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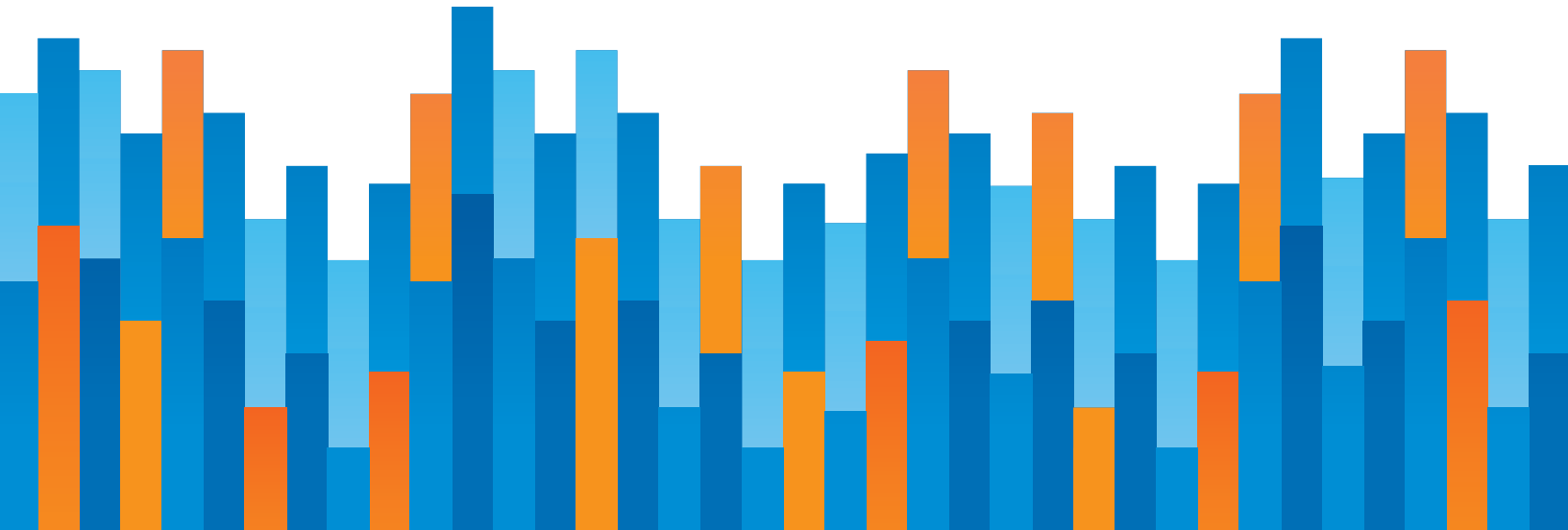
26TH ANNUAL HIGHWAY REPORT

by Baruch Feigenbaum and Spence Purnell

November 2021



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PART 1

STATE HIGHWAY PERFORMANCE RANKINGS

Reason's *26th Annual Highway Report* rates 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, Ph.D., Baruch Feigenbaum, and Spence Purnell. 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 ratings typically have better-than-average system conditions (good for road users) along with relatively low per-mile expenditures (good for taxpayers).

The following table shows the overall highway performance of the state highway systems using 2019 and 2020 data. This year's leading states are North Dakota, Virginia, Missouri, Kentucky, and North Carolina**.** At the other end of the rankings are New Jersey, Rhode Island, Alaska, Hawaii, and New York.

Similar to 2016, the top-performing states are a mix of large and small states as well as more urban and more rural. Very rural states may have a slight advantage (Tables 1, 2, 3, 4,

and Figure 1). But a number of states with large urban areas also rank highly: Virginia (2nd), Missouri (3rd), North Carolina (5th), Tennessee (10th), Georgia (14th), and Texas (16th). Although it is tempting to ascribe these ratings solely to geographic circumstances, a more careful review suggests that numerous other factors—terrain, climate, truck volumes, urbanization, system age, budget priorities, unit cost differences, state budget circumstances, and management/ maintenance philosophies, just to name a few—are all affecting overall performance. The remainder of this report reviews the statistics underlying these overall ratings in more detail.

TABLE 1: OVERALL HIGHWAY PERFORMANCE RANKINGS, 2019

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

TABLE 2: OVERALL HIGHWAY PERFORMANCE RANKINGS IN ALPHABETICAL ORDER, 2019

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

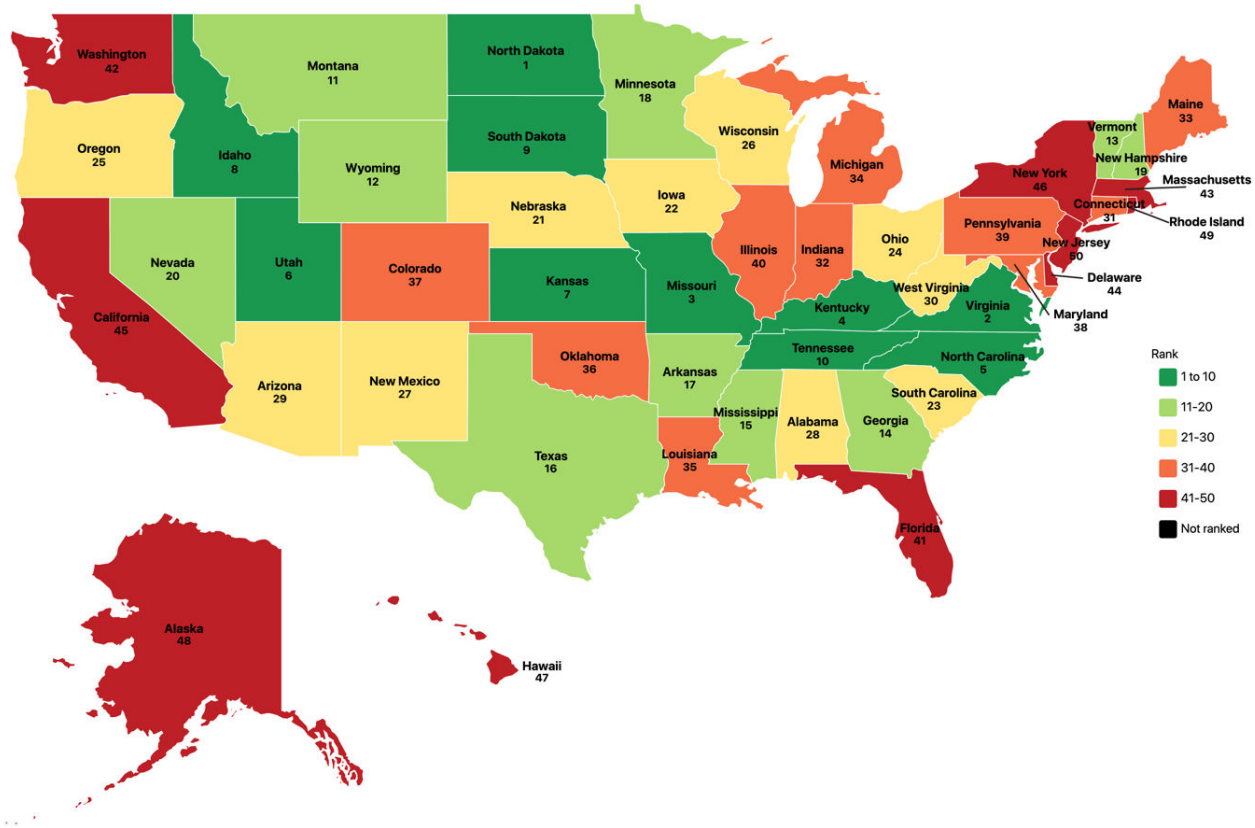
TABLE 3: HIGHWAY PERFORMANCE RANKINGS BY CATEGORY, 2019

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

TABLE 4: OVERALL HIGHWAY PERFORMANCE RANKING TRENDS, 2016-2019

State	Year			Change in Rank	
	2016	2018	2019	2018-2019	2016-2019
Alabama	10	19	28	-9	-18
Alaska	49	49	48	1	1
Arizona	29	23	29	-6	0
Arkansas	32	9	17	-8	15
California	43	43	45	-2	-2
Colorado	36	38	37	1	-1
Connecticut	44	35	31	4	13
Delaware	42	48	44	4	-2
Florida	40	40	41	-1	-1
Georgia	26	26	14	12	12
Hawaii	47	42	47	-5	0
Idaho	13	5	8	-3	5
Illinois	28	37	40	-3	-12
Indiana	33	32	32	0	-1
Iowa	31	20	22	-2	9
Kansas	6	3	7	-4	-1
Kentucky	5	4	4	0	-1
Louisiana	34	31	35	-4	-1
Maine	4	25	33	-8	-29
Maryland	39	41	38	3	1
Massachusetts	46	47	43	4	3
Michigan	30	24	34	-10	-4
Minnesota	22	15	18	-3	4
Mississippi	25	8	15	-7	10
Missouri	3	2	3	-1	0
Montana	8	10	11	-1	-3
Nebraska	15	12	21	-9	-6
Nevada	27	27	20	7	7
New Hampshire	24	29	19	10	5
New Jersey	50	50	50	0	0
New Mexico	21	16	27	-11	-5
New York	45	44	46	-2	-1
North Carolina	17	14	5	9	12
North Dakota	1	1	1	0	0
Ohio	18	13	24	-11	-6
Oklahoma	41	34	36	-2	5
Oregon	12	28	25	3	-13
Pennsylvania	35	39	39	0	-4
Rhode Island	48	46	49	-3	-1
South Carolina	20	6	23	-17	-3
South Dakota	14	11	9	2	5
Tennessee	7	7	10	0	-3
Texas	23	18	16	2	7
Utah	9	17	6	11	3
Vermont	19	30	13	17	6
Virginia	2	21	2	19	0
Washington	37	45	42	3	-5
West Virginia	16	33	30	3	-14
Wisconsin	38	22	26	-4	12
Wyoming	11	36	12	24	-1

FIGURE 1: OVERALL HIGHWAY PERFORMANCE RANK, 2019



Despite several minor methodological changes, the overall rankings were not dramatically different from the previous version of the *Annual Highway Report*. However, six states' overall ranking improved by double digits, while five states' overall ranking declined by 10 or more spots:

- **Wyoming improved by 24 positions from 36th to 12th in the overall rankings,** as urban Interstate pavement condition improved by 16 positions and urban arterial pavement condition improved by 28 positions. Last year's ranking may have been an aberration as in the previous report Wyoming ranked 11th. (Last year, FHWA supplied incorrect information for Wyoming's pavement conditions, which contributed to its lower ranking.)
- **Virginia improved 19 positions from 21st to 2nd in the overall rankings,** as capital and bridge disbursements improved by 24 positions, maintenance disbursements improved by 15 positions, and urbanized area congestion improved by 17 positions. Last year's ranking may have been an aberration as in the previous report Virginia ranked 2nd.
- **Vermont improved 17 positions from 30th to 13th in the overall rankings,** as the state improved 16 places in urban congestion and 10 places in rural fatality rate.

- **Georgia improved 12 positions from 26th to 14th in the overall rankings**, as administrative disbursements per mile and rural arterial pavement quality both improved nine places.
- **Utah improved 11 positions from 17th to 6th in the overall rankings,** as the state improved 13 positions in urban fatality rate and saw significant improvements in seven other categories. Last year's ranking may have been an aberration as in the previous report Utah ranked 9th.
- **New Hampshire improved 10 positions from 29th to 19th in the overall rankings**, as the state moved up 17 places in overall fatality rate and 15 places in urban fatality rate.
- **South Carolina declined 17 positions from 6th to 23rd in the overall rankings**, as urban Interstate pavement condition dropped 31 slots and urbanized area congestion dropped 11 slots. Last year's ranking may have been an aberration as in the previous report South Carolina ranked 20th.
- **New Mexico declined 11 positions from 16th to 30th in the overall rankings**, as rural fatality rate worsened by 14 positions and rankings in five other categories declined.
- **Ohio declined 11 positions from 13th to 24th,** as administrative disbursements worsened by 21 positions and urbanized area congestion worsened by 10 positions.
- **Michigan declined 10 positions from 24th to 34th in the overall rankings**, as capital and bridge disbursements worsened by 17 positions, maintenance disbursements worsened by 16 positions, and urbanized area congestion worsened by 20 positions.

PART 2

METHODOLOGICAL CHANGE

The *Annual Highway Report*'s goal is to provide an accurate, current evaluation of state highway systems. In order to meet that goal, we made two changes to better measure disbursements. The changes are described in this section and the report's technical and quantitative metrics are detailed in the appendix:

- **Calculate disbursement rankings using lane-miles.**
  Last year, we used a combination of centerline-miles (the length of the highway system: a five-mile road equals five centerline-miles), lane-miles (the length of the highway system multiplied by the number of lanes on a highway: a five-mile road with two lanes equals 10 lane-miles while a five-mile road with six lanes equals 30 lane-miles), and vehicle-miles traveled per lane-mile (the total amount of miles traveled on the state highway system divided by the lane-miles in the state: 100,000 vehicle-miles traveled per year divided by 200 miles of roadway equals 500 vehicle-miles traveled per lane).

  However, using that combination of metrics added complexity to the report, by requiring z-scores for the disbursement categories, while not changing the rankings significantly. As a result, in this report we returned to our previous approach of using lane-miles.

- **Calculate the ranking weighting all categories equally.**
  For the first 25 editions of the *Annual Highway Report*, all 13 rankings (11 in some years) were added together and then divided by 13 to determine an average ranking for the state. Then the financial metrics were added separately again and divided by four and the performance metrics were added separately again and divided by nine (seven in some years), and then each of these totals—the financial total and the performance total were given a weighting of 50% to determine the overall state score. This had the effect of giving more weight to the financial rankings. This year the report simply gave all categories equal weight. It summed all 13 categories and divided by 13 to determine an average ranking. We believe this is fairer to states that invest more in their highway systems.

  We believe these changes will improve the quality of the report. Next year, we will evaluate the results and may make additional improvements if needed.

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 on the state level, except for subdivision and other local roads. Other states, such as Florida, have robust county road systems. 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). The average number of lanes *per mile* is 2.53 lanes, but some states (Florida, New Jersey, California, and Massachusetts) manage significantly wider roads, averaging more than three lanes per mile.

Nationwide in 2019, there were 1,884,585 lane-miles under state control (Table 5, State-Controlled Highway Mileage by Lane-Miles), 2,743 lane-miles more than in 2018 (1,881,842), the last time this assessment was completed. Annual changes in state-controlled miles are to be expected, as state systems are expanded or contracted to meet increasing needs. Often new state highways are constructed and others widened. Conversely, as cities expand, local jurisdictions assume responsibility for mileage previously under state control. Hawaii (2,472 miles) and Rhode Island (2,805 miles) have the fewest lane-miles under state control; Texas (197,850 miles) and North Carolina (173,257miles) have the most.

TABLE 5: STATE-CONTROLLED HIGHWAY MILES, 2019

2019 Size	State	Lane-Miles
1	Texas	197,850
2	North Carolina	173,257
3	Virginia	128,623
4	South Carolina	90,533
5	Pennsylvania	88,261
6	Missouri	77,701
7	West Virginia	71,044
8	Kentucky	62,232
9	California	52,144
10	Ohio	49,631
11	Georgia	49,357
12	Florida	44,876
13	Illinois	42,154
14	Louisiana	39,040
15	New York	38,298
16	Arkansas	38,031
17	Tennessee	37,721
18	Oklahoma	30,530
19	Wisconsin	29,752
20	Alabama	29,614
21	New Mexico	29,462
22	Minnesota	29,222
23	Indiana	28,602
24	Mississippi	28,273
25	Michigan	27,372
26	Montana	25,188
27	Kansas	24,017
28	Colorado	22,965
29	Iowa	22,889
30	Nebraska	22,559
31	Arizona	19,965
32	Washington	18,477
33	Oregon	18,379
34	South Dakota	17,954
35	Maine	17,478
36	North Dakota	17,238
37	Utah	16,001
38	Wyoming	15,779
39	Maryland	14,926
40	Nevada	13,505
41	Idaho	12,314
42	Delaware	11,970
43	Alaska	11,742
44	Connecticut	9,831
45	Massachusetts	9,568
46	New Jersey	8,563
47	New Hampshire	8,422
48	Vermont	5,998
49	Rhode Island	2,805
50	Hawaii	2,472
	U.S. Total	780,613
	Average	17,141

Nationwide in 2019, there were 1,884,585 lane-miles under state control (Table 6, State-Controlled Highway Mileage by System Width). The widest systems are Florida (3.70 average lanes) and New Jersey (3.67 average lanes). The narrowest systems are West Virginia (2.06 lanes) and Alaska (2.08 lanes)

TABLE 6: STATE-CONTROLLED HIGHWAY MILEAGE BY SYSTEM WIDTH, 2019

2019 Size	State	Ratio	Lane-Miles	Centerline Mileage
1	Florida	3.70	44,876	12,130
2	New Jersey	3.67	8,563	2,334
3	California	3.46	52,144	15,058
4	Massachusetts	3.18	9,568	3,012
5	Arizona	2.94	19,965	6,784
6	Maryland	2.87	14,926	5,206
7	Michigan	2.84	27,372	9,651
8	Georgia	2.75	49,357	17,922
9	Utah	2.73	16,001	5,871
10	Alabama	2.72	29,614	10,904
11	Tennessee	2.68	37,721	14,063
12	Illinois	2.65	42,154	15,895
13	Connecticut	2.65	9,831	3,716
14	Washington	2.62	18,477	7,052
15	Hawaii	2.61	2,472	946
16	Mississippi	2.59	28,273	10,936
17	Indiana	2.58	28,602	11,085
18	Ohio	2.58	49,631	19,250
19	Rhode Island	2.58	2,805	1,088
20	Iowa	2.57	22,889	8,907
21	Colorado	2.54	22,965	9,032
22	New York	2.54	38,298	15,079
23	Wisconsin	2.53	29,752	11,745
24	Nevada	2.52	13,505	5,356
25	Minnesota	2.49	29,222	11,718
26	Idaho	2.48	12,314	4,972
27	Oklahoma	2.48	30,530	12,331
28	New Mexico	2.47	29,462	11,934
29	Texas	2.45	197,850	80,606
30	Oregon	2.43	18,379	7,559
31	Wyoming	2.34	15,779	6,742
32	Kansas	2.33	24,017	10,288
33	Louisiana	2.33	39,040	16,754
34	North Dakota	2.33	17,238	7,410
35	South Dakota	2.32	17,954	7,752
36	Arkansas	2.31	38,031	16,466
37	Missouri	2.30	77,701	33,832
38	Montana	2.29	25,188	11,016
39	Vermont	2.28	5,998	2,628
40	Nebraska	2.27	22,559	9,944
41	Kentucky	2.25	62,232	27,667
42	Pennsylvania	2.22	88,261	39,716
43	Delaware	2.20	11,970	5,450
44	South Carolina	2.19	90,533	41,271
45	Virginia	2.18	128,623	59,106
46	North Carolina	2.16	173,257	80,129
47	New Hampshire	2.16	8,422	3,900
48	Maine	2.09	17,478	8,345
49	Alaska	2.08	11,742	5,635
50	West Virginia	2.06	71,044	34,420
	U.S. Total		1,884,585	780,613
	Average			17,141

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 Total 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 congestion: Urban Area Congestion. The four remaining categories measure safety: Structurally Deficient Bridges, Overall Fatality Rate, Rural Fatality Rate, and Urban Fatality Rate.

All 13 categories are considered together, weighted equally and then averaged to get one overall score. Therefore, each measure, whether spending efficiency or system performance, is weighted equally.

This part of the report includes detailed data and trends for each category. Rankings include a table showing the state, the ranking, and a composite score. Each ranking also includes a color-coded map with the composite rank 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 50% of total disbursements, totaling $78.87 billion in 2019, about 2.2% more than was spent in 2018 ($77.15 billion), the last time this assessment was completed.

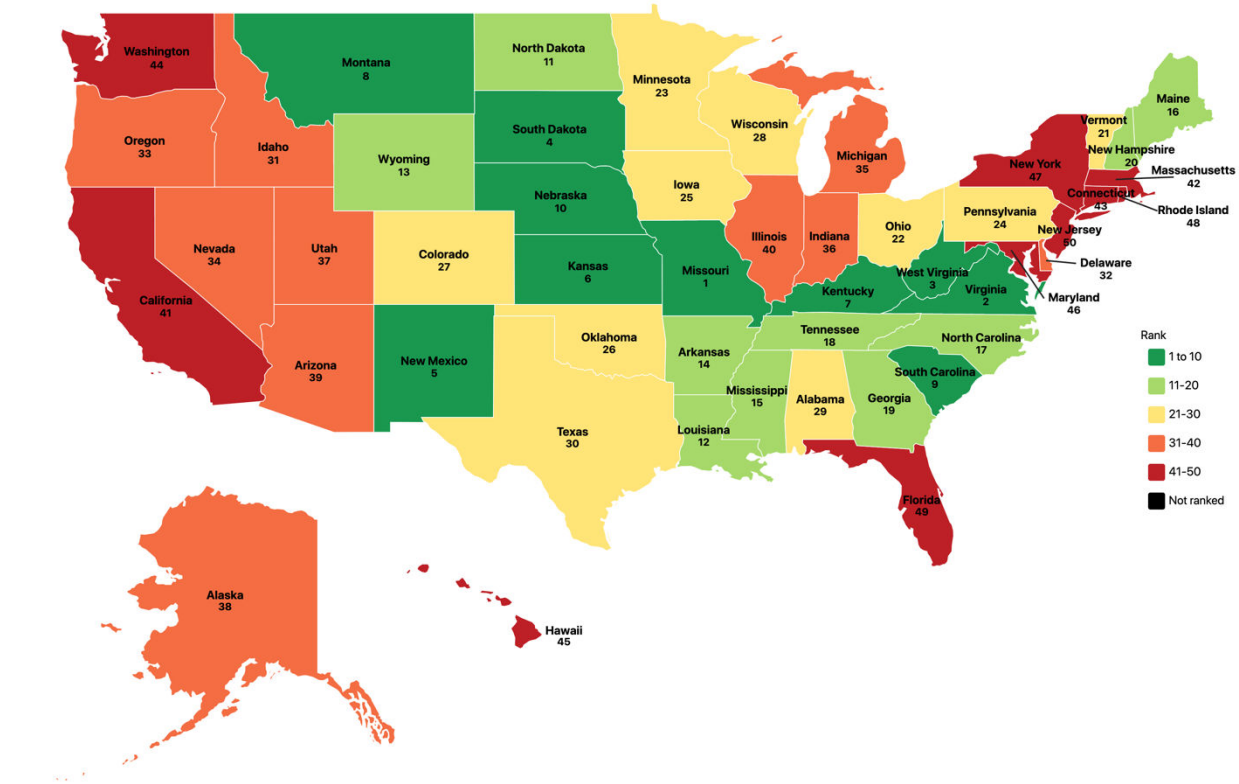
This year, we measure capital and bridge disbursements per lane-mile. Last year, we measured capital and bridge disbursements per centerline-mile, lane-mile, and vehicle-miles traveled (VMT) per lane-mile. The average 2019 lane-mile disbursement is $41,850, a 2.1% increase from 2018's $40,995 (Table 7, Capital and Bridge Disbursements by State, 2018, Figure 2.) This follows a generally steady increased spending trend over the past decade. Since 2007, these per-mile disbursements have increased about 23%, similar to the Consumer Price Index (CPI), which has increased about 23%.

TABLE 7: CAPITAL AND BRIDGE DISBURSEMENTS BY STATE, 2019

2019 Rank	State	Disbursement Per Lane-Mile
1	Missouri	$10,363
1	Virginia	$11,895
3	West Virginia	$12,822
4	South Dakota	$13,696
5	New Mexico	$14,778
6	Kansas	$18,560
7	Kentucky	$20,780
8	Montana	$20,980
9	South Carolina	$21,020
10	Nebraska	$21,435
11	North Dakota	$21,829
12	Louisiana	$22,714
13	Wyoming	$23,717
14	Arkansas	$24,185
15	Mississippi	$25,064
16	Maine	$27,823
17	North Carolina	$27,960
18	Tennessee	$31,079
19	Georgia	$31,701
20	New Hampshire	$32,432
21	Vermont	$32,496
22	Ohio	$39,701
23	Minnesota	$40,983
24	Pennsylvania	$43,247
25	Iowa	$44,187
26	Oklahoma	$44,547
27	Colorado	$45,778
28	Wisconsin	$46,539
29	Alabama	$46,861
30	Texas	$48,635
31	Idaho	$48,964
32	Delaware	$49,439
33	Oregon	$50,294
34	Nevada	$51,135
35	Michigan	$53,099
36	Indiana	$54,335
37	Utah	$58,679
38	Alaska	$65,370
38	Arizona	$68,902
40	Illinois	$74,632
41	California	$86,567
42	Massachusetts	$91,717
43	Connecticut	$94,399
44	Washington	$97,965
45	Hawaii	$98,330
46	Maryland	$101,852
47	New York	$102,824
48	Rhode Island	$126,947
49	Florida	$145,060
50	New Jersey	$343,914
	Average	$41,850

In 2019, Missouri, Virginia, West Virginia, South Dakota, and New Mexico reported the lowest capital and bridge expenditures. New Jersey, Florida, Rhode Island, New York, and Maryland reported the highest expenditures. In terms of disbursements per lane-mile, the largest percentage shifts from 2018 to 2019 were Idaho, Washington, and Arizona (which increased per lane-mile expenditures by 414%, 128%, and 103%, respectively) and West Virginia, Virginia, and Massachusetts (which decreased per lane-mile expenditures by 51%, 40%, and 39%). Some of 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



MAINTENANCE DISBURSEMENTS

Maintenance disbursements are the costs to perform routine upkeep, such as filling in potholes and repaving roads. Maintenance disbursements comprise about 17.4% of total disbursements, totaling $27.46 billion in 2019, up 13.8% from 2018 ($26.55 billion), the last time this assessment was completed.

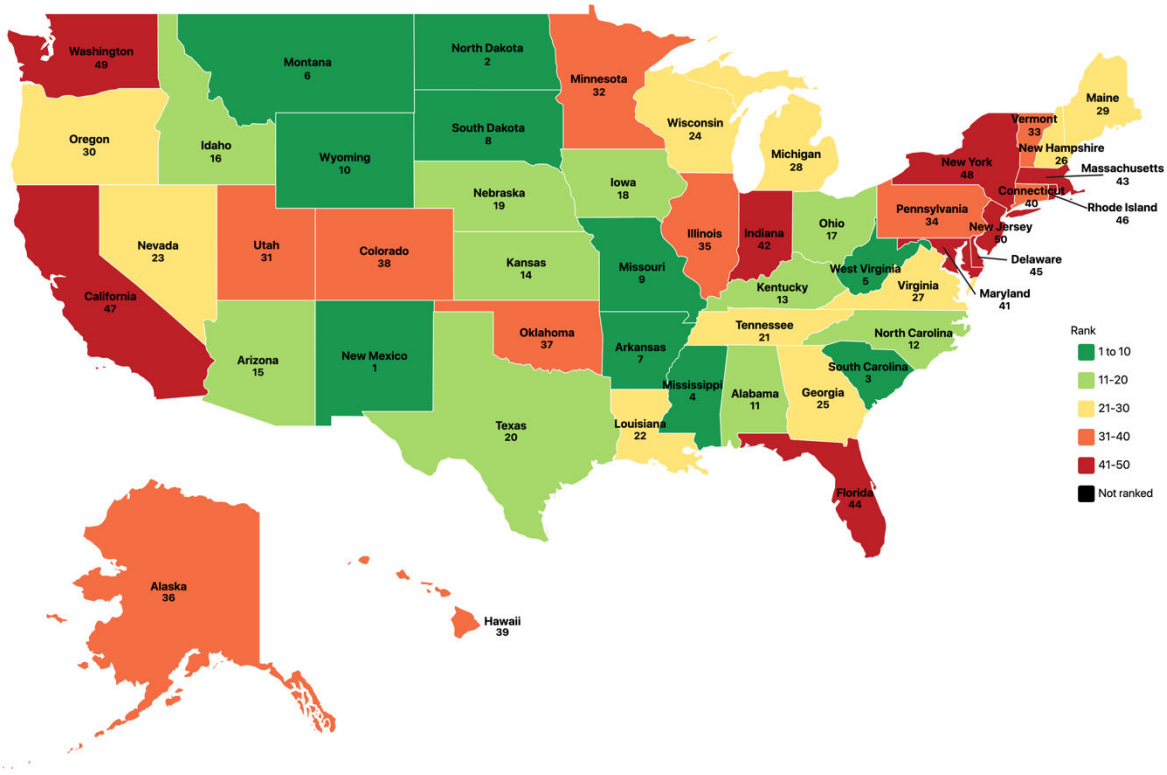
This year we measure maintenance disbursements in lane-miles. Last year, we measured maintenance disbursements per centerline-mile, lane-mile, and vehicle-miles traveled per lane-mile. The average 2019 per-mile disbursement is $14,570 (Table 8, Maintenance Disbursements by State, 2019, Figure 3), an increase of 3.3% from $14,111 in 2018. This follows a generally steady increased spending trend over the past decade. Since 2007, these per-mile disbursements have increased about 38%, while the Consumer Price Index (CPI) has increased about 23%.

TABLE 8: MAINTENANCE DISBURSEMENTS BY STATE, 2019

2019 Rank	State	Disbursement Per Lane-Mile
1	New Mexico	$1,790
1	North Dakota	$1,795
3	South Carolina	$4,255
4	Mississippi	$4,396
5	West Virginia	$4,711
6	Montana	$5,333
7	Arkansas	$5,455
8	South Dakota	$5,492
9	Missouri	$6,605
10	Wyoming	$6,743
11	Alabama	$6,919
12	North Carolina	$7,346
13	Kentucky	$7,824
14	Kansas	$7,988
15	Arizona	$8,087
16	Idaho	$9,162
17	Ohio	$9,672
18	Iowa	$9,920
19	Nebraska	$9,967
20	Texas	$10,623
21	Tennessee	$10,702
22	Louisiana	$11,115
23	Nevada	$11,573
24	Wisconsin	$11,752
25	Georgia	$12,498
26	New Hampshire	$13,096
27	Virginia	$13,757
28	Michigan	$13,849
29	Maine	$14,379
30	Oregon	$15,875
31	Utah	$16,137
32	Minnesota	$19,115
33	Vermont	$19,557
34	Pennsylvania	$20,336
35	Illinois	$22,031
36	Alaska	$22,595
37	Oklahoma	$23,030
38	Colorado	$23,270
38	Hawaii	$24,315
40	Connecticut	$27,101
41	Maryland	$28,199
42	Indiana	$32,138
43	Massachusetts	$32,714
44	Florida	$33,333
45	Delaware	$37,612
46	Rhode Island	$40,428
47	California	$44,710
48	New York	$50,148
49	Washington	$56,847
50	New Jersey	$86,698
	Average	$14,570

In 2019, New Mexico, North Dakota, South Carolina, Mississippi, and West Virginia reported the lowest overall maintenance expenditures. New Jersey, Washington, New York, California, and Rhode Island reported the highest overall expenditures. In terms of disbursements per lane-mile, the largest percentage shifts from 2018 to 2019 were Maryland (with a decrease of 17%) and Idaho, Arkansas, Washington, and New Mexico (with increases of 198%, 82%, 81%, and 81% respectively). Some of 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



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 compose about 6.2% of total disbursements, totaling $10.08 billion in 2019, an increase of 5.9% from $9.52 billion in 2018, the last time this assessment was completed.

This year, we measure administrative disbursements in lane-miles. Last year, we measured administrative disbursements in centerline-miles, lane-miles, and vehicle-miles traveled per lane mile. The average 2019 per lane-mile disbursement is $5,351 (Table 9, Administrative Disbursements per State, 2019, Figure 4). The average disbursement per lane-mile increased 5.8% from 2018 ($5,059 disbursement per lane-mile average), the last time this assessment was completed. This follows a generally steady increased spending trend over the past decade. Since 2007, these per-mile disbursements have increased about 25%, while the Consumer Price Index (CPI) has increased about 23%.[1]

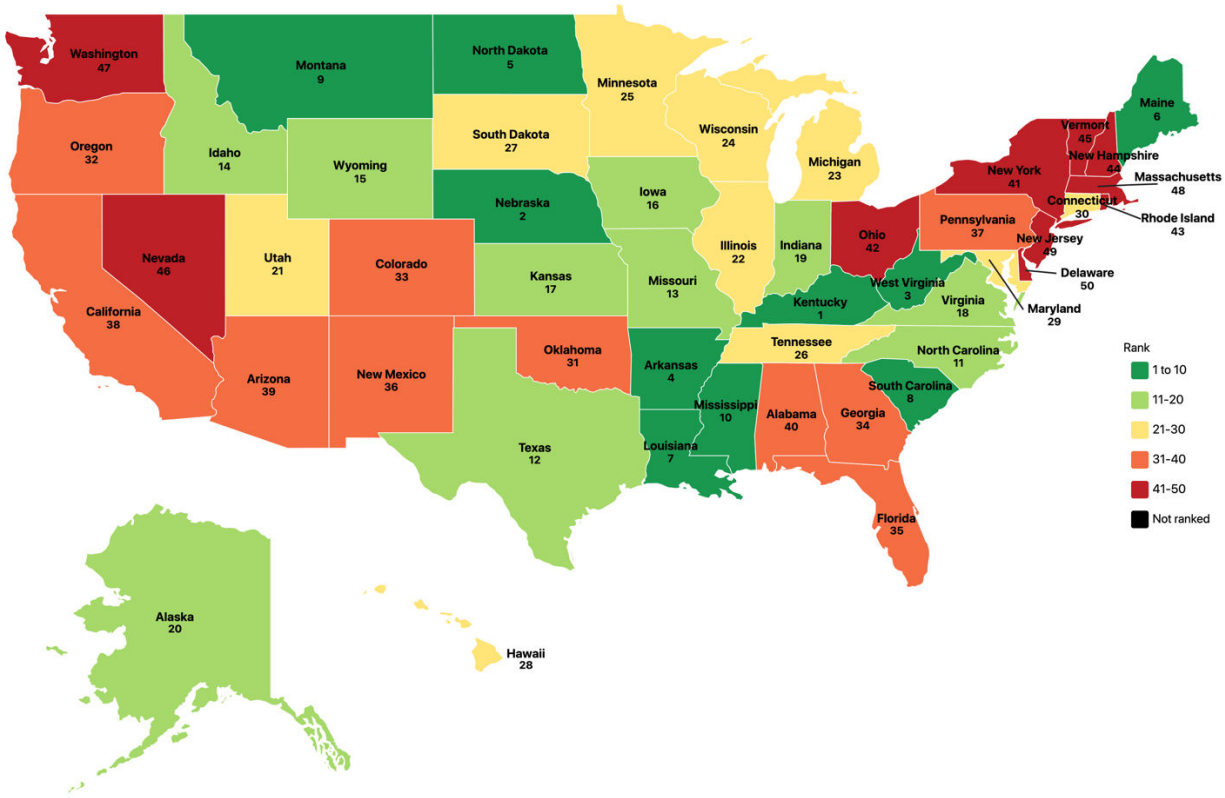
TABLE 9: ADMINISTRATIVE DISBURSEMENTS BY STATE, 2019

2019 Rank	State	Disbursement Per Lane-Mile
1	Kentucky	$553
2	Nebraska	$851
3	West Virginia	$932
4	Arkansas	$1,031
5	North Dakota	$1,177
6	Maine	$1,304
7	Louisiana	$1,377
8	South Carolina	$1,399
9	Montana	$1,752
10	Mississippi	$2,138
11	North Carolina	$2,163
12	Texas	$2,185
13	Missouri	$2,349
14	Idaho	$2,635
15	Wyoming	$2,671
16	Iowa	$3,012
17	Kansas	$3,363
18	Virginia	$3,720
19	Indiana	$3,740
20	Alaska	$3,885
21	Utah	$4,217
22	Illinois	$4,249
23	Michigan	$4,647
24	Wisconsin	$6,057
25	Minnesota	$6,199
26	Tennessee	$6,238
27	South Dakota	$6,327
28	Hawaii	$7,591
29	Maryland	$7,960
30	Connecticut	$8,090
31	Oklahoma	$8,099
32	Oregon	$8,703
33	Colorado	$9,703
34	Georgia	$9,807
35	Florida	$10,037
36	New Mexico	$10,660
37	Pennsylvania	$10,708
38	California	$11,129
38	Arizona	$11,236
40	Alabama	$11,364
41	New York	$12,138
42	Ohio	$12,342
43	Rhode Island	$12,711
44	New Hampshire	$12,990
45	Vermont	$13,545
46	Nevada	$13,617
47	Washington	$16,219
48	Massachusetts	$17,507
49	New Jersey	$20,309
50	Delaware	$29,864
	Average	$5,351

1 "U.S. Consumer Price Index Data from 2013 to 2019." https://www.usinflationcalculator.com.

In 2019, Kentucky, Nebraska, West Virginia, Arkansas, and North Dakota reported the lowest administrative expenditures. Delaware, New Jersey, Massachusetts, Washington, and Nevada reported the highest expenditures. In terms of disbursements per lane-mile, the largest percentage shifts from 2018 to 2019 were Idaho, Missouri, Ohio, and New Mexico (with increases of 252%. 132%, 129%, and 102% respectively) and California, Massachusetts, Alaska, and Georgia (with decreases of 28%, 28%, 26%, and 25%) respectively. Some administrative 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



The Difference Between Maintenance and Administrative Disbursements

Certain 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 New Jersey 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, of the two states, New Jersey has the worst ranking in Maintenance Disbursements and Delaware has the worst 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.

TOTAL DISBURSEMENTS

Since capital and bridge, maintenance, and administrative disbursements make up the majority of expenditures (73.8% in 2019), this report measures them individually and collectively. Total disbursements include those three funding categories, plus three others: Highway Law Enforcement and Safety, Interest, and Bond Retirement. In total, the 50 states disbursed about $157.8 billion for state-owned roads in 2019, a 3.9% increase from $151.8 billion in 2018, the last time this assessment was completed.

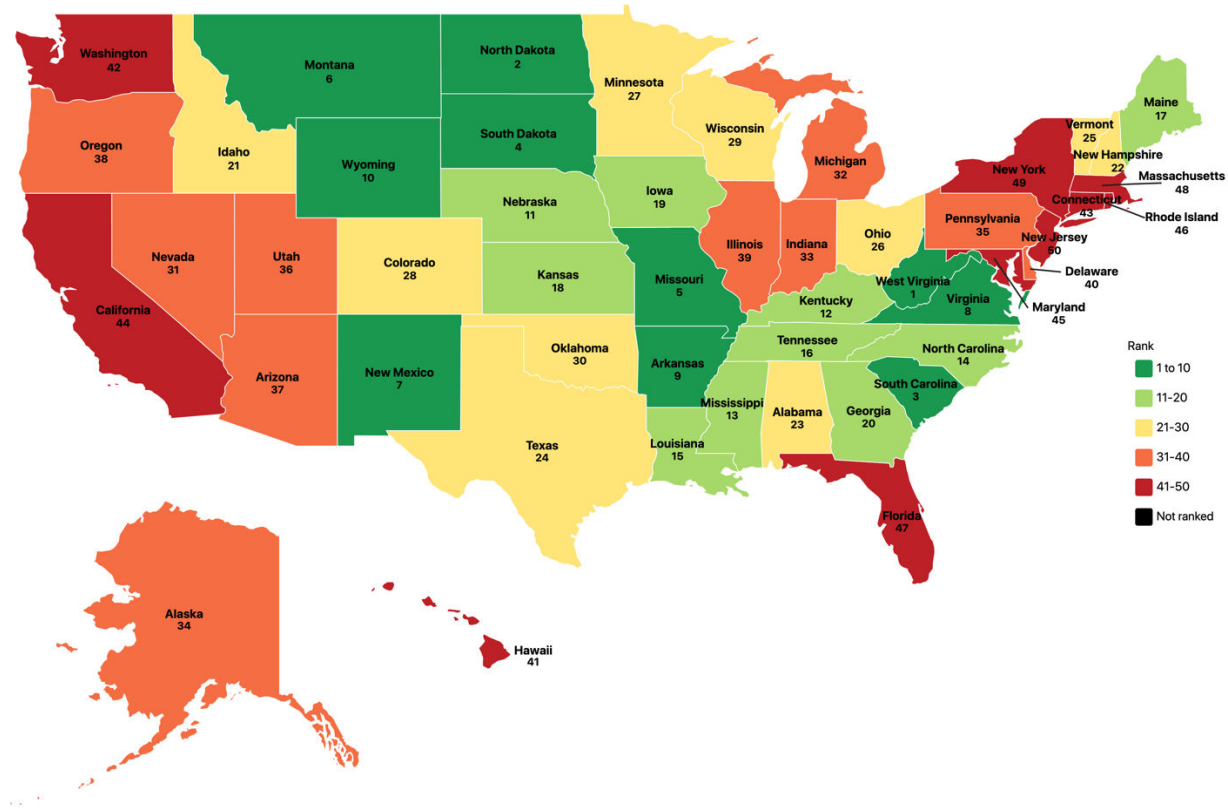
This year, we measured average state disbursements per lane-mile. Last year, we measured average state disbursement per centerline-mile, lane-mile, and vehicle-miles traveled per lane-mile. The average 2019 per lane-mile disbursement is $83,714, a 3.8% increase from $80,658 in 2018. This follows a generally steady increased spending trend over the past decade. Since 2007, these per lane-mile disbursements have increased about 42%, while the Consumer Price Index (CPI) has increased about 23%.

TABLE 10: TOTAL DISBURSEMENTS BY STATE, 2019

2019 Rank	State	Disbursement Per Lane-Mile
1	West Virginia	$20,884
2	North Dakota	$26,943
3	South Carolina	$27,479
4	South Dakota	$27,629
5	Missouri	$27,770
6	Montana	$31,131
7	New Mexico	$33,094
8	Virginia	$34,969
9	Arkansas	$35,410
10	Wyoming	$35,768
11	Nebraska	$36,173
12	Kentucky	$36,205
13	Mississippi	$36,473
14	North Carolina	$41,220
15	Louisiana	$41,800
16	Tennessee	$48,943
17	Maine	$49,204
18	Kansas	$50,253
19	Iowa	$63,471
20	Georgia	$66,994
21	Idaho	$68,482
22	New Hampshire	$71,214
23	Alabama	$74,015
24	Texas	$75,153
25	Vermont	$78,883
26	Ohio	$80,409
27	Minnesota	$80,561
28	Colorado	$84,554
29	Wisconsin	$85,343
30	Oklahoma	$88,266
31	Nevada	$90,048
32	Michigan	$92,547
33	Indiana	$94,623
34	Alaska	$98,683
35	Pennsylvania	$102,329
36	Utah	$104,840
37	Arizona	$108,044
38	Oregon	$108,880
39	Illinois	$123,522
40	Delaware	$148,736
41	Hawaii	$155,728
42	Washington	$202,823
43	Connecticut	$205,802
44	California	$206,924
45	Maryland	$213,631
46	Rhode Island	$225,118
47	Florida	$242,597
48	Massachusetts	$345,947
49	New York	$373,555
50	New Jersey	$1,136,255
	Average	$83,714

In 2019, West Virginia, North Dakota, South Carolina, South Dakota, and Missouri reported the lowest expenditures. New Jersey, New York, Massachusetts, Florida, and Rhode Island reported the highest per lane-mile expenditures. In terms of disbursements per lane-mile, the largest percentage shifts from 2018 to 2019 were Idaho, Washington, and New Jersey (with increases of 285%, 100%, and 99%, respectively) and West Virginia, Virginia, and Louisiana (with decreases of 35%, 31%, and 25% respectively). Some of the disbursements per state-controlled lane-mile can vary widely from year to year reflecting funding actions and project schedules.

FIGURE 5: TOTAL DISBURSEMENTS PER STATE-CONTROLLED LANE-MILE



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 2019, about 2% of U.S. rural Interstates—586 miles out of 29,232—were reported to be in poor condition. (Table 11, Percent Rural Interstate Mileage in Poor Condition, 2019, Figure 6.) This is a slight improvement from 2018, the last time this assessment was completed, when 598 miles out of 29,186 (about 2.04%) of rural Interstate pavement was rated poor.

Between 2018 and 2019, the percentage of poor rural Interstate mileage decreased in 22 states, increased in 19 states and remained about the same in seven states. The percent of poor mileage changed less than one percentage point in 42 of the states. Alaska, New Jersey, and Wisconsin led the states in decreasing poor-condition mileage (by 3.61, 2.22, and 1.18 percentage points, respectively) while South Carolina, Massachusetts, and Maine led the states in increasing poor-condition mileage (by 3.48, 1.61, and 1.08, respectively).

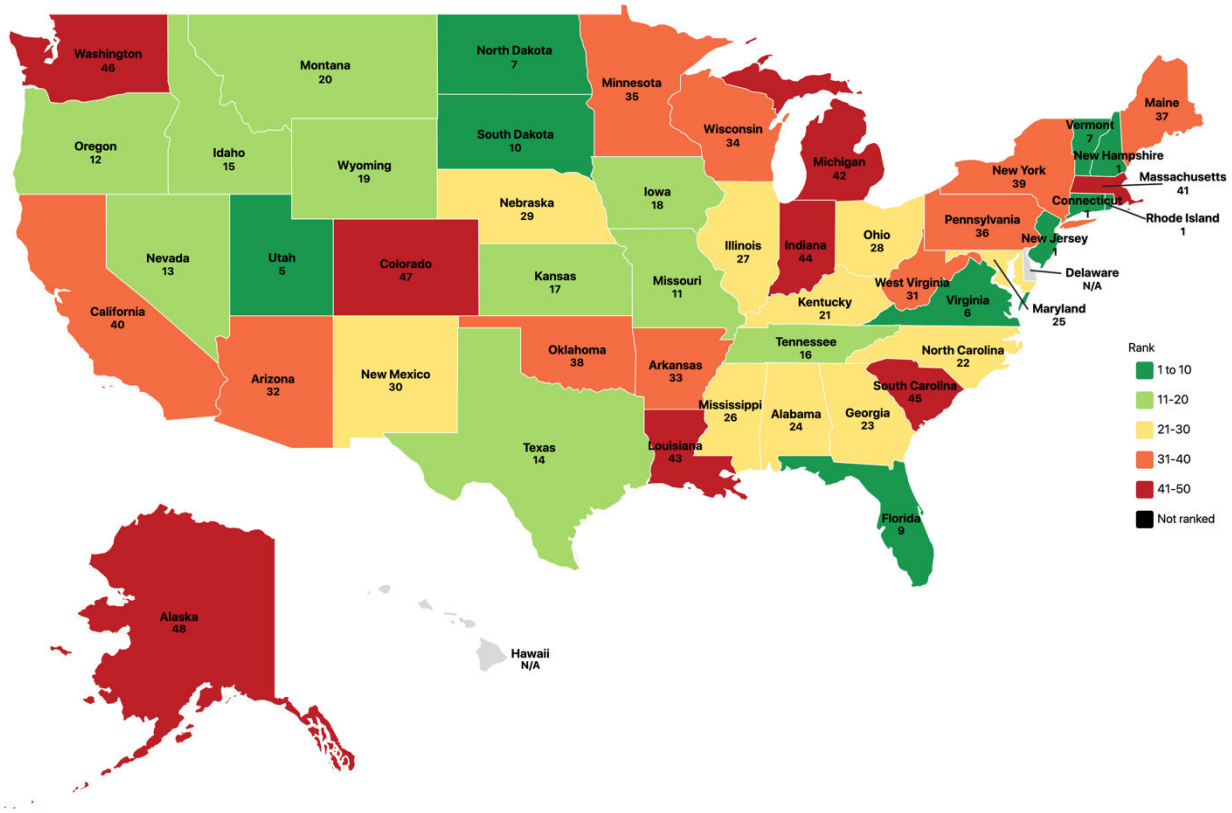
TABLE 11: PERCENT RURAL INTERSTATE MILEAGE IN POOR CONDITION, 2019

2019 Rank	State	Percent Urban Interstate Mileage in Poor Condition
1	Connecticut	0.00
1	New Hampshire	0.00
1	New Jersey	0.00
1	Rhode Island	0.00
5	Utah	0.29
6	Virginia	0.33
7	North Dakota	0.39
8	Vermont	0.39
9	Florida	0.42
10	South Dakota	0.51
11	Missouri	0.59
12	Oregon	0.60
13	Nevada	0.66
14	Texas	0.75
15	Idaho	0.77
16	Tennessee	0.78
17	Kansas	0.78
18	Iowa	0.98
19	Wyoming	0.99
20	Montana	1.00
21	Kentucky	1.12
22	North Carolina	1.25
23	Georgia	1.30
24	Alabama	1.40
25	Maryland	1.41
26	Mississippi	1.73
27	Illinois	1.77
28	Ohio	1.87
29	Nebraska	1.93
30	New Mexico	2.02
31	West Virginia	2.19
32	Arizona	2.20
33	Arkansas	2.28
34	Wisconsin	2.34
35	Minnesota	2.38
36	Pennsylvania	2.44
37	Maine	2.51
38	Oklahoma	2.54
38	New York	2.63
40	California	3.05
41	Massachusetts	3.17
42	Michigan	3.23
43	Louisiana	3.46
44	Indiana	4.08
45	South Carolina	4.21
46	Washington	5.36
47	Colorado	6.17
48	Alaska	8.17
	Delaware	N/A
	Hawaii	N/A
	Average	2.00

Rural Interstate mileage in poor condition varies widely by state. In 2019, four states reported no poor mileage (Connecticut, New Hampshire, New Jersey, and Rhode Island) and 15 more reported less than 1% poor mileage. On the other hand, three states (Alaska, Colorado, and Washington) reported more than 5% poor mileage. The three states together have about 7% of U.S. rural Interstate mileage (2,068 miles of 29,232) but have 25% 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, 2019



URBAN INTERSTATE PAVEMENT CONDITION

The urban Interstates consist of major multi-lane highways in urbanized areas. The pavement condition of the urban Interstate system improved from 2018 to 2019, decreasing from 5.23% in poor condition to 4.97% (Table 12, Percent Urban Interstate Mileage in Poor Condition, 2019, Figure 7). In 2019, 947 of the 19,069 miles of urban Interstates were rated as poor, as compared to 1,003 poor-condition miles out of 19,161 miles in 2018, the last time this assessment was completed.

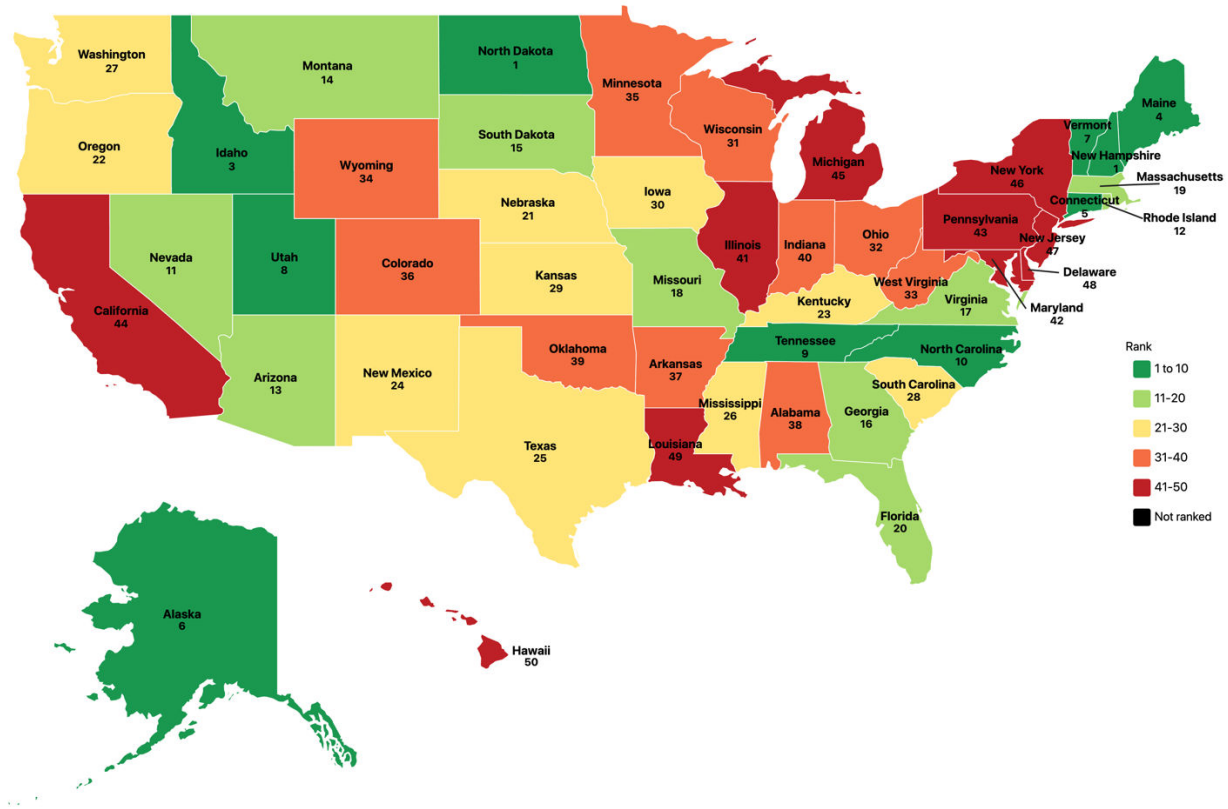
Between 2018 and 2019, the percentage of poor urban Interstate mileage increased in 21 states, decreased in 22 states and remained about the same in seven states. The percent of poor mileage changed less than one percentage point in 36 of the states. Washington and Wyoming led the states in reducing poor-condition mileage (by 2.69 and 31.93 points, respectively) while Hawaii and New York led the states in increasing poor-condition mileage (by 3.63 and 2.04 points, respectively).

The condition of urban Interstate miles also varies widely by state. In 2019, two states (New Hampshire and North Dakota) reported no poor mileage. The bottom four states (Hawaii, Louisiana, Delaware, and New Jersey) reported more than 10% of their mileage to be in poor condition. These four states, collectively, only have about 4.6% of the urban Interstate mileage in the U.S. (875 of 19,069 miles) but have over 11% of the poor mileage (105 of 947 miles).

TABLE 12: PERCENT URBAN INTERSTATE MILEAGE IN POOR CONDITION, 2019

2019 Rank	State	Percent Urban Interstate Mileage in Poor Condition
1	New Hampshire	0.00
1	North Dakota	0.00
3	Idaho	1.08
4	Maine	1.15
5	Connecticut	1.26
6	Alaska	1.27
7	Vermont	1.56
8	Utah	1.58
9	Tennessee	1.80
10	North Carolina	1.80
11	Nevada	1.84
12	Rhode Island	1.92
13	Arizona	2.01
14	Montana	2.04
15	South Dakota	2.27
16	Georgia	2.68
17	Virginia	2.69
18	Missouri	2.79
19	Florida	2.83
20	Nebraska	2.90
21	Oregon	2.99
22	Kentucky	3.02
23	New Mexico	3.21
24	Texas	3.43
25	Mississippi	3.56
26	Massachusetts	3.54
27	Washington	3.58
28	South Carolina	3.62
29	Kansas	3.85
30	Iowa	4.00
31	Wisconsin	4.40
32	Ohio	4.40
33	West Virginia	4.68
34	Wyoming	4.72
35	Minnesota	5.85
36	Colorado	5.92
37	Arkansas	6.13
38	Alabama	6.25
38	Oklahoma	6.25
40	Indiana	6.31
41	Illinois	6.39
42	Maryland	6.80
43	Pennsylvania	7.78
44	California	8.08
45	Michigan	8.17
46	New York	9.34
47	New Jersey	10.08
48	Delaware	10.53
49	Louisiana	12.41
50	Hawaii	23.64
	Average	4.97

FIGURE 7: PERCENT OF URBAN INTERSTATES IN POOR CONDITION, 2019



RURAL OTHER PRINCIPAL ARTERIAL PAVEMENT CONDITION

Rural Other Principal Arterials (ROPA) are two- to four-lane roadways connecting different cities or regions. The condition of major rural arterials improved substantially from 2018 to 2019, by about 0.05 percentage points. Overall, about 1.15% of the ROPA system—1,027 miles out of 89,287—was reported to be in poor condition (Table 13, Percent Rural Other Principal Arterial Mileage in Poor Condition, 2019, Figure 8). This compares with about 1.23% (1,068 of 88,926 miles) in 2018, 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, roads near cities are often reclassified from rural to urban. If these roads were in good condition already, their reclassification has the effect of increasing the percentage of rural roads in poor condition.)

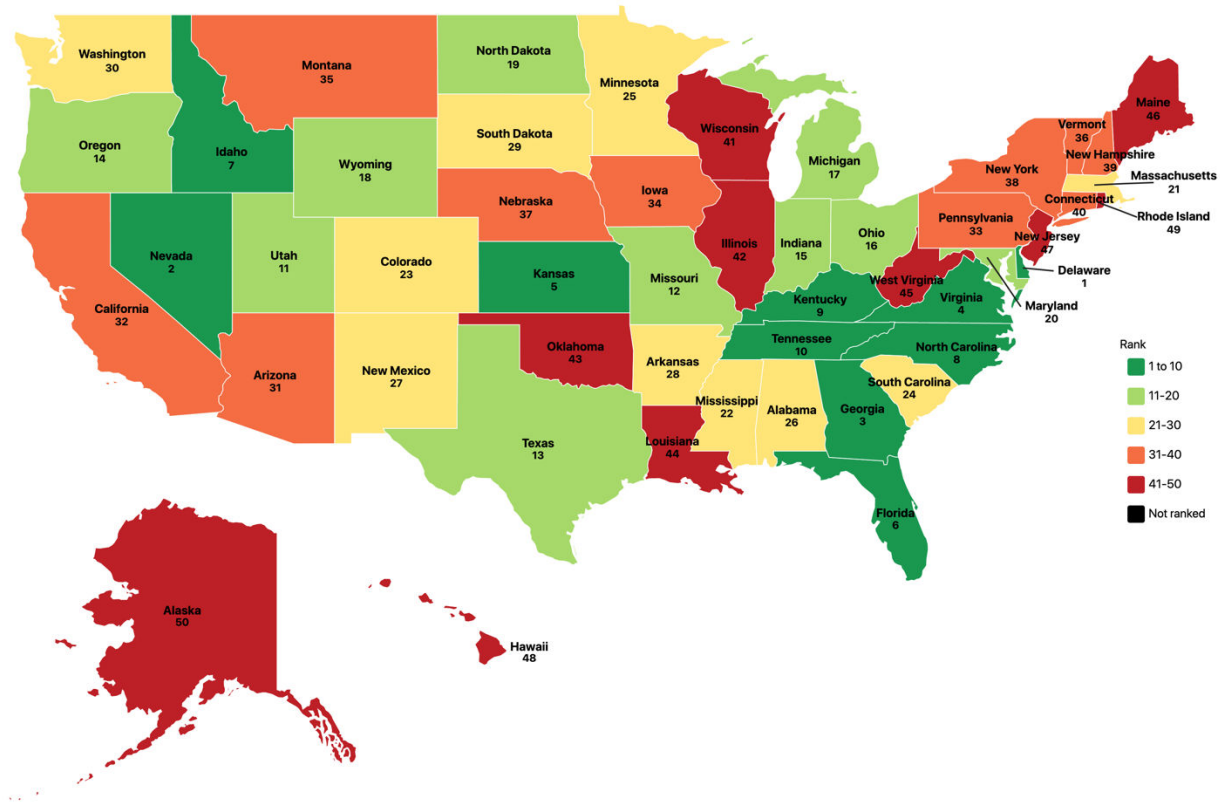
Between 2018 and 2019, the percentage of ROPA decreased in 22 states, increased in 21 states, and remained about the same in seven states. The percent of poor mileage changed less than 1% in 44 of the states. Of the remaining six states, three had changes of less than 2%. Alaska and Rhode Island led the states in reducing poor condition (by 7.39 and 2.20 points respectively) while West Virginia led the states in increasing poor condition mileage (by 2.04 points).

TABLE 13: PERCENT RURAL OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2019

2019 Rank	State	Percent Rural Other Principal Arterial Mileage in Poor Condition
1	Delaware	0.00
2	Nevada	0.07
3	Georgia	0.20
4	Virginia	0.24
5	Kansas	0.34
6	Florida	0.34
7	Idaho	0.35
8	North Carolina	0.39
9	Kentucky	0.41
10	Tennessee	0.41
11	Utah	0.43
12	Missouri	0.48
13	Texas	0.48
14	Oregon	0.49
15	Indiana	0.61
16	Ohio	0.66
17	Michigan	0.70
18	Wyoming	0.71
19	North Dakota	0.92
20	Maryland	0.93
21	Massachusetts	0.95
22	Mississippi	0.95
23	Colorado	0.97
24	South Carolina	1.04
25	Minnesota	1.08
26	Alabama	1.08
27	New Mexico	1.10
28	Arkansas	1.12
29	South Dakota	1.12
30	Washington	1.21
31	Arizona	1.22
32	California	1.31
33	Pennsylvania	1.39
34	Iowa	1.45
35	Montana	1.48
36	Vermont	1.52
37	Nebraska	1.53
38	New York	1.55
39	New Hampshire	1.55
40	Connecticut	1.64
41	Wisconsin	1.71
42	Illinois	2.25
43	Oklahoma	2.43
44	Louisiana	2.67
45	West Virginia	4.06
46	Maine	6.07
47	New Jersey	6.25
48	Hawaii	7.69
49	Rhode Island	11.34
50	Alaska	15.70
	Average	1.15

The condition of ROPA miles varies widely by state. One state, Delaware, reported zero poor condition ROPA mileage in 2018. Twenty-two additional states reported 1% or less ROPA mileage in poor condition. On the other hand, five states (Alaska, Rhode Island, Hawaii, New Jersey, and Maine) reported more than 5% of their ROPA mileage to be in poor condition. These five states have 1.8% of the U.S. ROPA mileage, but 14.7% of the mileage that is in poor condition. Alaska's ROPA system has the most significant problem, accounting for 7.4% of all the poor ROPA mileage in the country.

FIGURE 8: PERCENT OF RURAL OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2019



URBAN OTHER PRINCIPAL ARTERIAL PAVEMENT CONDITION

Urban Other Principal Arterials (UOPA) are four- to eight-lane roadways connecting different parts of an urban region. Overall, about 13.52% of the UOPA system—8,660 miles out of 64,054—was reported to be in poor condition (Table 14, Percent Urban Other Principal Arterial Mileage in Poor Condition, 2019, Figure 9). This is a 0.54-point decrease from 2018 where 14.06% or 8,985 miles out of 63,903 miles were in poor condition. Overall urban arterials are in much worse condition than rural arterials, rural Interstates, or urban Interstates with the percent in poor condition at 1.15%, 2.00% and 4.97% respectively.

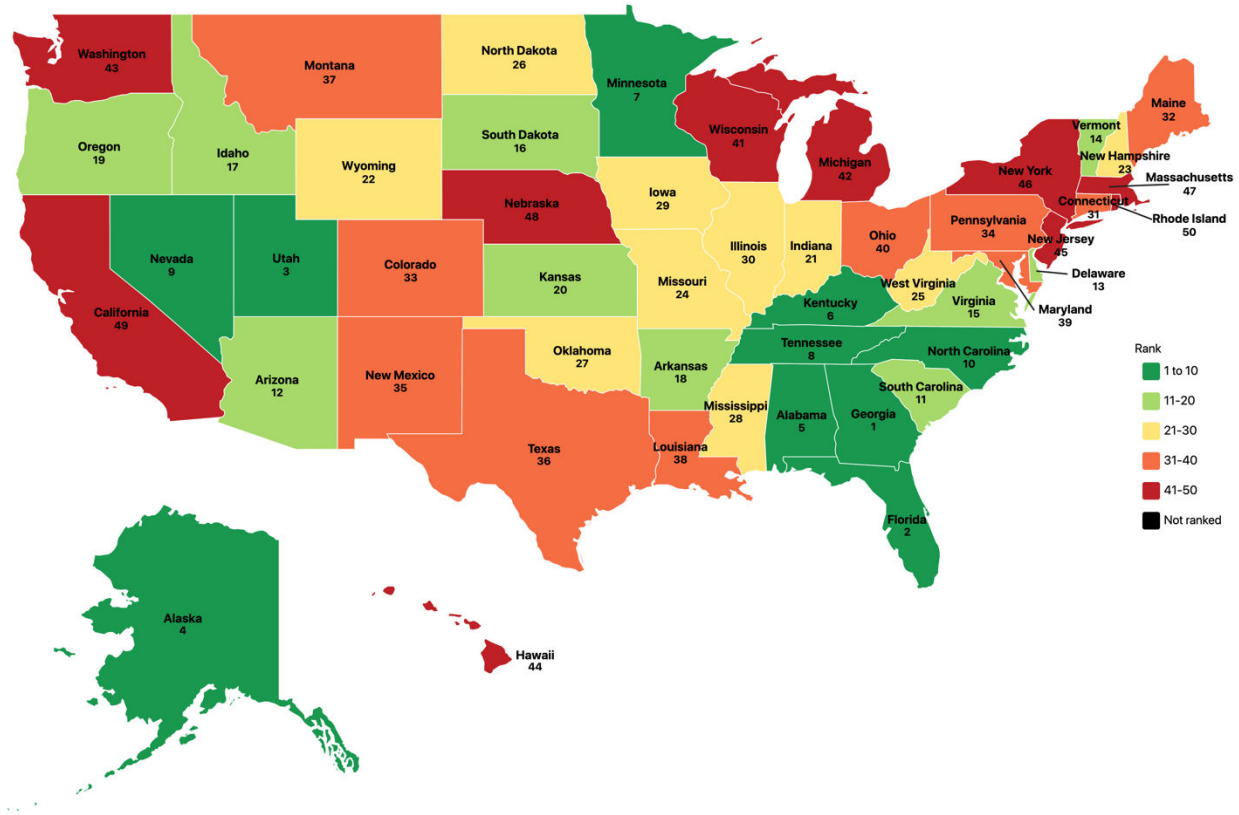
The percent UOPA mileage in poor condition varies drastically by state, from Georgia with 1.70% to Rhode Island at 30.82%. Ten states reported less than 5% of UOPA miles in poor condition. On the other hand, six states (Rhode Island, California, Nebraska, Massachusetts, New York, and New Jersey) reported more than 20% of their UOPA mileage to be in poor condition. These six states have 21.3% of the U.S. UOPA mileage, but 42.7% of the mileage that is in poor condition.

TABLE 14: PERCENT URBAN OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2019

2019 Rank	State	Percent Urban Other Principal Arterial Mileage in Poor Condition
1	Georgia	1.70
2	Florida	1.95
3	Utah	3.06
4	Alaska	3.58
5	Alabama	4.02
6	Kentucky	4.37
7	Minnesota	4.62
8	Tennessee	4.63
9	Nevada	4.76
10	North Carolina	4.93
11	South Carolina	5.28
12	Arizona	5.54
13	Delaware	5.68
14	Vermont	5.73
15	Virginia	6.07
16	South Dakota	6.26
17	Idaho	6.30
18	Arkansas	6.50
19	Oregon	6.85
20	Kansas	6.88
21	Indiana	6.98
22	Wyoming	8.30
23	New Hampshire	8.50
24	Missouri	8.66
25	West Virginia	8.85
26	North Dakota	9.19
27	Oklahoma	9.34
28	Mississippi	10.31
29	Iowa	10.45
30	Illinois	11.88
31	Connecticut	11.38
32	Maine	11.67
33	Colorado	11.89
34	Pennsylvania	13.32
35	New Mexico	13.98
36	Texas	14.05
37	Montana	14.39
38	Louisiana	15.90
39	Maryland	16.29
40	Ohio	16.56
41	Wisconsin	16.84
42	Michigan	16.97
43	Washington	17.40
44	Hawaii	18.30
45	New Jersey	23.13
46	New York	23.31
47	Massachusetts	23.91
48	Nebraska	28.07
49	California	30.63
50	Rhode Island	30.82
	Average	13.52

Between 2018 and 2019, most states saw minor changes in UOPA pavement condition. Twenty-eight states saw decreases/increases of poor condition mileage of one percentage point or less, with 12 states seeing decreases and 16 states seeing increases. On the other hand, eight states had changes of more than 2% in their mileage in poor condition. The percentage of the UOPA system in poor condition in West Virginia, Indiana, and California increased (by 3.80, 2.46, and 2.04 points, respectively), while the poor mileage in Wyoming, Washington, and Alaska decreased (by 34.38, 4.34, and 4.33 points, respectively). Three states, Rhode Island, California, and Nebraska, have 11% of the U.S. UOPA mileage but 24% of the UOPA mileage that is in poor condition.

FIGURE 9: PERCENT OF URBAN OTHER PRINCIPAL ARTERIAL MILEAGE IN POOR CONDITION, 2019



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.

The past two *Annual Highway Report*s use data directly from the INRIX *Global Traffic Scorecard*. This report uses 2020 congestion data. The metric selected was the "peak hours spent in congestion per auto commuter annually." This measure is taken directly from the INRIX *Scorecard* and uses real-time traffic data. For 2020, Inrix defines "hours lost in congestion" as, "The total number of hours lost in congestion during peak commute periods compared to free-flow conditions." (The INRIX data, which are computed only for selected cities, are extended to all U.S. metropolitan areas and then rolled up by state. See the Appendix for details.)

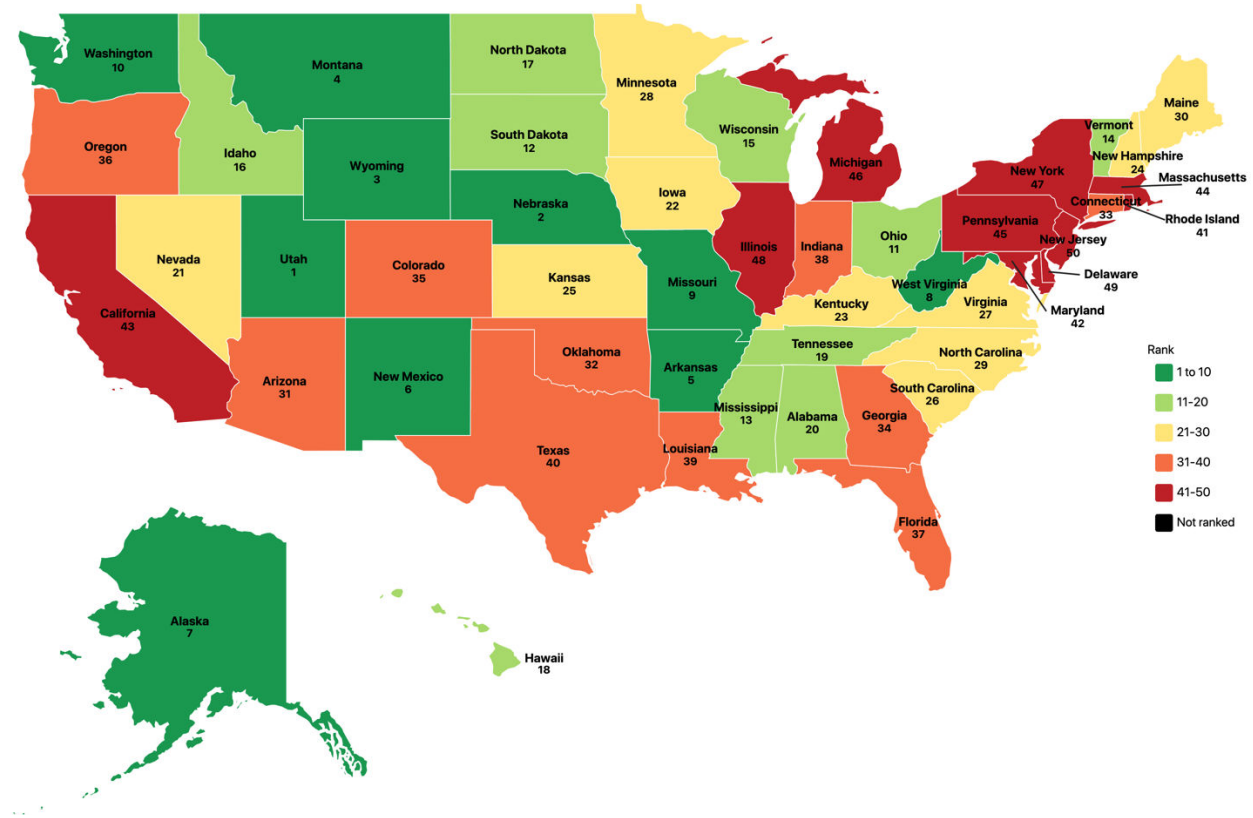
TABLE 15: ANNUAL PEAK HOURS SPENT IN CONGESTION PER AUTO COMMUTER, 2020

2020 Rank	State	Peak Hours Spent in Congestion per Auto Commuter
1	Utah	1.75
2	Nebraska	2.88
3	Wyoming	4.53
4	Montana	4.90
5	Arkansas	5.16
6	New Mexico	5.19
7	Alaska	5.38
8	West Virginia	5.58
9	Missouri	5.60
10	Washington	5.65
11	Ohio	5.68
12	South Dakota	5.83
13	Mississippi	5.91
14	Vermont	6.23
15	Wisconsin	6.25
16	Idaho	6.43
17	North Dakota	6.60
18	Hawaii	6.69
19	Tennessee	6.76
20	Alabama	7.19
21	Nevada	7.28
22	Iowa	7.69
23	Kentucky	7.91
24	New Hampshire	8.10
25	Kansas	8.42
26	South Carolina	8.45
27	Virginia	8.46
28	Minnesota	8.67
29	North Carolina	10.74
30	Maine	10.75
31	Arizona	11.21
32	Oklahoma	11.68
33	Connecticut	14.49
34	Georgia	14.75
35	Colorado	16.52
36	Oregon	17.01
37	Florida	17.58
38	Indiana	17.96
39	Louisiana	20.35
40	Texas	23.42
41	Rhode Island	23.70
42	Maryland	25.04
43	California	27.17
44	Massachusetts	33.63
45	Pennsylvania	35.53
46	Michigan	42.07
47	New York	53.60
48	Illinois	64.01
49	Delaware	75.29
50	New Jersey	86.14
	Average	23.83

In 2020, the average annual peak hours spent in congestion in the urbanized areas across the United States was 23.83 hours (see Table 15, Annual Peak Hours Spent in Congestion per Auto Commuter, 2020, Figure 10). Annual peak hours spent in congestion range from 1.75 in Idaho to 86.14 in New Jersey. The congestion problem is primarily concentrated in the major cities of just a few states.

Between 2019 and 2020 overall congestion improved in 46 states and worsened in four. Commuters in 28 states spent fewer than 10 hours sitting in peak-hour congestion in 2020. Commuters in 17 other states spent less than 40 hours sitting in peak-hour congestion. Commuters in the bottom four states (New Jersey, Delaware, Illinois, and New York) spent more than 50 hours per year in traffic congestion.

FIGURE 10: PEAK HOURS SPENT IN AUTO CONGESTION PER COMMUTER, 2020



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 2020" summary from the NBI would represent, on average, bridge condition as of 2019.

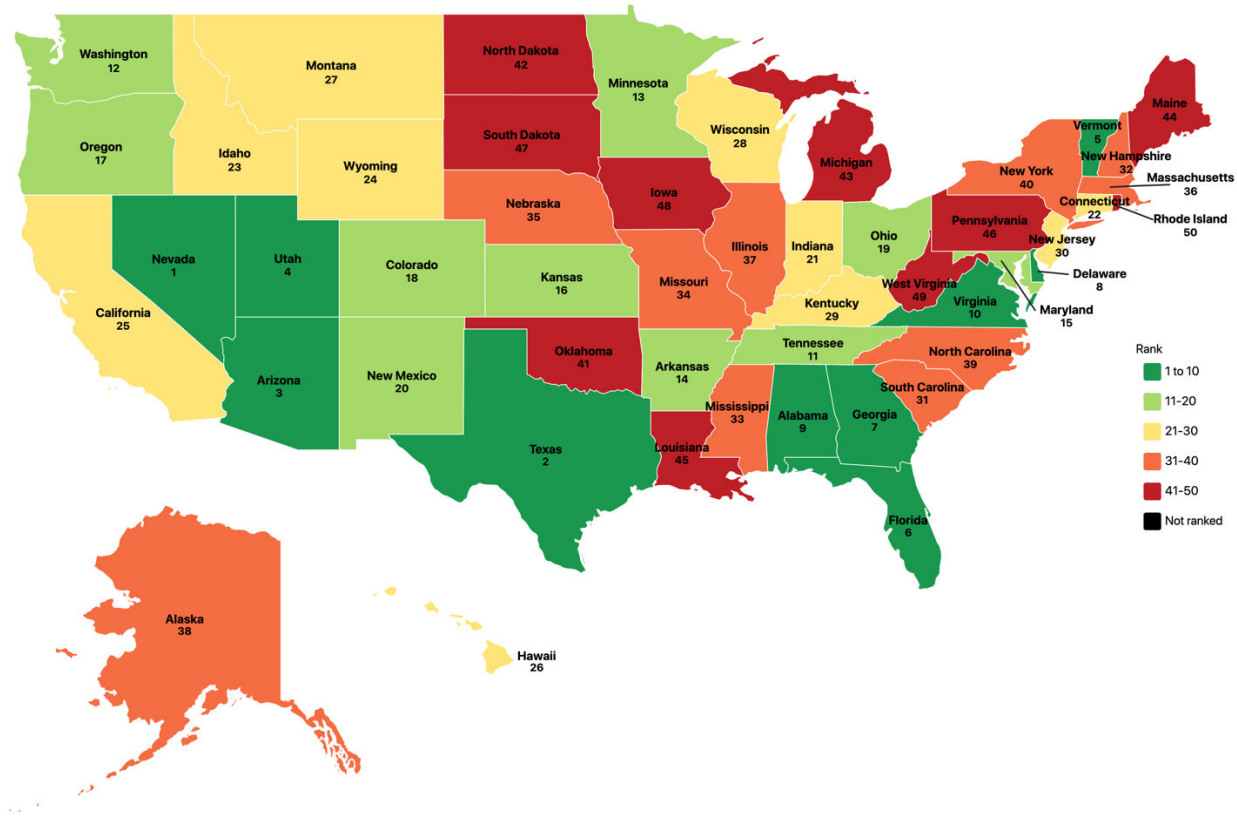
The condition of the nation's highway bridges in 2020 improved slightly from 2019, the last time this assessment was completed. Of the 614,490 highway bridges reported, 45,861 (7.46%) were rated deficient for 2020 (Table 16, Percent Structurally Deficient Bridges, 2020, Figure 11). This represents a 0.16% improvement over 2019 when 46,771 of 613,517 (7.62%) were rated as deficient.

Nevada, Texas, and Arizona reported less than 2% of their bridges to be structurally deficient (at 1.28%, 1.33%, and 1.65% respectively). Rhode Island and West Virginia reported more than 20% of their bridges as structurally deficient (at 22.34% and 21.00% respectively). The majority of states (35) reported at least some improvement in the percentage of structurally deficient bridges between 2019 and 2020, with Wyoming and Pennsylvania seeing the most improvement (1.31 and 1.30 percentage points, respectively). Of the five states that reported a higher percentage of deficient bridges, only one, Hawaii, saw an increase of more than one percentage point (1.12%).

TABLE 16: PERCENT STRUCTURALLY DEFICIENT BRIDGES, 2020

2020 Rank	State	Percent Structurally Deficient Bridges
1	Nevada	1.28
2	Texas	1.33
3	Arizona	1.65
4	Utah	2.15
5	Vermont	2.41
6	Florida	2.88
7	Georgia	2.95
8	Delaware	3.19
9	Alabama	4.05
10	Virginia	4.36
11	Tennessee	4.39
12	Washington	4.62
13	Minnesota	4.73
14	Arkansas	4.85
15	Maryland	5.05
16	Kansas	5.13
16	Oregon	5.19
18	Colorado	5.30
19	Ohio	5.36
20	New Mexico	5.48
21	Indiana	6.05
22	Connecticut	6.34
23	Idaho	6.57
24	Wyoming	6.90
25	California	6.97
26	Hawaii	7.03
27	Montana	7.20
28	Wisconsin	7.20
29	Kentucky	7.24
30	New Jersey	7.80
31	South Carolina	8.44
32	New Hampshire	8.51
33	Mississippi	8.72
34	Missouri	8.77
35	Nebraska	8.84
36	Massachusetts	8.96
37	Illinois	8.97
38	Alaska	9.09
39	North Carolina	9.31
40	New York	9.95
41	Oklahoma	10.17
42	North Dakota	10.67
43	Michigan	10.82
44	Maine	12.76
45	Louisiana	13.20
46	Pennsylvania	15.28
47	South Dakota	17.02
48	Iowa	19.03
49	West Virginia	21.00
50	Rhode Island	22.34
	Average	7.46

FIGURE 11: PERCENT STRUCTURALLY DEFICIENT BRIDGES, 2020



OVERALL FATALITY RATE

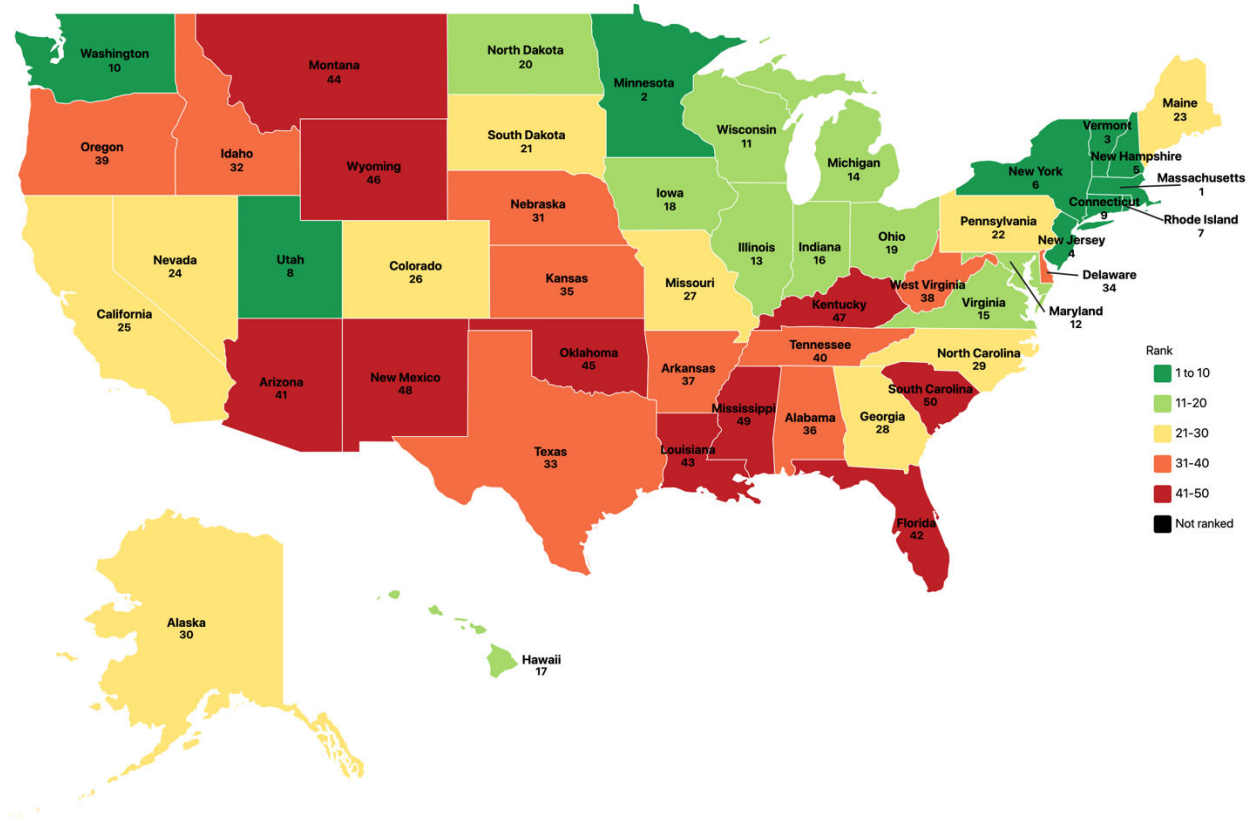
The fatality rate is an important overall measure of each state's road performance. The overall fatality rate measures fatalities on all roadways in the state as fatalities per 100 million vehicle-miles. The nation's highway fatality rate improved from 1.13 in 2018, the last time this assessment was completed, to 1.11 in 2019, (Table 17, Overall Fatality Rate per 100 Million Vehicle-Miles, 2019, Figure 12). In 2019, 36,073 fatalities were reported, fewer than the 36,529 fatalities reported in 2018, as VMT (vehicle-miles of travel) increased to 3.28 trillion from 3.26 trillion in 2018.

For 2019, Massachusetts reported the overall lowest fatality rate, 0.51, while South Carolina reported the highest, 1.73. Most states (32 of 50) reported a decrease in their fatality rate compared to 2018, led by Wyoming, New Hampshire, and Alaska (which improved by 0.38, 0.34, and 0.32 points respectively). Three states saw their fatality rates stay the same. Fifteen states saw their fatality rates increase, led by Wyoming, Delaware, and Maine (reporting increases of 0.38, 0.20, and 0.13 points, respectively).

TABLE 17: OVERALL FATALITY RATE PER 100 MILLION VEHICLE-MILES, 2019

2019 Rank	State	Fatality Rate Per 100 Million Vehicle-Miles
1	Massachusetts	0.51
2	Minnesota	0.60
3	Vermont	0.64
4	New Jersey	0.71
5	New Hampshire	0.73
6	New York	0.75
7	Rhode Island	0.75
8	Utah	0.75
9	Connecticut	0.79
10	Washington	0.83
11	Wisconsin	0.85
12	Maryland	0.87
13	Illinois	0.94
14	Michigan	0.96
15	Virginia	0.97
16	Indiana	0.98
17	Hawaii	0.98
18	Iowa	1.00
19	Ohio	1.01
20	North Dakota	1.02
21	South Dakota	1.03
22	Pennsylvania	1.03
23	Maine	1.06
24	Nevada	1.06
25	California	1.06
26	Colorado	1.09
27	Missouri	1.11
28	Georgia	1.12
29	North Carolina	1.12
30	Alaska	1.14
31	Nebraska	1.17
32	Idaho	1.24
33	Texas	1.25
34	Delaware	1.29
35	Kansas	1.29
36	Alabama	1.30
37	Arkansas	1.36
38	West Virginia	1.36
39	Oregon	1.37
40	Tennessee	1.37
41	Arizona	1.40
42	Florida	1.41
43	Louisiana	1.42
44	Montana	1.43
45	Oklahoma	1.43
46	Wyoming	1.44
47	Kentucky	1.48
48	New Mexico	1.53
49	Mississippi	1.56
50	South Carolina	1.73
	Average	1.11

FIGURE 12: OVERALL FATALITY RATE PER 100 MILLION VEHICLE-MILES, 2019



RURAL FATALITY RATE

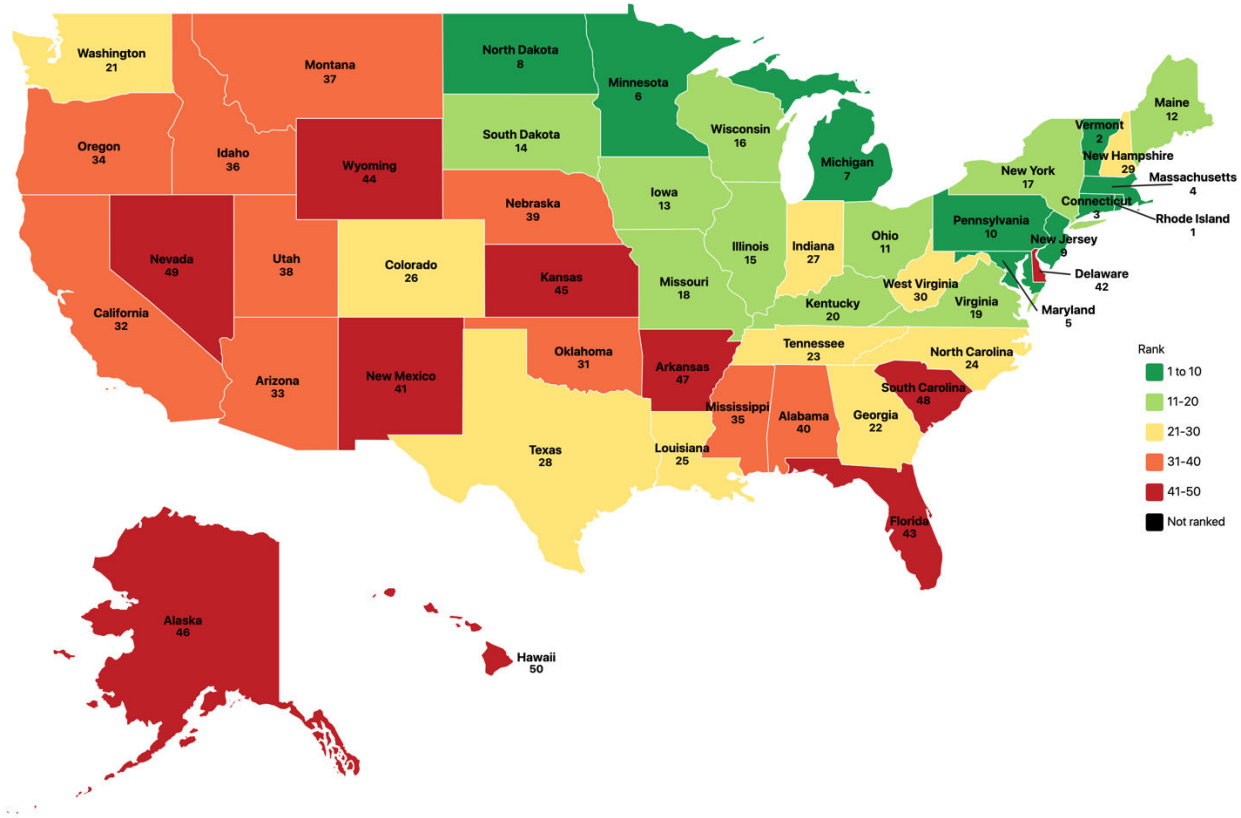
The rural fatality rate measures fatalities on all rural arterials in the state. The nation's rural highway fatality rate improved from 1.36 in 2018 to 1.26 in 2019 (Table 18, Rural Fatality Rate per 100 Million Vehicle-Miles, 2019, Figure 13). In 2019, 6,273 rural fatalities were reported, fewer than the 6,654 rural fatalities reported in 2018, as rural VMT (vehicle-miles of travel) increased to 0.50 trillion from 0.49 trillion in 2018.

For 2019, Rhode Island reported the lowest rural fatality rate, 0.17, while Hawaii reported the highest, 4.86. Twenty-nine states reported a decrease in their rural fatality rate compared to 2018, led by North Carolina, Hawaii, and Rhode Island (which improved 2.41, 1.74, and 1.15 points respectively). Twenty-one states saw their fatality rate increase, led by Nevada, Utah, and Nebraska (at 0.56, 0.51, and 0.40 points, respectively).

TABLE 18: FATALITY RATE PER 100 MILLION RURAL VEHICLE-MILES, 2019

2019 Rank	State	Fatality Rate Per 100 Million Rural Vehicle-Miles
1	Rhode Island	0.17
2	Vermont	0.39
3	Connecticut	0.40
4	Massachusetts	0.48
5	Maryland	0.57
6	Minnesota	0.60
7	Michigan	0.66
8	North Dakota	0.73
9	New Jersey	0.75
10	Pennsylvania	0.75
10	Ohio	0.78
12	Maine	0.82
13	Iowa	0.83
14	South Dakota	0.84
15	Illinois	0.85
16	Wisconsin	0.89
17	New York	0.98
18	Missouri	1.02
19	Virginia	1.03
20	Kentucky	1.05
21	Washington	1.05
22	Georgia	1.12
23	Tennessee	1.13
24	North Carolina	1.18
25	Louisiana	1.18
26	Colorado	1.24
27	Indiana	1.34
28	Texas	1.35
29	New Hampshire	1.35
30	West Virginia	1.38
31	Oklahoma	1.39
32	California	1.42
33	Arizona	1.43
33	Oregon	1.46
35	Mississippi	1.50
35	Idaho	1.53
37	Montana	1.54
38	Utah	1.58
39	Nebraska	1.62
40	Alabama	1.67
41	New Mexico	1.74
41	Delaware	1.82
43	Florida	1.86
44	Wyoming	1.92
45	Kansas	1.97
46	Alaska	2.01
47	Arkansas	2.06
48	South Carolina	2.19
49	Nevada	2.30
50	Hawaii	4.86
	Average	1.26

FIGURE 13: FATALITY RATE PER 100 MILLION RURAL VEHICLE-MILES, 2019



URBAN FATALITY RATE

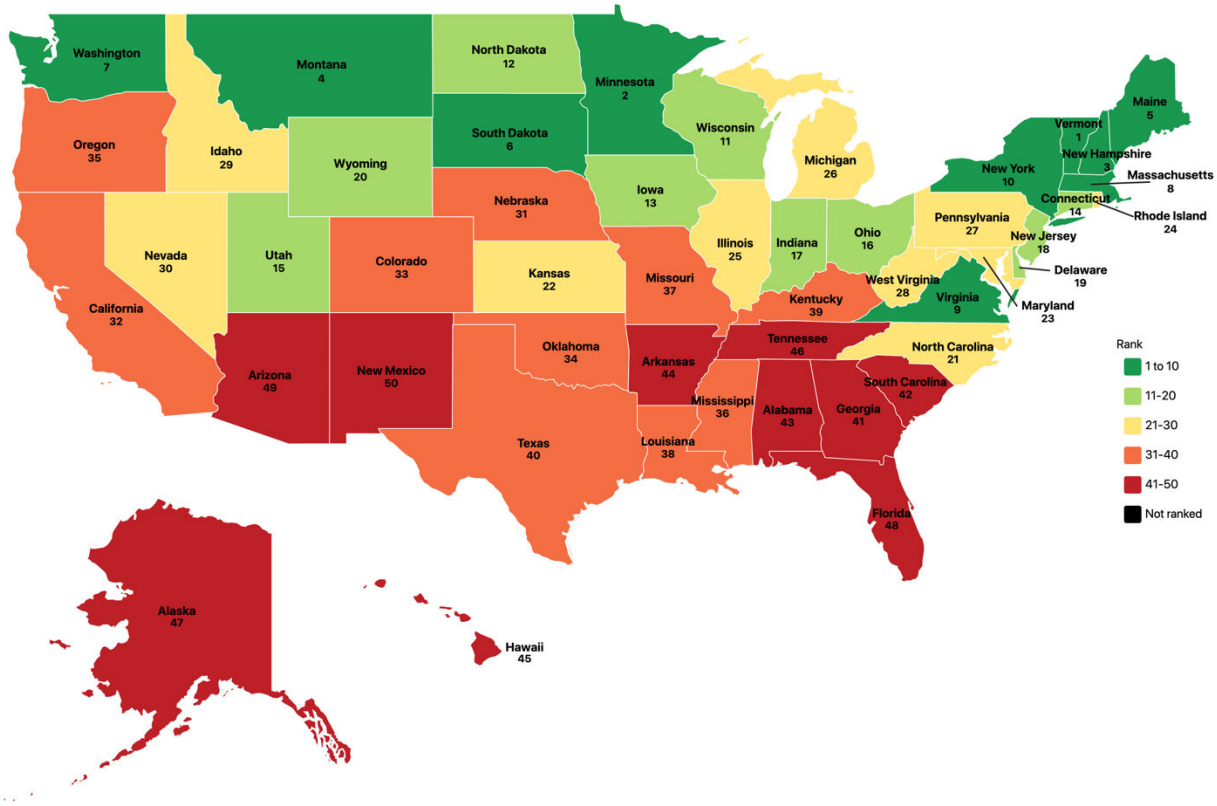
The urban fatality rate measures fatalities on all urban arterials in the state. The nation's urban highway fatality rate held steady at 0.82 (Table 19, Urban Fatality Rate per 100 Million Vehicle-Miles, 2019, Figure 14). The urban fatality rate has increased over the last several years after a decades-long downward trend. While there is no one cause, distracted driving may be a significant contributor. In 2019, 10,737 urban fatalities were reported, fewer than the 10,777 urban fatalities reported in 2018, as urban VMT (vehicle-miles of travel) decreased to 1.310 trillion from 1.314 trillion in 2018. The year 2019 had the second highest number of fatalities in any year since 2007.

For 2019, Vermont reported the lowest urban fatality rate, 0.17, while New Mexico reported the highest, 1.74. Twenty-nine states reported a decrease in their urban fatality rates compared to 2018, led by West Virginia and New Hampshire (which improved 0.33 and 0.30 points respectively). Twenty-one states saw their fatality rate increase, led by Wyoming and Oregon (which increased by 0.26 and 0.25 points respectively). The fatality rate held constant in Minnesota and Oklahoma.

TABLE 19: FATALITY RATE PER 100 MILLION URBAN VEHICLE-MILES, 2019

2019 Rank	State	Fatality Rate Per 100 Million Urban Vehicle-Miles
1	Vermont	0.17
2	Minnesota	0.29
3	New Hampshire	0.33
4	Montana	0.42
5	Maine	0.43
6	South Dakota	0.43
7	Washington	0.43
8	Massachusetts	0.45
8	Virginia	0.48
10	New York	0.49
11	Wisconsin	0.49
12	North Dakota	0.49
12	Iowa	0.55
14	Connecticut	0.55
14	Utah	0.55
16	Ohio	0.58
17	Indiana	0.61
18	New Jersey	0.61
19	Delaware	0.66
19	Wyoming	0.66
21	North Carolina	0.67
22	Kansas	0.68
23	Maryland	0.68
23	Rhode Island	0.69
25	Illinois	0.72
25	Michigan	0.74
27	Pennsylvania	0.74
28	West Virginia	0.74
28	Idaho	0.77
30	Nevada	0.77
31	Nebraska	0.78
32	California	0.80
33	Colorado	0.86
34	Oklahoma	0.86
34	Oregon	0.90
36	Mississippi	0.92
37	Missouri	0.93
38	Louisiana	0.95
39	Kentucky	0.99
39	Texas	1.00
41	Georgia	1.03
42	South Carolina	1.03
43	Alabama	1.05
44	Arkansas	1.07
45	Hawaii	1.07
46	Tennessee	1.10
47	Alaska	1.16
48	Florida	1.38
49	Arizona	1.51
50	New Mexico	1.74
	Average	0.82

FIGURE 14: FATALITY RATE PER 100 MILLION URBAN VEHICLE–MILES, 2019



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Feigenbaum is involved with various transportation organizations. He is a member of the Transportation Research Board Intelligent Transportation Systems Committee, secretary of the Bus Transit Committee and chairs the Bus Transit Conference Subcommittee. He is president of the Transportation and Research Forum, 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 compares states with one another based on self-reported data. In general, we use the 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 measure 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 the 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 2019* (https://www.fhwa.dot.gov/policyinformation/statistics/2019/).

DISBURSEMENTS FOR STATE-OWNED HIGHWAYS

There are several 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 collected for the first three categories (Capital and Bridge Disbursements, Maintenance Disbursements, Administrative Disbursements) as well as for the total expenditures (Total 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 2019* (https://www.fhwa.dot.gov/policyinformation/statistics/2019/). These disbursements are divided by lane-miles under state control to create the state numbers. The national average is the weighted average, obtained by summing the financial numbers for all states, then dividing by the sum of all state-administered mileage. Since large per-mile expenditures are also a burden on taxpayers, the states are ranked inversely by this measure, with the highest per-mile expenditures rated the lowest.

***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 use private-sector contracts to build and reconstruct the system, although in some cases they 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 sometimes vary widely from year to year.

***Total Disbursements*:** Total disbursements represent total state outlays for state-administered roads, and include several categories not detailed above. Usually, states disburse about 2% to 3% less than they collect, the difference resulting from timing differences and delays in project completion. However, states sometimes collect revenues that are not immediately expended, such as major bond sales, which 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, Fatality Rate, Rural Fatality Rate, and Urban 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 2019* (https://www.fhwa.dot.gov/policyinformation/statistics/2019/), 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 "average number of hours lost in congestion 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 lost in congestion 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.

Three data sources are required to calculate the current metric: the 2020 INRIX *Global Traffic Scorecard* and its supporting materials (http://inrix.com/scorecard/), the *2019 American Community Survey* (https://www.census.gov/acs/www/data/data-tables-and-tools/index.php) and Table HM-74 from the FHWA *Highway Statistics* series (https://www.fhwa.dot.gov/policyinformation/statistics/2019/).

The INRIX *Global Traffic Scorecard* provides 2020 empirical congestion data for more than 900 cities in 43 countries, including 286 cities in the U.S. Data items include the Hours Lost in Congestion metric for each city. The *American Community Survey* data used are the Means of Transportation data for workers 16 years and over (Table S0802). These data are used to calculate the number of auto commuters (the workers 16 years and older who drove alone or carpooled, with the carpoolers being divided by the average carpool occupancy rate of 2.2). 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.

Using *American Community Survey* data as the base table, the INRIX city data are linked to the ACS metro areas. The DVMT percentages for the multi-state cities are now linked to the base table.

The Hours Lost in Congestion metric is calculated for each non-INRIX metro based on national averages of groupings of the numbers of auto commuters. (We use national averages rather than state averages because the number of data points for the individual states is most often inadequate for a good average.) The metric is then weighted by the number of auto commuters. A pivot table-like tool is used to sum the Hours Lost in Congestion metric and the Auto Commuters totals by state. Finally, the former is divided by the latter to get the state's Peak Hours Spent in Congestion figure.

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 as two years ago, the "average" inspection age is about one year. So, an October 2020 summary from the *Inventory* would represent, on average, bridge condition as of October 2019.

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 2020 *Better Roads Bridge Inventory* (http://www.equipmentworld.com/2020-better-roads-bridge-inventory-2-year-decline-in-deficient-u-s-bridges-snapped/) contains data collected through October 2020.

Overall 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 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 2019* (https://www.fhwa.dot.gov/policyinformation/statistics/2019/). 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 averages across the states.

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

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 Overall 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 weighted U.S. mean for the 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)

  R_{is} = Performance Ratio for measure "i", state "s"
  = M_{is}/**M,** where **M** is the weighted average of M_{is} across the 50 states.

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

  =Mis1 +.....Mis13

  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.