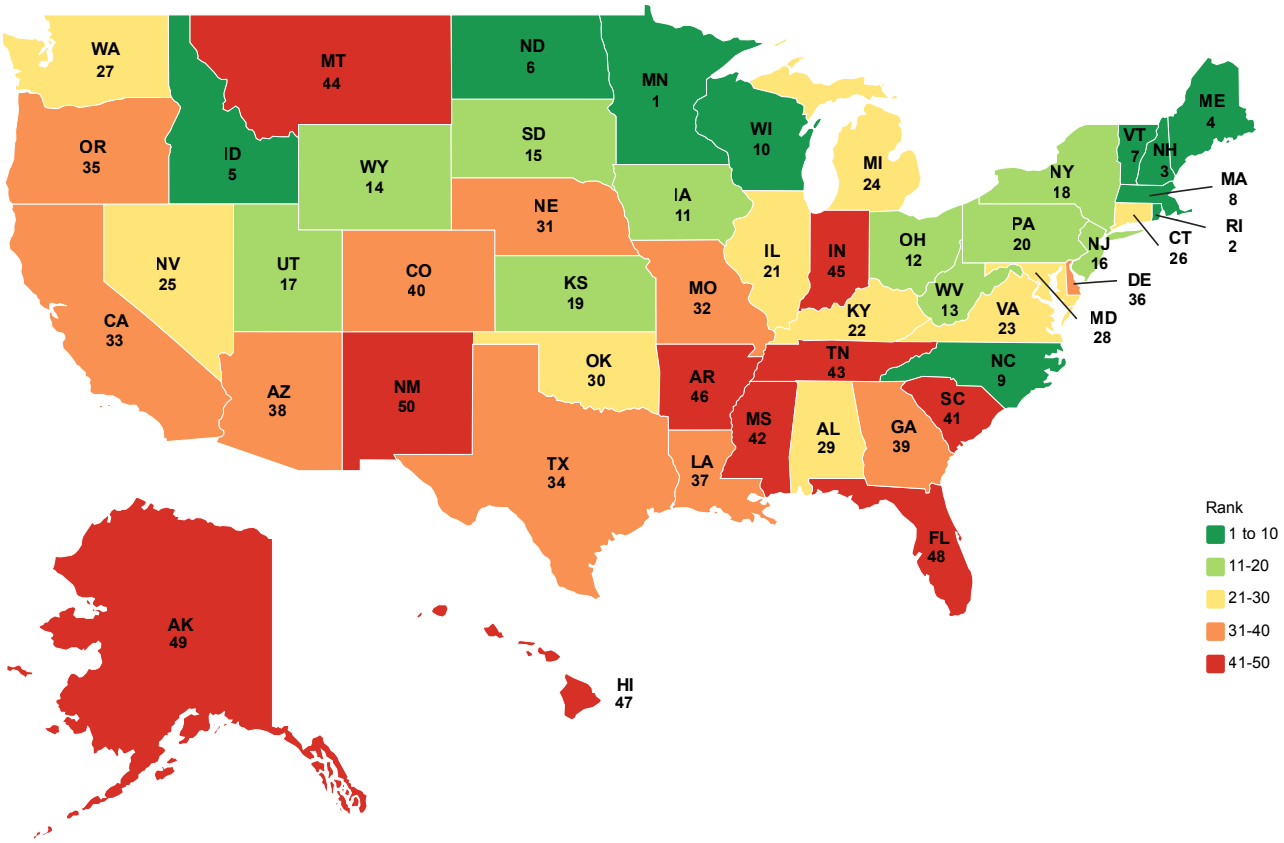
The urban fatality rate measures fatalities on all urban arterials in the state. The nation's urban highway fatality rate worsened slightly from 1.04 in 2020 to 1.07 in 2022 (Table 19, Urban Fatality Rate per 100 Million Vehicle-Miles, 2022, Figure 13). The urban fatality rate has increased over the last several years after a decades-long downward trend. While there is no one cause, distracted driving may be a significant contributor. In 2022, 13,545 urban fatalities were reported, more than the 11,889 urban fatalities reported in 2020, as urban VMT (vehicle-miles of travel) increased to 1.26 trillion from 1.14 trillion in 2020, partly as a result of the return to in-person work post-COVID-19.

For 2022, Minnesota reported the lowest urban fatality rate, 0.49, while New Mexico reported the highest, 1.88. Ten states saw their fatality rate decrease compared with 2020, led by Wyoming (0.56 points) and Kentucky (0.30 points). Fifteen states saw their urban fatality rate increase led by Arkansas and Montana (at 0.96 and 0.65 points, respectively).

TABLE 18: FATALITY RATE PER 100 MILLION URBAN VEHICLE-MILES, 2022

2022 Rank	State	Fatality Rate Per 100 Million Urban Vehicle-Miles
1	Minnesota	0.49
2	Rhode Island	0.59
3	New Hampshire	0.63
4	Maine	0.64
5	Idaho	0.65
6	North Dakota	0.65
7	Vermont	0.68
8	Massachusetts	0.70
9	North Carolina	0.72
10	Wisconsin	0.74
11	Iowa	0.75
12	Ohio	0.76
13	West Virginia	0.77
14	Wyoming	0.81
15	South Dakota	0.82
16	New Jersey	0.83
17	Utah	0.83
18	New York	0.86
19	Kansas	0.90
20	Pennsylvania	0.94
21	Illinois	0.95
22	Kentucky	0.96
23	Virginia	0.97
24	Michigan	1.00
25	Nevada	1.01
26	Connecticut	1.01
27	Washington	1.02
28	Maryland	1.03
29	Alabama	1.04
30	Oklahoma	1.04
31	Nebraska	1.05
32	Missouri	1.08
33	California	1.09
34	Texas	1.15
35	Oregon	1.17
36	Delaware	1.20
37	Louisiana	1.21
38	Arizona	1.24
39	Georgia	1.24
40	Colorado	1.27
41	South Carolina	1.33
42	Mississippi	1.35
43	Tennessee	1.39
44	Montana	1.44
45	Indiana	1.48
46	Arkansas	1.52
47	Hawaii	1.55
48	Florida	1.56
49	Alaska	1.87
50	New Mexico	1.88
	Average	1.07

FIGURE 13: FATALITY RATE PER 100 MILLION URBAN VEHICLE-MILES, 2022



OTHER FATALITY RATE

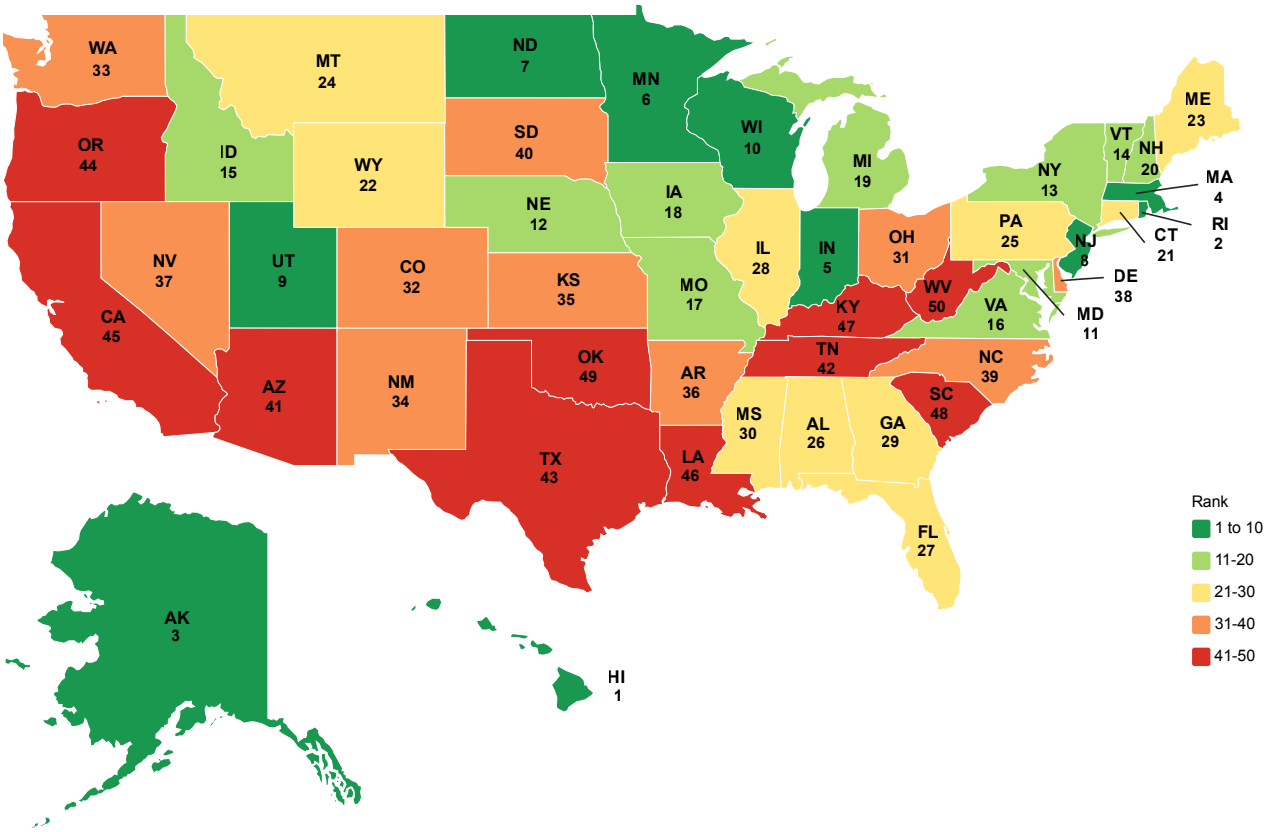
The other fatality rate measures fatalities on rural and urban minor arterials, collectors, and local roadways in the state as fatalities per 100 million vehicle-miles. The nation's average other fatality rate increased between 2020 and 2022 from 1.54 to 1.56, (Table 17, Other Fatality Rate per 100 Million Vehicle-Miles, 2022, Figure 14). In 2022, 22,098 fatalities were reported, more than the 20,193 fatalities reported in 2020, as VMT (vehicle-miles of travel) decreased due to COVID-19.

For 2022, Hawaii reported the lowest other fatality rate, 0.62, while West Virginia reported the highest, 2.36. Twenty-two states saw their fatality rates decrease, led by Mississippi (0.61 points) and Rhode Island (0.53 points). Twenty-four states reported an increase to their other fatality rates compared to 2020, led by Nevada and Arkansas (which worsened by 0.62 and 0.59 points respectively).

TABLE 19: OTHER FATALITY RATE PER 100 MILLION VEHICLE-MILES, 2022

2022 Rank	State	Fatality Rate Per 100 Million Vehicle-Miles
1	Hawaii	0.62
2	Rhode Island	0.68
3	Alaska	0.73
4	Massachusetts	0.81
5	Indiana	0.88
6	Minnesota	0.99
7	North Dakota	1.00
8	New Jersey	1.03
9	Utah	1.06
10	Wisconsin	1.07
11	Maryland	1.10
12	Nebraska	1.21
13	New York	1.25
14	Vermont	1.31
15	Idaho	1.32
16	Virginia	1.34
17	Missouri	1.38
18	Iowa	1.39
19	Michigan	1.45
20	New Hampshire	1.45
21	Connecticut	1.46
22	Wyoming	1.47
22	Maine	1.47
24	Montana	1.48
25	Pennsylvania	1.49
26	Alabama	1.51
27	Florida	1.52
28	Illinois	1.52
29	Georgia	1.54
30	Mississippi	1.55
31	Ohio	1.56
32	Colorado	1.57
33	Washington	1.59
34	New Mexico	1.65
34	Kansas	1.69
36	Arkansas	1.70
37	Nevada	1.72
38	Delaware	1.72
39	North Carolina	1.73
40	South Dakota	1.74
41	Arizona	1.83
42	Tennessee	1.88
43	Texas	1.92
44	Oregon	1.92
45	California	1.99
46	Louisiana	2.11
47	Kentucky	2.17
48	South Carolina	2.24
49	Oklahoma	2.27
50	West Virginia	2.36
	Average	1.56

FIGURE 14: OTHER FATALITY RATE PER 100 MILLION URBAN VEHICLE-MILES, 2022



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Feigenbaum is involved with various transportation organizations. He is a member of the Transportation Research Board Managed Lanes Committee, Bus Transit Committee and Intelligent Transportation Systems Committee. He is secretary of the Bus Transit Committee and he chairs the Bus Transit Conference Subcommittee. He is a reviewer for the *Journal of the American Planning Association* (*JAPA*), and a contributor to *Planetizen*.

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APPENDIX: TECHNICAL NOTES

This brief technical appendix summarizes the definitions and sources of the data used in this assessment. The discussion is based on the assumption that comparative cost-effectiveness requires data on system condition or performance, information on the costs to operate and improve the system, and an understanding of the relationship between economic activity and tax revenues.

This report relies heavily on the *Highway Statistics* series, which is compiled by the Federal Highway Administration (FHWA) from data reported by each state. We also use bridge condition data from the National Bridge Inventory and highway fatality rates reported by each state, and for congestion, we use data from INRIX Research and the *American Community Survey*. This assessment evaluates states based on expenditures, pavement quality, traffic congestion, and safety. In general, we use state self-reported data as posted in the various data tables. We do not attempt to audit the data; instead, we assume the data to be correct. However, in cases where the data are clearly incorrect, we make appropriate adjustments to the data and footnote the changes made.

MEASURE OF MILEAGE

In general, larger highway systems require more resources to build and maintain than smaller systems. Accordingly, it is important to weight systems so that states can be compared accurately. In this study, mileage is the basic measure for bringing the states to a common baseline. Highway width is also important in differentiating system size (number of lanes), as more pavement generally requires more resources. This study does not rank states based on the size of their highway systems. However, it does use average highway width differences, as derived from state highway agency lane width measures, to calculate overall financial performance.

State Highway Agency Mileage: For each state the report uses the total numbers of lane-miles for the state roadway system. Each state's responsibility for roads varies. In some, such as North Carolina, the state is responsible for every roadway except subdivision streets, while in others, such as New Jersey, the state is responsible primarily for the major, multiple-lane roads. In addition, other features such as bridges also vary, with some states having many and others few. We use lane-miles to calculate and then to weight overall financial performance. The source of data for state lane-miles is Table HM-81, *Highway Statistics 2022* (https://www.fhwa.dot.gov/policyinformation/statistics/2022/).

DISBURSEMENTS FOR STATE-OWNED HIGHWAYS

There are multiple types of disbursements for state-administered highways: capital and bridge work, maintenance and highway services, administration, research and planning, law enforcement and safety, interest (on bond payments) and bond retirement. Disbursement data are put into four categories (Capital and Bridge Disbursements, Maintenance Disbursements, Administrative Disbursements, and Other Disbursements). Disbursements by state-administered agencies fund the state highway agency, other toll and turnpike state agencies, and state universities, parks, prisons, etc.

The source of all these data is Table SF-4, *Highway Statistics 2022* (https://www.fhwa.dot.gov/policyinformation/statistics/2022/).

Capital and Bridge Disbursements and Maintenance Disbursements: "Capital" actions are those intended to reconstruct or improve the system, whereas "maintenance" actions are those intended to preserve or repair the system, but not improve it. However, the definitions of these categories vary somewhat between the states. Most states contract with private-sector companies to build and reconstruct the system, although in some cases

states may also use their own workforces for some projects. Most states also conduct maintenance largely with agency forces, and the work is generally light in character, but many also conduct some major repairs such as thick overlays using contracted forces from the private sector.

Administrative Disbursements: Administrative disbursements are intended to include all non-project-specific disbursements, and typically include most main-office and regional-office costs, research, planning, and similar activities. Sometimes this category also includes bond restructurings and other non-project-specific financial actions. As a result, administrative disbursement can vary widely from year to year.

Other Disbursements: These disbursements are not counted in the first three categories and include law enforcement, safety, bonds, and interest. This category can vary from year to year due to major bond sales, which, because they are collected in one year and expended in another, show up as major increases in "receipts" without a similar increase in disbursements. And sometimes, later-year disbursements can be higher than receipts as states transfer money into projects without increasing revenues.

MEASURES OF SYSTEM CONDITION

There are nine measures of highway system condition: Rural Interstate Poor-Condition Mileage, Urban Interstate Poor-Condition Mileage, Rural Other Principal Arterial (ROPA) Poor-Condition Mileage, Urban Other Principal Arterial (UOPA) Poor-Condition Mileage, Urbanized Area Congestion, Structurally Deficient Bridges, Rural Fatality Rate, Urban Fatality Rate, and Other Fatality Rate.

Poor-Condition Mileage: Perhaps no measure is more fundamental to road performance than road condition. There are numerous ways of defining road condition, but the one used for the U.S. higher-road system is the International Roughness Index (IRI), a measure of surface "bumpiness" in inches of vertical deviation per mile of length. The states use a variety of procedures in gathering the data, but most use mechanical or laser equipment driven over the road system. They often supplement these data with detailed information on road distress features, but this information is not generally used in federal reporting. A few states, however, still use visual ratings as the basis of their reports. Lower "roughness index" scores equate to a smoother road. Roads classified as poor typically have visible bumps and ruts leading to a rough ride. Long, smooth sections (greater than one mile in length) tend to dampen out short rough ones, so if a state has long, smooth sections in its database it can report very little "rough mileage" as a percent of the system.

The source of road roughness data is Table HM-64, *Highway Statistics 2022* (https://www.fhwa.dot.gov/policyinformation/statistics/2022/), which shows miles by roughness, for several functional classes, for each state. This mileage is then converted into a percent, to account for different sizes of systems (rural Interstate, urban Interstate, and rural other principal arterials) in each state. The national average is the weighted average, obtained by dividing the sum of all poor-rated mileage by the sum of all state-administered mileage.

Rural Interstate Poor-Condition Mileage: Rural Interstate mileage is all mileage outside of urban areas. By convention, Interstate sections with an IRI roughness of greater than 170 inches of roughness per mile (about three inches of vertical variation per 100 feet of road) are classified as "poor" in most reports. By comparison, sections with less than 60 inches of roughness per mile (about one inch of vertical deviation per 100 feet) would be classified as "excellent." (Delaware and Hawaii have no rural Interstate mileage and are not rated on this measure).

Urban Interstate Poor-Condition Mileage: Urban Interstate mileage is all mileage inside census-defined urban areas. It is calculated the same way as rural Interstate mileage is calculated. The IRI cutoff for urban Interstates is the same as for rural Interstates: 170 inches per mile or higher, for "poor" mileage.

Rural Other Principal Arterial Poor-Condition Mileage: Rural other principal arterials (ROPAs) are the major inter-city or regional connectors, off the Interstate system. They can be US-numbered and state-numbered roads, and sometimes toll roads or parkways. This system is generally a top priority of most state highway agencies because of its importance to the economic competitiveness of the state. By convention, ROPA sections with an IRI greater than 220 inches per mile of roughness (about four inches of vertical deviation per 100 feet) are classified as "poor" in most reports. The cutoff is higher than for Interstates since speeds on these roads are typically lower, resulting in a smoother trip.

Urban Other Principal Arterial Poor-Condition Mileage*:* Urban other principal arterials (UOPAs) are the major connectors within an urban area, off the Interstate system. They can be US-numbered and state-numbered roads, and sometimes toll roads or parkways. The IRI cutoff for urban other principal arterials is the same as for rural principal arterials: 220 inches per mile or higher for "poor" mileage.

Urbanized Area Congestion*:* The Urbanized Area Congestion metric is measured as the "annual hours of delay per auto commuter during peak hours compared to free flow conditions." Peak commute is defined as the most congested portion of the morning and afternoon commute periods. Free flow is defined as the highest average speed over the previous 24 hours. Hours of delay captures the intensity of traffic in a given city. In other words, it compares how fast traffic would move from one destination to another (which destinations are chosen is defined further by INRIX) during free flow periods compared to speed during peak periods.

Two data sources are required to calculate the current metric: *INRIX's 2022 Global Traffic Scorecard* (https://inrix.com/scorecard/) and Table HM-74 from the FHWA *Highway Statistics* series (https://www.fhwa.dot.gov/policyinformation/statistics.cfm)

INRIX's 2022 global traffic scorecard provides 2022 congestion data for approximately 200 urban areas in the U.S. Data items include annual hours of delay per auto commuter as well as the number of auto commuters for each area. INRIX calculates their rankings based on speed data. Table HM-74 (Daily Vehicle-Miles of Travel (DVMT) by Measured Pavement Roughness / Present Serviceability Rating) includes data on all urbanized areas in the U.S. (i.e., those with populations above 50,000). The DVMT data for multi-state urbanized areas are apportioned by state, and the percentages of the DVMT in each state are calculated based on total reported DVMT.

Three steps are used to calculate the final metric. First, the total annual hours of delay for each state are calculated by multiplying the annual hours of delay per auto commuter by the number of auto commuters for each urban area, and then summing them up for each state, adjusted by the DVMT data. Second, the total number of commuters for each state, adjusted by the DVMT data, are added up from the urban areas. Finally, each state's annual hours of delay per commuter are computed by dividing the state's total annual hours of delay by its total number of commuters.

Structurally Deficient Bridges*:* As a result of several major bridge disasters in the 1960s and 1970s, states are required to inspect bridges biennially (every year if a bridge is rated structurally deficient) and maintain uniform records of inspections.

This data source, titled the *National Bridge Inventory* (NBI), provides information on deficient bridges. Since the NBI contains a mixture of bridges inspected at different times, some as long ago as two years ago, the "average" inspection age is about one year. So, an October

2023 summary from the *Inventory* would represent, on average, bridge condition as of October 2022.

While deficient bridge data are in the NBI, we use the annual summary of bridge deficiencies prepared by *Better Roads*, a trade publication, as our source. This summary, published since 1979, contains very recent information, gathered from each state shortly before the end of each calendar year, using a proprietary survey sent to state bridge engineers. The 2023 *Better Roads Bridge Inventory* http://www.equipmentworld.com/2022-better-roads-bridge-inventory-2-year-decline-in-deficient-u-s-bridges-snapped/) contains data collected through October 2023.

Rural Fatality Rate: Road safety is a very important measure of system performance, and fatality rates are a key measure of safety. The overall state fatality rate has long been seen as a measure of state performance in road safety.

The Rural Fatality Rate applies to all rural Interstates, other freeways and expressways, and other principal arterials. The fatality rate includes two components: a count of fatalities and a measure of travel, i.e., vehicle-miles. The sources of each are Tables FI-20 and VM-2, *Highway Statistics 2022* (https://www.fhwa.dot.gov/policyinformation/statistics/2022/). Table FI-20 provides a count of fatalities by state and highway functional class and Table VM-2 provides an estimate of annual vehicle-miles of travel for each state by functional class. The national average fatality rates are the weighted averages across the states.

Urban Fatality Rate: The Urban Fatality Rate applies to all urban Interstates, other freeways and expressways, and other principal arterials. It is calculated in the same manner as the Rural Fatality Rate.

Other Fatality Rate: The Other Fatality Rate applies to all rural and urban minor arterials, collectors, and local roads. It is calculated in the same manner as the Rural Fatality Rate.

OVERALL RATINGS

The overall ratings for each state are developed in several steps:

- The relative performance of each state on each of 13 performance measures is determined by computing each state's "performance ratio." This is defined as the ratio of each state's measure to the expected measure. The mathematical structure is as follows:

M_{is} = Measure "i" for state "s" (e.g., percent of rural Interstates in poor condition, for North Carolina)

$E(M_{is})$ = Expected value of Measure "i" for state "s".

The expected values for the four spending categories are determined by LOESS regressions between the spending amounts per lane-mile and the percent of urban lane-miles to take into account the fact that more urbanized states are expected to spend more on roads (per lane-mile) than less urbanized ones. For each state, the percent of urban lane-miles is calculated by dividing the urban lane-miles by the total (urban plus rural) lane-miles of that state. We use local regressions instead of linear regressions to account for the non-linear relationships between the percent of urban lane-miles and the disbursement per lane-mile, especially for the "other disbursement" category. The local regressions are performed in R, a statistical programming language, using the default span of 0.75. For the other nine categories, the expected value is the national weighted average of the measure across the 50 states.

R_{is} = Performance Ratio for measure "i", state "s"
$= M_{is}/E(M_{is})$

- The 13 performance ratios are combined to calculate the average performance ratio:

$$\overline{R_s} = \frac{1}{n}\sum_{i=1}^{n} R_{is}$$

In lieu of 13, Delaware and Hawaii use 12 since they have no rural Interstates. In final weighting, all metrics are weighted equally.

Since several state agencies are included in each state's reports, this report should *not* be viewed as a cost-effectiveness comparison of the state highway departments. Instead, it should be viewed as an assessment of how the state, as a whole, is managing the state-owned roads.