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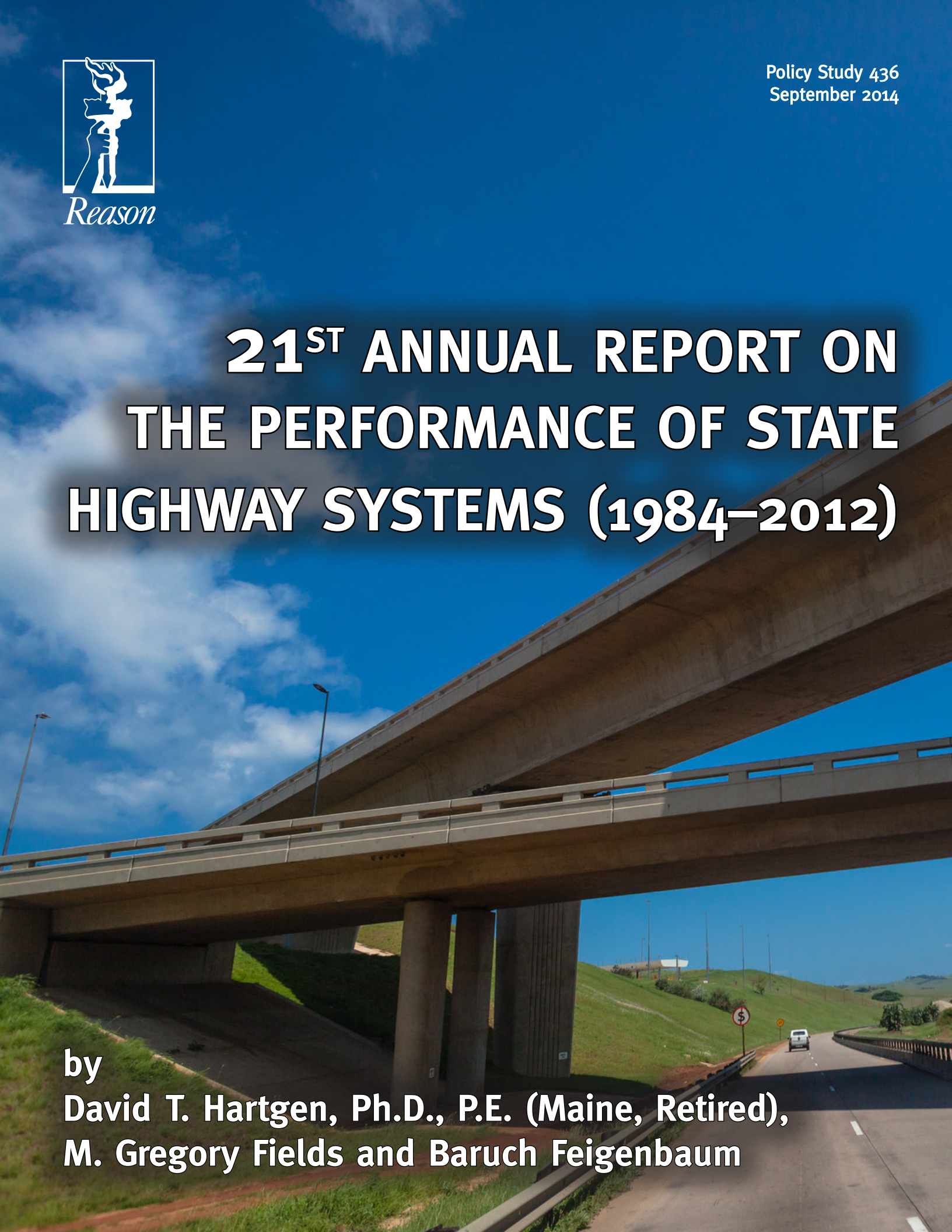
21ST ANNUAL REPORT ON THE PERFORMANCE OF STATE HIGHWAY SYSTEMS (1984–2012)



by
David T. Hartgen, Ph.D., P.E. (Maine, Retired),
M. Gregory Fields and Baruch Feigenbaum

Reason Foundation

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21st Annual Report on the Performance of State Highway Systems (1984–2012)

By David T. Hartgen, Ph.D., P.E. (Maine, Retired),
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Executive Summary

Reason Foundation's *21st Annual Highway Report* tracks the performance of the 50 state-owned highway systems from 1984 to 2012. Each state's overall rating consists of 11 category rankings. The rankings include highway expenditures, Interstate and rural primary road pavement conditions, bridge conditions, urban Interstate/freeway congestion, fatality rates and narrow rural arterial lanes. The study is based on spending and performance data submitted by the state highway agencies to the federal government. It also reviews changes in highway performance since 2009, the prior report's focus.

Table ES1 summarizes recent system trends for key indicators. Although individual highway sections (roads, bridges, pavements) steadily deteriorate over time due to age, traffic and weather, they are periodically improved by maintenance and re-construction. **Over the past four years the overall condition of the system has improved. In 2012 the overall condition of the U.S. state-owned highway system continued to improve, but progress appears to be slowing.**

Table ES1: Performance of State-Owned Highways, 2009–2012

Statistic	2009	2010	2011	2012	Percent Change 2011–12	Percent Change 2009–12
Mileage under State Control (Thousands)	814.29	NA	813.69	814.28	0.07	0.00
Total Revenues, All Sources, $ Billions	117.02	131.27	126.69	132.86	4.87	13.54
Total Expenditures, $ Billions	117.69	122.51	124.16	132.01	6.32	12.17
Expenditures, Capital/Bridges, $ Billions	65.10	66.48	66.60	70.15	5.33	7.76
Expenditures, Maintenance, $ Billions	20.76	20.92	20.45	21.24	3.86	2.31
Expenditures, Administration, $ Billions	9.25	8.55	8.49	8.61	1.41	-6.92
Consumer Price Index (1987=100)	188.9	192.0	198.0	202.1	2.07	6.99
Rural Interstate, Percent Poor Condition	1.67	NA	1.78	1.78	0.00	6.59
Urban Interstate, Percent Poor Condition	4.97	NA	5.18	4.97	-4.05	0.00
Rural Arterial, Percent Poor Condition	0.65	NA	0.77	0.89	15.58	36.92
Urban Interstate/Freeway, Percent Congested	46.67	NA	*42.15	NA	NA	**-9.69
Bridges, Percent Deficient	23.24	22.71	22.52	21.52	-4.44	-7.40
Fatality Rate per 100 Million Vehicle-Miles	1.15	1.11	1.10	1.13	2.72	-1.74
Rural Primary, Percent Narrow Lanes	9.66	NA	9.02	8.89	-1.44	-7.97

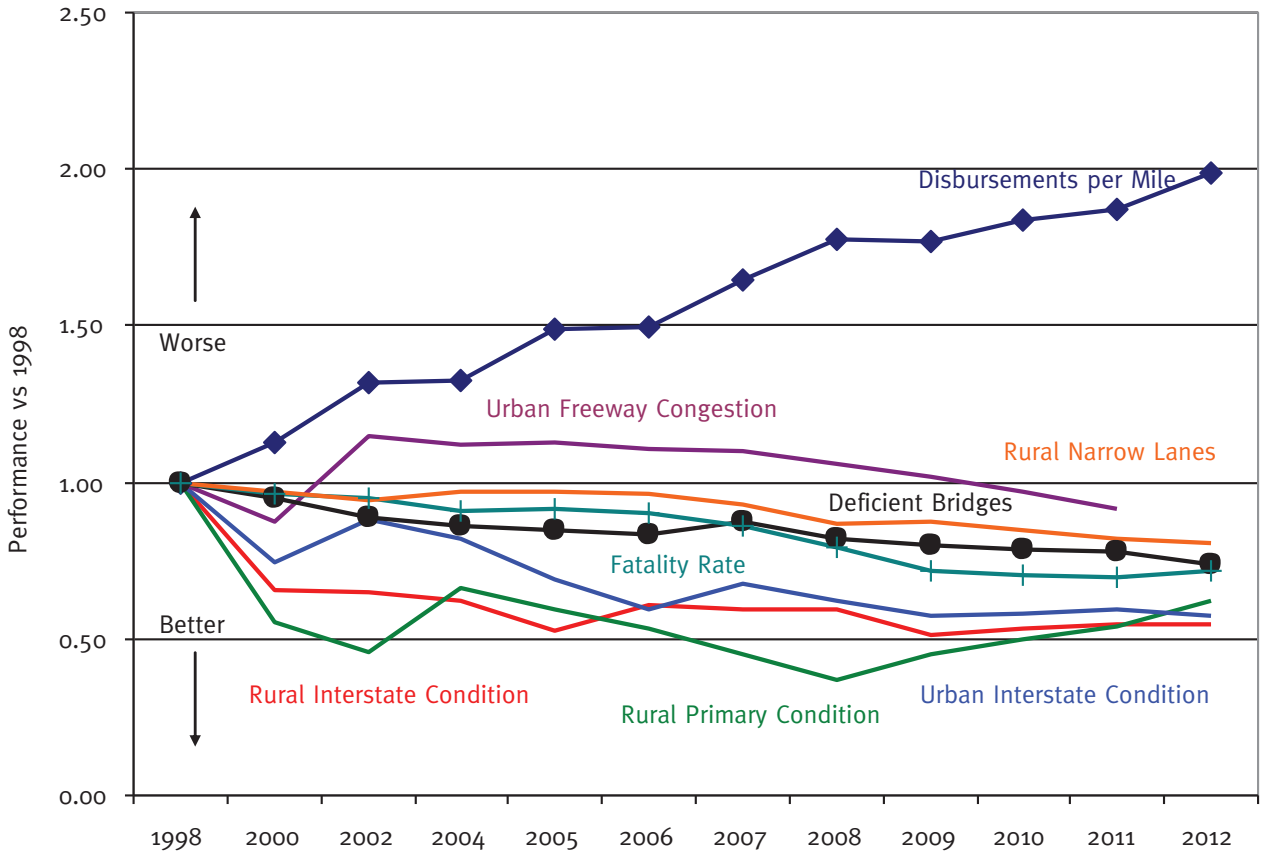
* change in method, see appendix; **2009–2011 change

Overall, the system's condition continued to improve from 2009 to 2012 (Figure ES1). Four of the seven key indicators of system condition showed improvement, including sizable decreases in urban Interstate congestion (which could be related to the change in method—see Appendix), fatality rates, deficient bridges and narrow rural lanes. But rural Interstate pavement condition and rural arterial pavement condition worsened, and urban Interstate pavement condition was unchanged. Between 2011 and 2012, two indicators worsened, one stayed the same, and three improved. These changes, following an increase in both absolute and per mile expenditures, suggest that an increase of focus on problems can yield positive results, but at a declining rate. Overall, expenditures for state-owned roads have increased about 12 percent since 2009, and 6.3 percent since 2011. Both increases exceed the rate of inflation. The 2009 recession year expenditures were slightly lower than 2008 expenditures (about 0.6 percent). In general, states have become more cost-efficient over the last four years: administrative costs have decreased almost seven percent, although there was a slight uptick from 2011 to 12. Additional funds were allocated to capital and bridge efforts (expenditures up 5.3 percent from 2011) and maintenance activities (expenditures up 3.9 percent from 2011).

The top rankings continue to be dominated by relatively small rural states. **Wyoming led the cost-effectiveness ratings, followed by Nebraska, South Dakota, South Carolina and Kansas. But two large states, Texas and Missouri, were top-12 performers, with Georgia (13th) and Ohio (14th) close behind. At the bottom were Hawaii, Alaska, New Jersey, Rhode Island and Massachusetts.** Most states continued to improve their systems. Increasingly, system performance problems seem to be concentrated in a few states:

- Almost half (49.7 percent) of the poor-condition rural Interstate mileage is in just five states: Alaska, California, Colorado, Washington and Indiana.
- Almost half (49.5 percent) of the poor-condition urban Interstate mileage is in just six states: California, New York, Louisiana, New Jersey, Michigan and Texas.
- Two states (Alaska and Hawaii) reported more than 10 percent of their rural principal arterial mileage to be in poor condition.
- Eight states (Florida, Hawaii, Maryland, Illinois, California, Nevada, Georgia and Indiana) reported more than half of their urban Interstates/freeways congested.
- Although bridge conditions are steadily improving, seven states (Rhode Island, New York, Pennsylvania, Massachusetts, Hawaii, Connecticut and West Virginia) reported that more than 1/3rd of their bridges are deficient, with Rhode Island reporting more than half of its bridges as deficient.
- Most states are improving their fatality rates. But eight states (West Virginia, South Carolina, Montana, North Dakota, Arkansas, Kentucky, Louisiana and Mississippi) reported a rate greater than 1.5 fatalities per 100 million vehicle-miles.
- Three states (Pennsylvania, West Virginia and Virginia) reported more than 1/3rd of their rural principal arterial mileage with narrow lanes.

Figure ES1: Trends in U.S. State Highway Performance, 1998–2012



A widening gap seems to be emerging between most states that are making progress, and a few states that are finding it difficult to improve. There is also increasing evidence that higher-level road systems (Interstates, other freeways and principal arterials) are in better shape than lower-level road systems, particularly local roads.

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Part 1

State Highway Performance Ranks

This report continues its annual ratings of state highway systems on cost versus quality. Since the states have different budgets, system sizes, traffic and circumstances, their comparative performance depends on both system performance and the resources available. To determine relative performance, 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 systems along with relatively low per-mile expenditures.

The following table shows the overall highway performance of the state highway systems for 2012 and for prior years. **This year's leading states are Wyoming, Nebraska, South Dakota, South Carolina and Kansas.** This year's trailing states are Hawaii, Alaska, New Jersey, Rhode Island and Massachusetts.

As in prior years, the top-performing states tend to be rural states with limited congestion (Table 1 and Figure 1). But several states with large urban areas also rank well: Texas (11th), Missouri (12th), Georgia (13th) and Ohio (14th). While background circumstances play a role, a careful review suggests that numerous factors—terrain, climate and geography, truck volume, urban congestion, system age, budget priorities, unit cost differences, state budget circumstances and management/maintenance philosophies—are affecting overall performance. The remainder of this report reviews the statistics underlying these ratings in more detail.

Table 1: Overall Highway Performance Rankings 2012	
State	Overall
Wyoming	1
Nebraska	2
South Dakota	3
South Carolina	4
Kansas	5
North Dakota	6
New Mexico	7
Mississippi	8
Montana	9
Kentucky	10
Texas	11
Missouri	12
Georgia	13
Ohio	14
Wisconsin	15
Maine	16
Tennessee	17
Iowa	18
Arizona	19
North Carolina	20
Alabama	21
Oklahoma	22
New Hampshire	23
Nevada	24
Virginia	25
Oregon	26
Illinois	27
Minnesota	28
Utah	29
Idaho	30
Florida	31
Michigan	32
Colorado	33
West Virginia	34
Arkansas	35
Indiana	36
Delaware	37
Vermont	38
Maryland	39
Louisiana	40
Pennsylvania	41
Washington	42
New York	43
Connecticut	44
California	45
Massachusetts	46
Rhode Island	47
New Jersey	48
Alaska	49
Hawaii	50

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

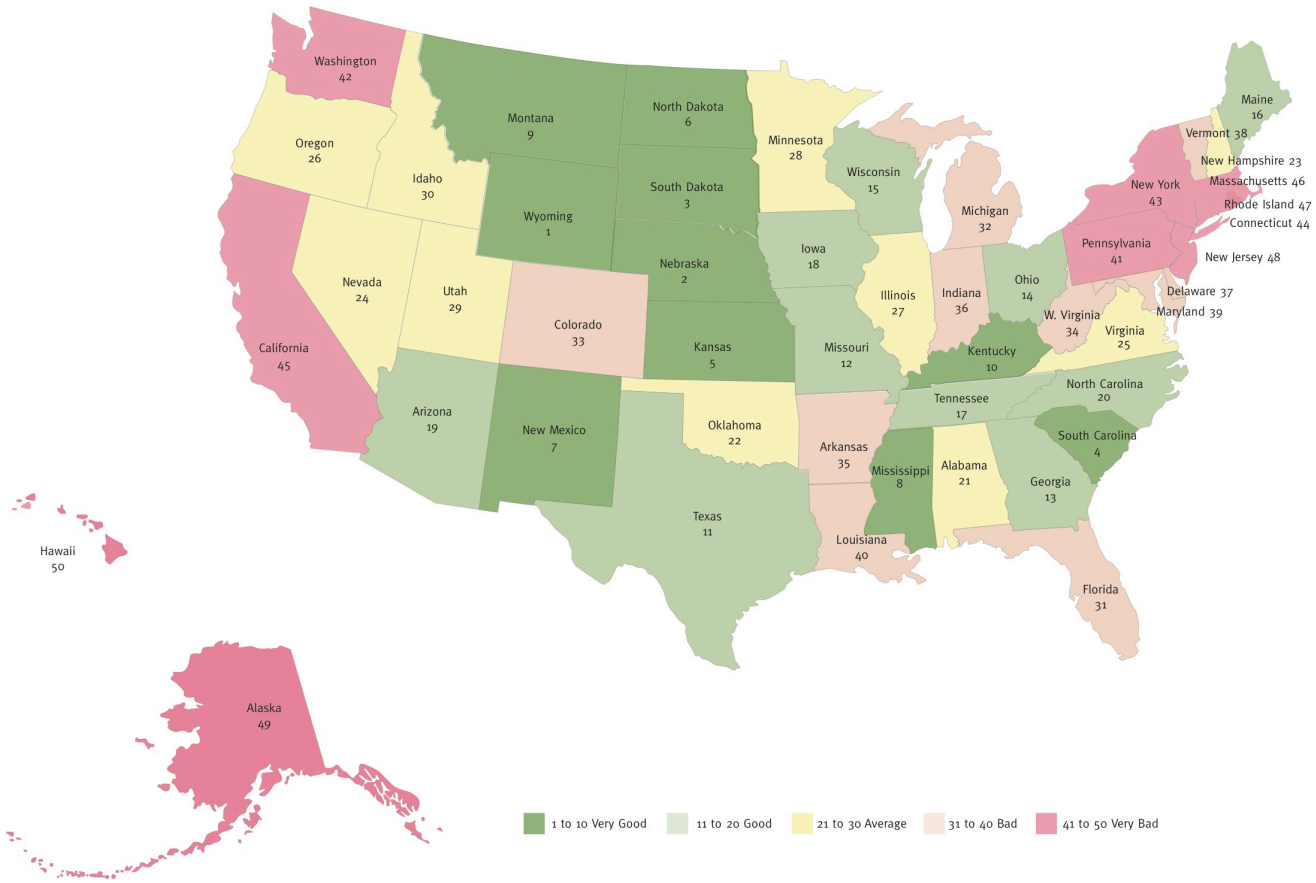
Table 3: Highway Performance Rankings by Category 2012

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

Table 4: Overall Highway Performance Rating Trends, 2009–12

				Change in Rank	
	2009	2011	2012	2009–12	2011–12
Wyoming	3	4	1	2	3
Nebraska	6	2	2	4	0
South Dakota	9	1	3	6	-2
South Carolina	7	5	4	3	1
Kansas	2	3	5	-3	-2
North Dakota	1	7	6	-5	1
New Mexico	4	6	7	-3	-1
Mississippi	10	10	8	2	2
Montana	5	9	9	-4	0
Kentucky	14	26	10	4	16
Texas	11	14	11	0	3
Missouri	8	13	12	-4	1
Georgia	12	11	13	-1	-2
Ohio	25	19	14	11	5
Wisconsin	31	25	15	16	10
Maine	29	18	16	13	2
Tennessee	21	20	17	4	3
Iowa	33	12	18	15	-6
Arizona	23	21	19	4	2
North Carolina	19	17	20	-1	-3
Alabama	27	28	21	6	7
Oklahoma	38	32	22	16	10
New Hampshire	18	23	23	-5	0
Nevada	16	16	24	-8	-8
Virginia	15	22	25	-10	-3
Oregon	13	15	26	-13	-11
Illinois	34	30	27	7	3
Minnesota	42	31	28	14	3
Utah	26	27	29	-3	-2
Idaho	17	8	30	-13	-22
Florida	37	33	31	6	2
Michigan	30	36	32	-2	4
Colorado	41	29	33	8	-4
West Virginia	32	34	34	-2	0
Arkansas	36	37	35	1	2
Indiana	22	41	36	-14	5
Delaware	20	35	37	-17	-2
Vermont	28	39	38	-10	1
Maryland	40	38	39	1	-1
Louisiana	35	24	40	-5	-16
Pennsylvania	39	40	41	-2	-1
Washington	24	42	42	-18	0
New York	45	44	43	2	1
Connecticut	44	43	44	0	-1
California	47	46	45	2	1
Massachusetts	43	45	46	-3	-1
Rhode Island	49	50	47	2	3
New Jersey	46	47	48	-2	-1
Alaska	50	48	49	1	-1
Hawaii	48	49	50	-2	-1

Figure 1: Overall Highway Performance Rank, 2012



Several states improved their ratings sharply from 2009:

- **Wisconsin improved 16 spots, from 31st to 15th**, as total disbursements increased slightly (relative to the U.S. average) and poor condition mileage (on urban and rural Interstates and rural arterials) decreased.
- **Oklahoma improved 16 spots, from 38th to 22nd**, as total disbursements increased slightly (relative to the U.S. average) and poor condition mileage (on urban and rural Interstates and rural arterials) decreased.
- **Iowa improved 15 spots, from 33rd to 18th**, as total disbursements increased slightly (relative to the U.S. average) and poor condition mileage (on urban and rural Interstates and rural arterials) decreased.
- **Minnesota improved 14 spots, from 42nd to 28th**, as total disbursements decreased slightly (relative to the U.S. average) and rural Interstate mileage in poor condition decreased significantly.
- **Maine improved 13 spots, from 29th to 16th**, as total disbursements remained about the same (relative to the U.S. average), but the state's rural principal arterial mileage in poor condition decreased substantially.

On the other hand, several states worsened sharply from 2009**:**

- **Washington fell 18 spots, from 24th to 42nd,** as its mileage in poor condition (on urban and rural Interstates and rural arterials) increased considerably, despite increased spending (relative to the U.S. average).
- **Delaware fell 17 spots, from 20th to 37th,** as total disbursements more than doubled (relative to the U.S. average), but poor condition mileage worsened slightly.
- **Indiana fell 14 spots, from 22nd to 36th,** as total disbursements decreased slightly (relative to the U.S. average) and performance in all measured areas declined.
- **Idaho fell 13 spots, from 17th to 30th**. Although disbursements decreased (relative to the U.S. average), rural poor condition mileage (both Interstate and principal arterial) increased substantially.
- **Oregon fell 13 spots, from 13th to 26th**, as its poor condition mileage (on urban and rural Interstates and rural arterials) increased considerably despite increased spending (relative to the U.S. average).

Part 2

Background Data

State highway sizes range from approximately 1,000 miles to more than 80,000 miles. States with larger geographic areas and larger populations tend to have larger systems. Whether states have a county-level road system is another factor. Some states, such as North Carolina, maintain all of their roads (except for subdivision and other local roads). Other states, such as Florida, have a robust county road system. State-controlled highway mileage and state highway agency miles are not included directly in the rankings. They are included in this report as background information and are also used to weight the financial data (See Appendix). State highway size is not a big factor in overall performance.

State-Controlled Miles

State-controlled miles include 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. Nationwide in 2012, about 814,284 miles were under state control (Table 5, State-Controlled Highway Mileage), about the same as in 2009 but 595 more miles than in 2011. Small changes in state-controlled miles are to be expected, as state systems expand to meet increasing needs, and as growing cities assume responsibility for mileage previously under state control. States may see larger changes following updated road mileage inventories (e.g. Pennsylvania in 2011). The smallest state-owned road systems continued to be Hawaii (1,013 miles) and Rhode Island (1,114 miles); the largest were Texas (80,476 miles) and North Carolina (80,456 miles).

Table 5: State-Controlled Mileage

2012 Rank	State	Mileage
1	Texas	80,476
2	North Carolina	80,456
3	Virginia	58,355
4	South Carolina	41,584
5	Pennsylvania	41,147
6	West Virginia	34,645
7	Missouri	33,884
8	Kentucky	28,006
9	Ohio	20,371
10	Georgia	18,268
11	California	18,198
12	Washington	17,232
13	Illinois	16,735
14	Louisiana	16,690
15	New York	16,482
16	Arkansas	16,395
17	Tennessee	14,226
18	Minnesota	13,563
19	Oklahoma	13,369
20	Florida	12,154
21	New Mexico	12,091
22	Wisconsin	11,902
23	Montana	**11,339
24	Indiana	11,177
25	Alabama	11,064
26	Mississippi	11,043
27	Kansas	10,555
28	Nebraska	10,142
29	Colorado	9,912
30	Michigan	9,692
31	Iowa	9,512
32	South Dakota	9,428
33	Maine	8,696
34	Oregon	8,331
35	Wyoming	7,896
36	Alaska	**7,405
37	North Dakota	7,397
38	Arizona	**7,143
39	Utah	*5,866
40	Nevada	5,693
41	Delaware	5,457
42	Maryland	5,439
43	Idaho	*4,986
44	Connecticut	4,054
45	New Hampshire	4,030
46	Massachusetts	3,662
47	New Jersey	3,338
48	Vermont	2,669
49	Rhode Island	1,114
50	Hawaii	1,013
	US Total	814,284
	Average	16,286

* SHA only data; **2011 data plus change in SHA

State Highway Agency (SHA) Miles

State Highway Agency roads are generally the Interstates and other major U.S.-numbered and state-numbered roads, but a few states also manage major portions of the rural road system. In 2012, about 778,747 miles were the responsibility of the 50 state highway agencies (Table 6, State Highway Agency Mileage), about 81 more miles than in 2011 and 402 more miles than in 2009 (the year of the last report; data were not available in 2010). The average number of lanes *per mile* is 2.40 lanes, but a few states (New Jersey, Florida, California and Massachusetts) manage significantly wider roads, averaging more than 3.0 lanes per mile.

Table 6: State Highway Agency Miles

Rank	State	Miles	Lane Miles	Ratio
1	Alaska	5,610	11,415	2.03
2	West Virginia	34,558	71,217	2.06
3	Maine	8,375	17,687	2.11
4	New Hampshire	3,925	8,431	2.15
5	North Carolina	79,333	170,546	2.15
6	Virginia	58,296	126,227	2.17
7	South Carolina	41,393	90,242	2.18
8	Delaware	5,379	11,807	2.19
9	Pennsylvania	39,791	88,383	2.22
10	Kentucky	27,625	61,858	2.24
11	Missouri	33,884	76,206	2.25
12	Nebraska	9,948	22,473	2.26
13	Montana	11,001	25,055	2.28
14	Arkansas	16,395	37,400	2.28
15	Vermont	2,619	5,980	2.28
16	North Dakota	7,378	16,976	2.30
17	South Dakota	7,806	18,013	2.31
18	Kansas	10,316	23,988	2.33
19	Wyoming	6,846	15,972	2.33
20	Louisiana	16,660	39,194	2.35
21	Oregon	7,662	18,598	2.43
22	Texas	80,268	194,954	2.43
23	New Mexico	11,937	29,143	2.44
24	Idaho	4,986	12,288	2.46
25	Oklahoma	12,266	30,322	2.47
26	Minnesota	11,833	29,297	2.48
27	Wisconsin	11,766	29,624	2.52
28	Nevada	5,297	13,388	2.53
29	Colorado	9,063	22,934	2.53
30	New York	15,029	38,204	2.54
31	Mississippi	10,886	27,728	2.55
32	Indiana	11,006	28,174	2.56
33	Iowa	8,892	22,818	2.57
34	Ohio	19,236	49,381	2.57
35	Washington	7,054	18,422	2.61
36	Rhode Island	1,099	2,887	2.63
37	Hawaii	948	2,491	2.63
38	Illinois	15,992	42,122	2.63
39	Connecticut	3,720	9,832	2.64
40	Tennessee	13,885	36,974	2.66
41	Alabama	10,894	29,247	2.68
42	Georgia	17,912	48,415	2.70
43	Utah	5,866	15,960	2.72
44	Michigan	9,652	27,434	2.84
45	Maryland	5,155	14,753	2.86
46	Arizona	6,751	19,385	2.87
47	Massachusetts	3,019	9,572	3.17
48	California	15,127	50,462	3.34
49	Florida	12,079	43,195	3.58
50	New Jersey	2,326	8,496	3.65
	U.S.	778,747	1,865,572	2.40
	Weighted Average	15,575	37,311	

Part 3

Performance Indicators

Detailed data and trends in rankings for each of the states are shown in the attached tables. Each state is ranked in each of the following categories: Capital and Bridge Disbursements, Maintenance Disbursements, Administrative Disbursements, Total Disbursements, Rural Interstate Pavement Condition, Urban Interstate Pavement Condition, Rural Other Principal Arterial Pavement Condition, Urban Interstate/Freeway Congestion, Deficient Bridges, Fatality Rates and Narrow Rural Other Principal Arterial Lanes. (Delaware has no Rural Interstate Pavement Condition mileage and is not ranked in this category)

System condition measures are also shown in the maps below. (Individual vignettes for each state are also available at *Reason Foundation website, www.reason.org.)*

Capital and Bridge Disbursements

Capital and bridge disbursements for state-owned roads totaled $70.2 billion in 2012, about 5.3 percent higher than in 2011 and 7.8 percent higher than in 2009. On a per-mile basis, capital and bridge disbursements increased about 7.8 percent, from $79,951/mile in 2009 to $86,153/mile in 2012 (Table 7, Capital and Bridge Disbursements per State-Controlled Mile). Since 1984, these per-mile disbursements have increased over 330 percent, while the Consumer Price Index (CPI) has increased about 121 percent.[1] In 2012, Virginia, West Virginia, South Carolina and North Carolina reported the lowest per-mile capital and bridge expenditures; New Jersey, Florida, Massachusetts and Rhode Island reported the highest per-mile expenditures. The states with the largest percent increases from 2009 to 2012 include North Dakota, Rhode Island and Washington, which all increased their per-mile expenditures by at least 100 percent. Some of the disbursements per state mile can vary widely, reflecting funding actions and project schedules.

Table 7: Capital and Bridge Disbursements per State-Controlled Mile, 2012		
1	Virginia	$23,278
2	West Virginia	$23,707
3	South Carolina	$24,523
4	North Carolina	$32,416
5	Missouri	$35,197
6	New Mexico	$36,644
7	South Dakota	$39,403
8	Nebraska	$40,172
9	Maine	$43,702***
10	Montana	$44,226
11	Kentucky	$45,624
12	Arkansas	$48,429
13	Wyoming	$52,923
14	Alaska	$53,508
15	Oregon	$68,303
16	Georgia	$69,830
17	Minnesota	$70,056
18	Mississippi	$74,960
19	Idaho	$75,395
20	New Hampshire	$79,284**
21	Pennsylvania	$80,566
22	Delaware	$81,748
23	Louisiana	$81,781
24	Colorado	$82,786
25	North Dakota	$84,805
26	Alabama	$86,015
27	Kansas	$87,490
28	Iowa	$93,982
29	Tennessee	$95,087
30	Vermont	$97,988
31	Oklahoma	$101,608
32	Texas	$102,395
33	Ohio	$105,229
34	Michigan	$113,639
35	Wisconsin	$122,272
36	Nevada	$127,127
37	Arizona	$142,943
38	Indiana	$152,162
39	New York	$174,132***
40	Utah	$181,815
41	Connecticut	$190,868
42	Maryland	$198,131
43	Illinois	$200,159
44	Washington	$201,441
45	California	$219,469
46	Hawaii	$219,859
47	Rhode Island	$282,917
48	Massachusetts	$290,584**
49	Florida	$353,684
50	New Jersey	$790,953
	Weighted Average	$86,153

*2009 disbursement data; **2010 disbursement data; ***2011 disbursement data

Maintenance Disbursements

Maintenance disbursements increased about 2.3 percent from 2009 to 2012, from $20.8 billion to $21.2 billion**,** and accounted for about 16.1 percent of total disbursements, a decrease from a 17.6 percent share in 2009 (Table 8, Maintenance Disbursements per State-Controlled Mile). Since 1984 per-mile maintenance disbursements have increased about 253 percent, relative to a 336 percent increase in total disbursements and a 121 percent increase in the Consumer Price Index (CPI). On a per-mile basis 2012 maintenance disbursements per mile averaged about $26,079, up about 2.3 percent. The lowest per-mile maintenance disbursement was $955 in New Mexico; the highest was $154,552 in New Jersey.

Table 8: Maintenance Disbursement per State-Controlled Mile, 2012		
2012 Rank	State	Disbursements per Mile
1	New Mexico	$955
2	North Dakota	$3,576
3	South Dakota	$5,433
4	South Carolina	$7,320
5	Mississippi	$7,884
6	North Carolina	$8,966
7	West Virginia	$9,054
8	Louisiana	$9,204
9	Wyoming	$11,308
10	Arkansas	$11,706
11	Georgia	$13,092
12	Montana	$13,524
13	Missouri	$13,676
14	Kansas	$13,807
15	Kentucky	$14,570
16	Oklahoma	$15,543
17	Nebraska	$15,727
18	Alabama	$17,559
19	Wisconsin	$17,816
20	Idaho	$18,577
21	Tennessee	$19,868
22	New Hampshire	$19,880**
23	Ohio	$20,694
24	Arizona	$20,818
25	Iowa	$21,365
26	Nevada	$23,698
27	Maine	$24,333***
28	Connecticut	$25,027
29	Texas	$26,467
30	Minnesota	$28,926
31	Michigan	$29,354
32	Virginia	$29,431
33	Alaska	$31,825
34	Pennsylvania	$33,509
35	Oregon	$35,078
36	Illinois	$41,034
37	Colorado	$42,082
38	Washington	$42,863
39	Indiana	$44,371
40	Hawaii	$55,000
41	Utah	$55,876
42	Vermont	$64,692
43	Rhode Island	$68,375
44	Delaware	$71,815
45	Florida	$76,759
46	Massachusetts	$78,240**
47	New York	$91,907***
48	Maryland	$93,620
49	California	$102,889
50	New Jersey	$154,552
	Weighted Average	$26,079

*2009 disbursement data; **2010 disbursement data; ***2011 disbursement data

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 that have not been expended. Therefore, they can vary widely from year to year. Although administrative disbursements have decreased overall since 2009 (about 6.8 percent), they increased slightly (1.5 percent) from 2011 to 2012. Administrative spending totaled $9.2 billion, $8.5 billion and $8.6 billion in 2009, 2011 and 2012, accounting for 7.8 percent, 6.8 percent and 6.5 percent of total disbursements, respectively. Since 1984 per-mile administrative disbursements have increased about 305 percent, less than the 336 percent increase in total disbursements, but more than the 121 percent increase in the Consumer Price Index (CPI). On a per-mile basis, 2012 administrative disbursements averaged $10,579, ranging from a very low $904 in Kentucky to a high of $90,001 in Hawaii (Table 9, Administrative Disbursements per State-Controlled Mile).

Table 9: Administrative Disbursements per State-Controlled Mile		
2012 Rank	State	2012
1	Kentucky	$904
2	Missouri	$2,021
3	Arkansas	$2,024
4	Maine	$2,410***
5	Nebraska	$2,591
6	South Carolina	$2,967
7	North Dakota	$3,074
8	West Virginia	$3,335
9	Texas	$3,779
10	Montana	$4,199
11	North Carolina	$4,208
12	Virginia	$5,216
13	South Dakota	$5,493
14	Idaho	$5,550
15	Iowa	$6,258
16	Mississippi	$6,258
17	Kansas	$6,416
18	Wyoming	$6,464
19	Louisiana	$6,569
20	Indiana	$7,260
21	Alaska	$9,287
22	Michigan	$9,863
23	Tennessee	$11,676
24	Pennsylvania	$12,204
25	Washington	$12,505
26	Minnesota	$12,559
27	Oklahoma	$13,007
28	Ohio	$15,332
29	Delaware	$15,664
30	Wisconsin	$15,709
31	Maryland	$16,791
32	Alabama	$17,376
33	Oregon	$17,951
34	Illinois	$18,036
35	Arizona	$18,196
36	Florida	$19,452
37	Colorado	$20,673
38	New York	$22,333***
39	Georgia	$22,692
40	New Mexico	$23,020
41	Nevada	$23,053
42	New Hampshire	$23,577**
43	Vermont	$25,023
44	Rhode Island	$33,092
45	New Jersey	$44,388
46	Utah	$47,471
47	California	$48,754
48	Massachusetts	$74,855**
49	Connecticut	$77,140
50	Hawaii	$90,001
	Weighted Average	$10,579

**2010 disbursement data; ***2011 disbursement data

Total Disbursements

In total, the states disbursed about $132.1 billion for state-owned roads in 2012, about 12.2 percent more than the $117.7 billion in 2009 and 6.4 percent more than the $124.2 billion in 2011. Since 1984, per-mile total disbursements have increased about 336 percent, while the Consumer Price Index (CPI) has increased 121 percent. On a per-mile basis, 2012 disbursements averaged $162,202 (Table 10, Total Disbursements per State-Controlled Mile). The lowest disbursement per mile was in South Carolina ($39,403) and the highest in New Jersey ($2,027,711).

Table 10: Total Disbursements per State-Controlled Mile		
2012 Rank	State	2012
1	South Carolina	$39,403
2	West Virginia	$39,883
3	North Carolina	$52,282
4	South Dakota	$54,834
5	Nebraska	$65,872
6	Missouri	$67,290
7	Virginia	$70,017
8	Kentucky	$70,566
9	Arkansas	$72,796
10	Montana	$74,204
11	New Mexico	$75,852
12	Wyoming	$77,197
13	Maine	$78,993***
14	North Dakota	$95,898
15	Mississippi	$99,493
16	Alaska	$108,742
17	Idaho	$117,559
18	Tennessee	$129,018
19	Minnesota	$132,230
20	Iowa	$133,499
21	Alabama	$150,998
22	Oklahoma	$155,408
23	Texas	$157,053
24	Georgia	$161,171
25	Louisiana	$165,438
26	Pennsylvania	$165,728
27	Kansas	$172,159
28	Ohio	$174,199
29	Colorado	$179,126
30	New Hampshire	$185,957**
31	Michigan	$206,144
32	Oregon	$210,930
33	Indiana	$213,964
34	Vermont	$214,396
35	Nevada	$219,535
36	Wisconsin	$226,901
37	Washington	$301,035
38	Illinois	$327,605
39	Arizona	$331,557
40	Delaware	$345,992
41	Utah	$367,185
42	Hawaii	$426,861
43	New York	$462,098***
44	Connecticut	$470,399
45	Maryland	$470,419
46	California	$501,136
47	Rhode Island	$533,614
48	Florida	$572,337
49	Massachusetts	$675,312
50	New Jersey	$2,027,711
	Weighted Average	$162,202

**2010 disbursement data; ***2011 disbursement data

Rural Interstate Condition

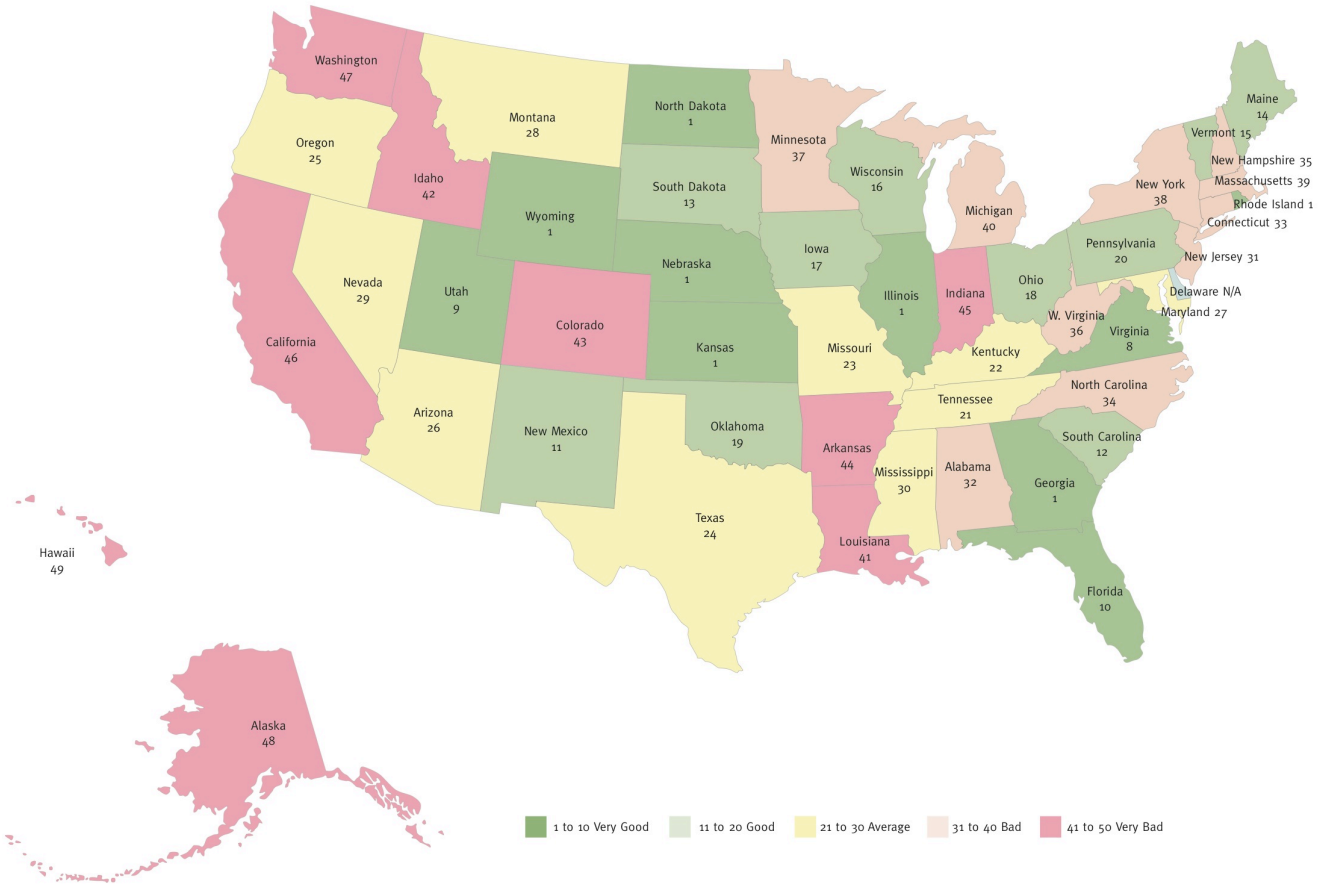
In most states road pavement condition is measured using special machines that determine the roughness of road surfaces. A few states continue to use visual ratings, which are then converted to "roughness" for comparison. In 2012, about 1.78 percent of U.S. rural Interstates—537 miles out of 30,204—were reported in poor condition (Table 11, Rural Interstate Condition, and Figure 2). This is slightly worse than in 2009, when 498 miles out of 29,910 (about 1.67 percent) of rural Interstates were rated poor, but about the same as in 2011.

The amount of poor-condition rural Interstate mileage varies widely by state. In 2012, seven states reported no poor mileage, and 16 more reported less than one percent poor mileage. On the other hand, five states (Indiana, California, Washington, Alaska and Hawaii) reported more than five percent poor mileage. Of these five, Hawaii has a small rural Interstate system with only about one of its six miles in poor condition. The other four states, however, have much larger rural Interstate systems (467 to 1,222 measured miles) and together contain over 40 percent of the poor-condition mileage in the U.S. Additionally, several states (Connecticut, North Carolina, Louisiana and Idaho) reported large increases in the percentage of poor-condition rural Interstate mileage from 2011 to 2012.

Table 11: Percent Rural Interstate Mileage in Poor Condition		
2012 Rank	State	2012
NA	Delaware	NA
1	Georgia	0.00
1	Illinois	0.00
1	Kansas	0.00
1	North Dakota	0.00
1	Nebraska	0.00
1	Rhode Island	0.00
1	Wyoming	0.00
8	Virginia	0.04
9	Utah	0.05
10	Florida	0.05
11	New Mexico	0.07
12	South Dakota	0.10
13	South Carolina	0.13
14	Maine	0.14
15	Vermont	0.18
16	Wisconsin	0.18
17	Iowa	0.24
18	Ohio	0.27
19	Oklahoma	0.29
20	Pennsylvania	0.33
21	Tennessee	0.33
22	Kentucky	0.35
23	Missouri	0.72
24	Texas	1.06
25	Oregon	1.25
26	Arizona	1.32
27	Maryland	1.44
28	Montana	1.47
29	Nevada	1.52
30	Mississippi	1.68
31	New Jersey	2.05
32	Alabama	2.08
33	Connecticut	2.17
34	North Carolina	2.33
35	New Hampshire	2.49
36	West Virginia	2.52
37	Minnesota	2.71
38	New York	2.82
39	Massachusetts	2.97
40	Michigan	3.55
41	Louisiana	4.07
42	Idaho	4.39
43	Colorado	4.52
44	Arkansas	4.54
45	Indiana	5.04
46	California	6.00
47	Washington	6.73
48	Alaska	9.91
49	Hawaii	12.91
	Weighted Average	1.78

*Delaware has no rural Interstate mileage.

Figure 2: Percent Rural Interstate Mileage in Poor Condition, 2012



Urban Interstate Condition

The urban Interstates consist of major multi-lane Interstates in and near urbanized areas. The condition of the urban Interstate system improved slightly from 2011 to 2012, returning to the historically low 2009 level of 4.97 percent poor (Table 12, Urban Interstate Condition, and Figure 3). In 2012, 813 of the 16,371 miles of urban Interstates were rated as poor.

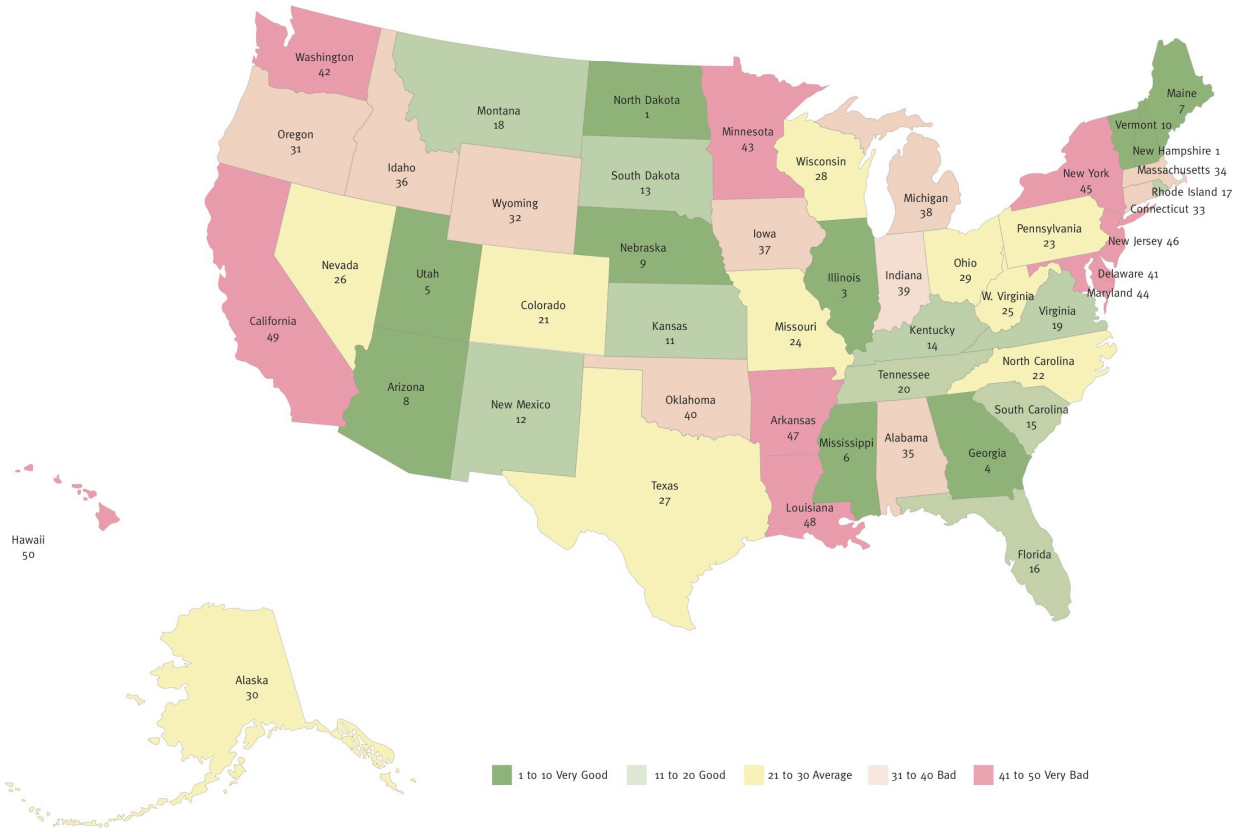
Between 2009 and 2012, the percentage of poor urban-Interstate mileage decreased in 20 states, increased in 24 states and remained the same in the six other states. Three states (South Dakota, Illinois and New Jersey) reported reducing their poor-mileage urban Interstates by five percentage points or more. On the other hand, Louisiana, Washington and Massachusetts saw increases of five percentage points or more.

The condition of urban Interstate miles also varies widely by state. While two states reported no poor urban Interstate mileage (down from nine in 2009 and four in 2011), three states (Louisiana, California and Hawaii) reported more than 15 percent poor mileage. Six states (California, New York, Louisiana, New Jersey, Michigan and Texas) each have over 40 miles of poor-condition urban Interstates, almost half (49.4 percent) of the national total.

Table 12: Percent Urban Interstate Mileage in Poor Condition

2012 Rank	State	2012
1	North Dakota	0.00
1	New Hampshire	0.00
3	Illinois	0.08
4	Georgia	0.09
5	Utah	0.18
6	Mississippi	0.39
7	Maine	0.44
8	Arizona	0.47
9	Nebraska	0.48
10	Vermont	0.50
11	Kansas	0.66
12	New Mexico	0.69
13	South Dakota	0.70
14	Kentucky	0.70
15	South Carolina	0.87
16	Florida	0.93
17	Rhode Island	1.55
18	Montana	1.78
19	Virginia	2.36
20	Tennessee	2.50
21	Colorado	2.66
22	North Carolina	2.74
23	Pennsylvania	2.75
24	Missouri	2.76
25	West Virginia	3.13
26	Nevada	3.26
27	Texas	3.48
28	Wisconsin	3.56
29	Ohio	3.72
30	Alaska	4.26
31	Oregon	4.28
32	Wyoming	4.57
33	Connecticut	4.61
34	Massachusetts	5.48
35	Alabama	5.97
36	Idaho	6.11
37	Iowa	6.14
38	Michigan	6.39
39	Indiana	7.19
40	Oklahoma	7.35
41	Delaware	7.78
42	Washington	7.79
43	Minnesota	8.28
44	Maryland	8.90
45	New York	10.53
46	New Jersey	10.71
47	Arkansas	11.51
48	Louisiana	15.31
49	California	15.47
50	Hawaii	32.04
	Weighted Average	4.97

Figure 3: States Ranked by Percent of Urban Interstate Mileage in Poor Condition, 2012



Rural Other Principal Arterial Pavement Condition

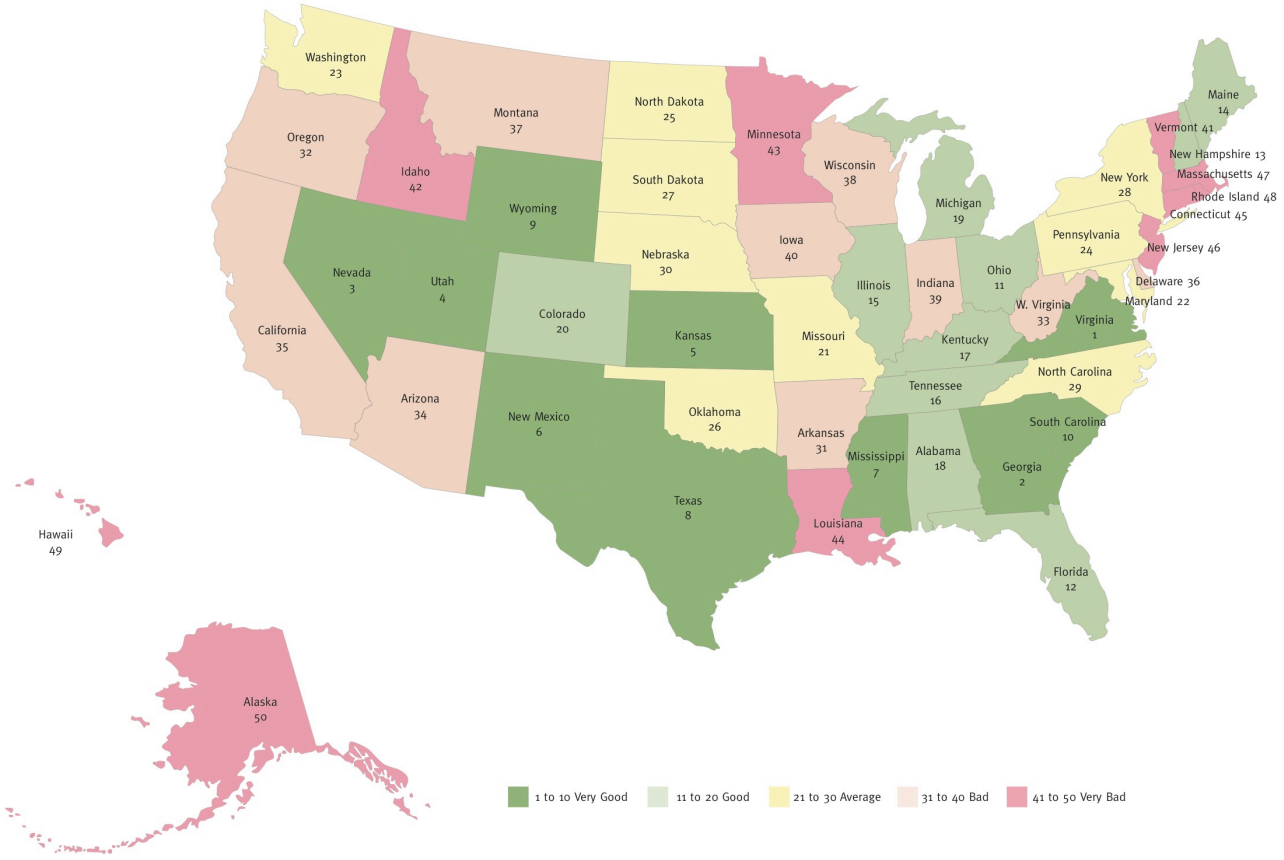
The condition of the major rural highways worsened slightly from 2009 to 2012, by about 0.24 percentage points. Overall, about 0.89 percent of the rural other principal arterial (ROPA) system—798 miles out of 89,700—was reported to be in poor condition (Table 13, Rural Arterial Condition, and Figure 4). This compares with 0.65 percent, or about 600 miles, in 2009.

Although no states reported substantial improvements in the percentage of poor-mileage ROPA, eight improved on their 2009 levels and another 18 remained relatively flat (+/- 0.2 percentage points). Twenty-four states worsened, but only one state (Hawaii) worsened significantly, reporting a near five-fold increase in percentage of poor condition ROPA mileage (from 3 to 14 miles).

One state (Virginia) reported no poor condition ROPA mileage in 2012, down from two in 2011 and three in 2009. On the other hand, Alaska and Hawaii reported more than 10 percent of their rural primary mileage to be in poor condition.

Table 13: Percent Rural Other Principal Arterial Mileage in Poor Condition		
2012 Rank	State	2012
1	Virginia	0.00
2	Georgia	0.01
3	Nevada	0.01
4	Utah	0.02
5	Kansas	0.02
6	New Mexico	0.04
7	Mississippi	0.13
8	Texas	0.14
9	Wyoming	0.17
10	South Carolina	0.25
11	Ohio	0.26
12	Florida	0.27
13	New Hampshire	0.29
14	Maine	0.32
15	Illinois	0.33
16	Tennessee	0.33
17	Kentucky	0.35
18	Alabama	0.38
19	Michigan	0.54
20	Colorado	0.56
21	Missouri	0.65
22	Maryland	0.74
23	Washington	0.74
24	Pennsylvania	0.75
25	North Dakota	0.80
26	Oklahoma	0.80
27	South Dakota	0.89
28	New York	0.93
29	North Carolina	0.93
30	Nebraska	0.93
31	Arkansas	0.94
32	Oregon	0.95
33	West Virginia	0.97
34	Arizona	1.02
35	California	1.03
36	Delaware	1.11
37	Montana	1.25
38	Wisconsin	1.26
39	Indiana	1.31
40	Iowa	1.44
41	Vermont	1.95
42	Idaho	2.43
43	Minnesota	2.45
44	Louisiana	3.06
45	Connecticut	3.30
46	New Jersey	4.11
47	Massachusetts	4.52
48	Rhode Island	8.73
49	Hawaii	12.92
50	Alaska	19.98
	Weighted Average	0.89

Figure 4: States Ranked by Percent Rural Other Principal Arterial Mileage in Poor Condition, 2012



Urban Interstate/Freeway Congestion

There are several ways to measure traffic congestion. In reporting to the federal government, the states have previously used peak-hour 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 summed up these V/C calculations to determine the state mileage in various V/C categories. However, since 2009 these tables have not been published.

Therefore, this year's report uses a new congestion measure based on data from the Texas Transportation Institute's Urban Mobility Report (UMR).[2] This measure estimates the freeway lane-miles that experience operating speeds of less than 85 percent of free-flow speeds during the peak periods (6:00–10:00 AM and 3:00–7:00 PM; see Appendix). This measure differs from the earlier V/C measure in several key ways: it includes freeways and expressways (not just Interstates); it focuses on lane-miles, not centerline-miles; it includes only state data from urbanized areas (cities with populations above 50,000), excluding congestion problems in smaller towns and villages; and it is based on peak-hour speed reductions obtained from millions of cell phone users, rather than on traffic volumes and highway capacity. While the new measure still details congestion, these differences will make comparisons from previous reports somewhat difficult. Some states will see huge gains in this area; others will see huge declines. Our own comparisons of the 2011 data to the 2009 data (the last congestion data using the V/C ratio) reveal no consistent pattern as to the changes. States with a large number of cities with fewer than 50,000 residents may see gains and states with extensive freeway systems may see losses. It will likely take a few years for this measure to stabilize.

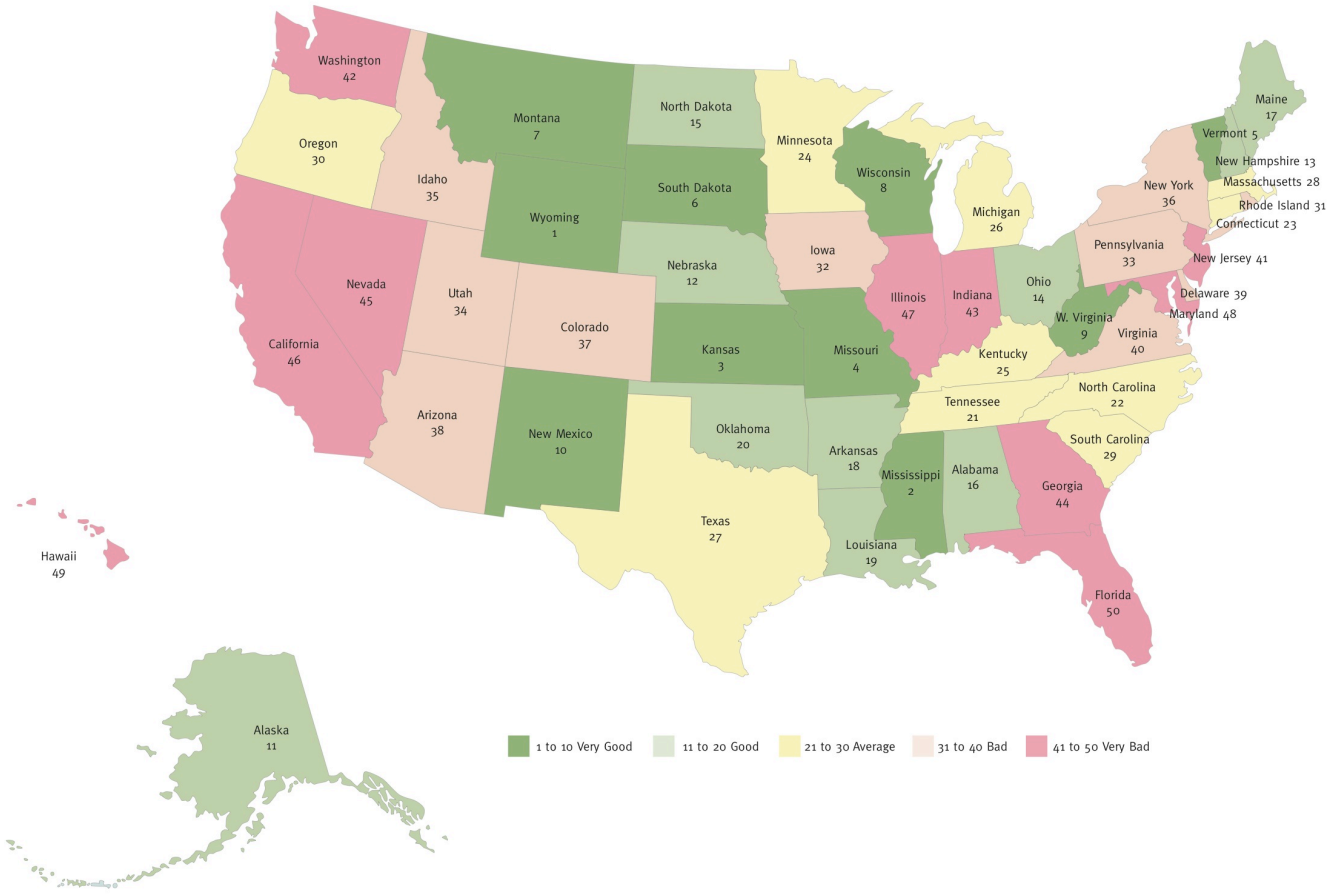
The latest statistic, 42.15 percent of urban freeway-miles congested, compares favorably with the 2009 statistic, 46.67 percent of urban Interstate-miles congested (see Table 14, Urban Interstate Congestion, and Figure 5).

In 2011, three states (Wyoming, Mississippi and Kansas) had fewer than 20 percent of urban freeway lane-miles congested, while two states (Florida and Hawaii) had more than 60 percent congested, and another six (Maryland, Illinois, California, Nevada, Georgia and Indiana) had more than 50 percent congested. The table shows that congestion continues to be a problem in urban areas.

Table 14: Percent Urban Interstate/Freeway Lane-Miles Congested

2011 Rank	State	2011 Percent Urban Interstate/Freeway Lane-Miles Congested	2009 Percent Urban Interstate-Miles Congested
1	Wyoming	15.81	0.00
2	Mississippi	16.83	29.71
3	Kansas	18.63	22.90
4	Missouri	22.46	34.45
5	Vermont	22.87	3.04
6	South Dakota	23.25	0.00
7	Montana	24.18	0.00
8	Wisconsin	25.26	43.40
9	West Virginia	25.44	1.68
10	New Mexico	26.05	19.37
11	Alaska	27.10	2.16
12	Nebraska	27.49	35.68
13	New Hampshire	28.00	35.53
14	Ohio	28.12	63.08
15	North Dakota	30.63	3.86
16	Alabama	30.99	53.68
17	Maine	31.13	2.35
18	Arkansas	31.44	45.41
19	Louisiana	31.67	36.12
20	Oklahoma	34.00	37.10
21	Tennessee	34.99	46.05
22	North Carolina	35.00	60.89
23	Connecticut	35.12	67.95
24	Minnesota	35.86	77.66
25	Kentucky	36.84	61.05
26	Michigan	37.71	36.34
27	Texas	38.53	48.59
28	Massachusetts	39.28	42.87
29	South Carolina	39.39	47.83
30	Oregon	39.59	39.76
31	Rhode Island	40.15	57.34
32	Iowa	40.39	35.99
33	Pennsylvania	41.08	41.87
34	Utah	41.51	41.78
35	Idaho	42.41	33.15
36	New York	43.25	46.43
37	Colorado	45.17	47.58
38	Arizona	45.19	46.28
39	Delaware	45.94	25.03
40	Virginia	46.39	38.13
41	New Jersey	47.36	62.77
42	Washington	48.59	32.26
43	Indiana	50.75	19.51
44	Georgia	51.77	46.84
45	Nevada	54.53	53.95
46	California	54.92	80.35
47	Illinois	55.25	41.13
48	Maryland	55.94	69.85
49	Hawaii	61.48	42.43
50	Florida	64.50	47.91
	Weighted Average	42.15	46.67

Figure 5: States Ranked by Percent of Urban Interstate/Freeway Lane-Miles Congested, 2011



Deficient Bridges

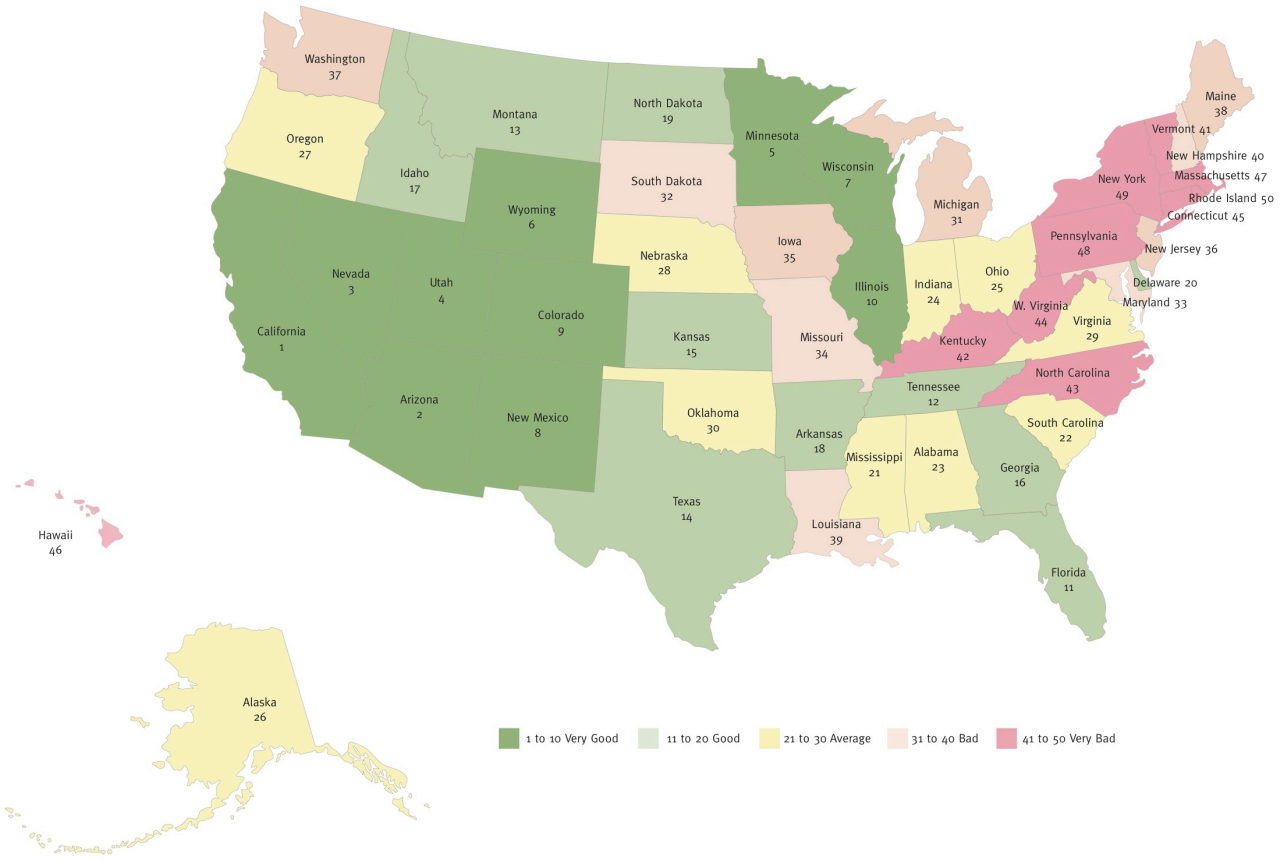
Federal law mandates the uniform inspection of all bridges for structural and functional adequacy at least every two years; bridges rated "deficient" are eligible for federal repair dollars. The National Bridge Inventory (NBI) is the source of the bridge data below, although we use summaries provided in *Better Roads* (see Appendix). Since the NBI contains a mixture of inspections, some as old as two years, the "average" inspection is about one year old. So, a December 2013 summary from the NBI would represent, on average, bridge condition as of 2012.

The condition of the nation's highway bridges continued to improve in 2012. Of the 609,233 highway bridges reported, 131,083 (about 21.52 percent) were rated deficient for 2012 (Table 15, Deficient Bridges, and Figure 6). This represents a 7.4 percent improvement over 2009 and a 4.4 percent increase over 2011.

California reported the lowest percentage of deficient bridges, 6.26 percent, while Rhode Island reported the highest, 50.52 percent. (California's reported data implies one-year repairs to over 2,800 bridges, a very large number that may be an anomaly.) Most states (42 of 50) reported at least some improvement in the percentage of deficient bridges from 2009 to 2012, with California and Oklahoma seeing the most improvement (11.3 and 5.2 percentage points, respectively). Of the eight states that reported a higher percent of deficient bridges, two (Massachusetts and Colorado) saw more than a two percentage point change, 2.8 and 2.2 points, respectively.

Table 15: Percent of Bridges in Deficient Condition		
2012 Rank	State	2012
1	California	6.26
2	Arizona	11.03
3	Nevada	11.15
4	Utah	11.35
5	Minnesota	12.68
6	Wyoming	13.14
7	Wisconsin	14.23
8	New Mexico	15.11
9	Colorado	15.65
10	Illinois	15.74
11	Florida	15.94
12	Tennessee	16.06
13	Montana	16.47
14	Texas	16.53
15	Kansas	17.09
16	Georgia	17.56
17	Idaho	18.34
18	Arkansas	18.80
19	North Dakota	19.31
20	Delaware	19.42
21	Mississippi	20.65
22	South Carolina	20.77
23	Alabama	20.91
24	Indiana	21.06
25	Ohio	21.43
26	Alaska	21.77
27	Oregon	22.04
28	Nebraska	22.91
29	Virginia	23.26
30	Oklahoma	23.36
31	Michigan	23.63
32	South Dakota	24.43
33	Maryland	24.67
34	Missouri	24.75
35	Iowa	25.05
36	New Jersey	25.33
37	Washington	25.62
38	Maine	25.77
39	Louisiana	27.80
40	New Hampshire	28.41
41	Vermont	28.73
42	Kentucky	29.18
43	North Carolina	29.19
44	West Virginia	33.69
45	Connecticut	35.88
46	Hawaii	36.80
47	Massachusetts	38.10
48	Pennsylvania	38.74
49	New York	38.82
50	Rhode Island	50.52
	Weighted Average	21.52

Figure 6: States Ranked by Percent of Bridges in Deficient Condition, 2012



Fatality Rates

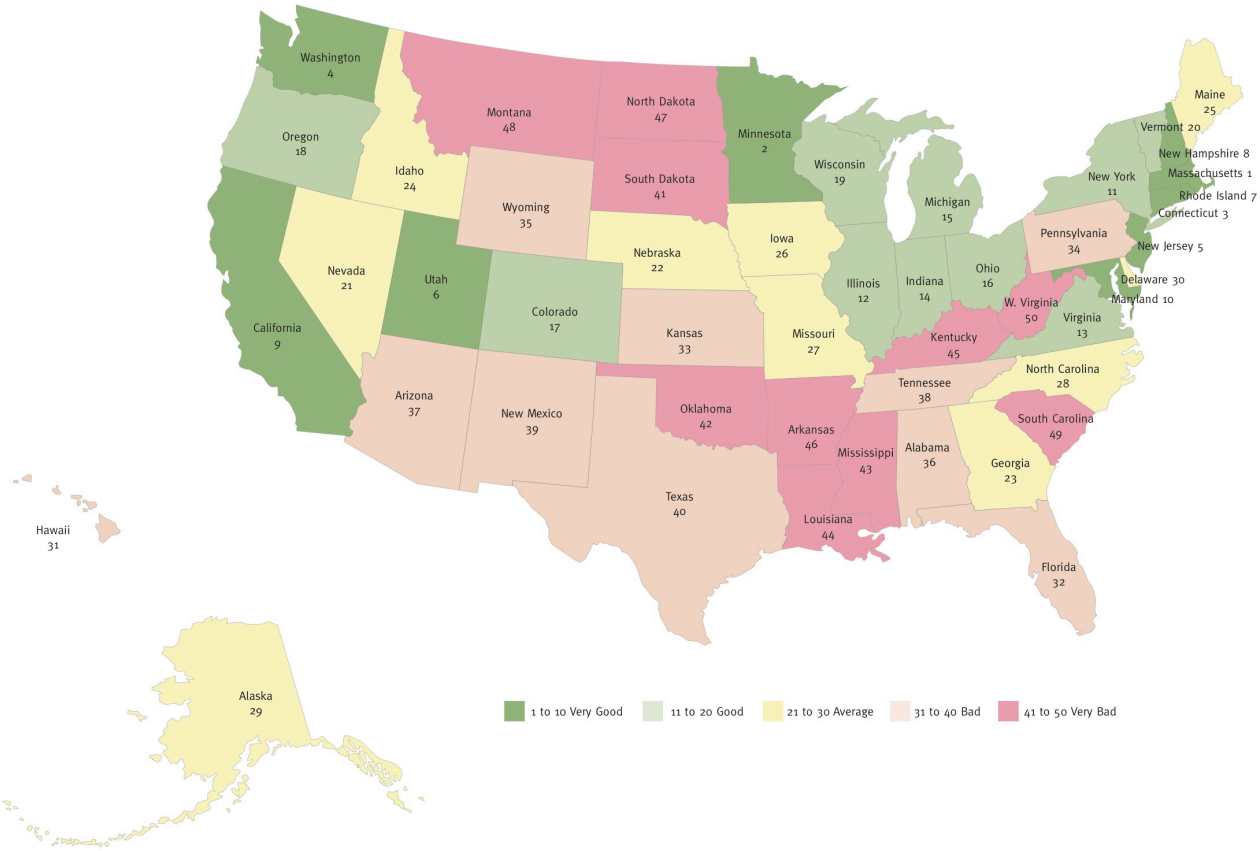
Fatality rates are an important overall measure of each state's road performance. The nation's highway fatality rate increased slightly in 2012, after decreasing for years (Table 16, Fatality Rates, and Figure 7). Although the 2012 rate of 1.13 fatalities per 100 million vehicle-miles is slightly worse than 1.10 in 2011 and 1.11 in 2010, it is better than the 1.15 rate in 2009. In 2012, 33,546 fatalities were reported, fewer than the 33,779 fatalities reported in 2009, even as VMT (vehicle-miles of travel) increased to 2.965 trillion from 2.948 trillion in 2009. Further, the National Highway Traffic Safety Administration reports that, for the first six months of 2013, the fatality rate was 1.06, which is down from the first half of 2012's rate of 1.10.[3]

For 2012, Massachusetts reported the lowest fatality rate, 0.62, while West Virginia and South Carolina reported the highest, 1.76. Most states (29 of 50) reported a reduction in their fatality rate over 2009, led by Idaho, Louisiana and Montana, which improved 0.33, 0.29 and 0.28 points, respectively. Nineteen states saw their fatality rates increase: Hawaii reported its rate increased 0.16 points and Pennsylvania, 0.12 points.

Table 16: Fatality Rate per 100 Million Vehicle-Miles

2012 Rank	State	2012
1	Massachusetts	0.62
2	Minnesota	0.69
3	Connecticut	0.75
4	Washington	0.78
5	New Jersey	0.79
6	Utah	0.82
7	Rhode Island	0.82
8	New Hampshire	0.84
9	California	0.88
10	Maryland	0.89
11	New York	0.91
12	Illinois	0.91
13	Virginia	0.96
14	Indiana	0.99
15	Michigan	0.99
16	Ohio	1.00
17	Colorado	1.01
18	Oregon	1.01
19	Wisconsin	1.04
20	Vermont	1.07
21	Nevada	1.07
22	Nebraska	1.10
23	Georgia	1.11
24	Idaho	1.13
25	Maine	1.16
26	Iowa	1.16
27	Missouri	1.21
28	North Carolina	1.23
29	Alaska	1.23
30	Delaware	1.24
31	Hawaii	1.25
32	Florida	1.27
33	Kansas	1.32
34	Pennsylvania	1.32
35	Wyoming	1.33
36	Alabama	1.33
37	Arizona	1.37
38	Tennessee	1.42
39	New Mexico	1.43
40	Texas	1.43
41	South Dakota	1.46
42	Oklahoma	1.48
43	Mississippi	1.51
44	Louisiana	1.54
45	Kentucky	1.58
46	Arkansas	1.65
47	North Dakota	1.69
48	Montana	1.72
49	South Carolina	1.76
50	West Virginia	1.76
	Weighted Average	1.13

Figure 7: States Ranked by Fatality Rates per 100 Million Vehicle-Miles, 2012



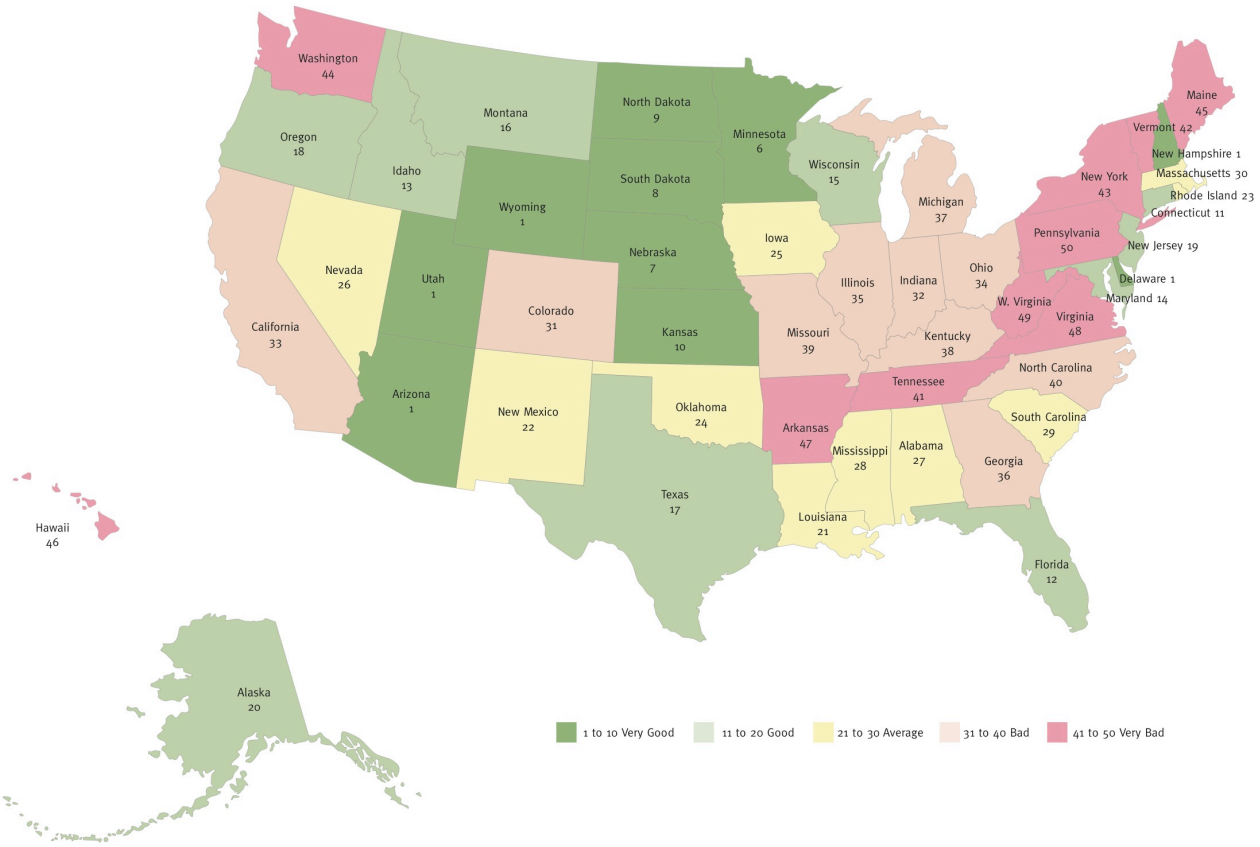
Narrow Rural Lanes

Narrow lanes on major rural primary roads are key indicators of sight visibility and road design adequacy. The national design standard for lane width on major rural roads is generally 12 feet, and few major rural primary roads could be improved without widening lanes to that standard.

In 2012, about 8.89 percent of rural other principal arterials (8,061 miles out of 90,704) had narrow lanes less than 12 feet wide (Table 17, Rural Narrow Lanes, and Figure 8), better than the 9.02 percent in 2011 and the 9.66 percent reported in 2009. For 2012, five states reporting no narrow-lane mileage. Three states (Pennsylvania, West Virginia and Virginia) had at least 40 percent of their rural other principal arterials with narrow lanes. A majority of states (26 of 50) reported improvement since 2009 or maintained the status quo. Of the 24 states experiencing worsening, four (Virginia, West Virginia, Maine and Georgia) saw double-digit percentage point increases. This may be an anomaly in the data calculations but the first three of these states have historically had a high percentage of narrow rural primary roads. Georgia, however, has historically been under five percent on this measure, but for 2012 reported 13.6 percent narrow lanes on its rural other principal arterial system.

Table 17: Percent of Rural Other Principal Arterials with Narrow Lanes		
2012 Rank	State	2012
1	Arizona	0.00
1	Delaware	0.00
1	New Hampshire	0.00
1	Utah	0.00
1	Wyoming	0.00
6	Minnesota	0.13
7	Nebraska	0.20
8	South Dakota	0.26
9	North Dakota	0.87
10	Kansas	0.93
11	Connecticut	0.96
12	Florida	1.27
13	Idaho	1.45
14	Maryland	1.78
15	Wisconsin	1.92
16	Montana	2.03
17	Texas	2.38
18	Oregon	3.45
19	New Jersey	3.85
20	Alaska	3.91
21	Louisiana	3.99
22	New Mexico	4.22
23	Rhode Island	4.30
24	Oklahoma	4.37
25	Iowa	4.46
26	Nevada	4.99
27	Alabama	5.24
28	Mississippi	5.33
29	South Carolina	5.43
30	Massachusetts	6.41
31	Colorado	7.53
32	Indiana	8.49
33	California	9.57
34	Ohio	10.74
35	Illinois	11.50
36	Georgia	13.62
37	Michigan	15.50
38	Kentucky	16.18
39	Missouri	19.46
40	North Carolina	20.22
41	Tennessee	20.24
42	Vermont	23.74
43	New York	24.93
44	Washington	26.01
45	Maine	32.08
46	Hawaii	32.15
47	Arkansas	33.07
48	Virginia	40.39
49	West Virginia	41.75
50	Pennsylvania	49.60
	Weighted Average	8.89

Figure 8: States Ranked by Percent of Rural Other Principal Arterials with Narrow Lanes, 2012



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, 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 and highway fatality rates reported by each state. For congestion, we use data from the Texas A&M Transportation Institute. 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. In cases where the data are clearly incorrect, however, we will make appropriate adjustments to the data and footnote the changes made.

Measures 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. In this study, average highway width differences, as derived from State Highway Agency lane width measures, are used to weight overall financial performance.

"State-Owned" Highway Mileage. In each state, the "state-owned" highway systems consist of the State Highway System and other systems such as toll roads or similar, state-owned smaller systems in state parks, universities, prisons, medical facilities, etc. Each state's responsibility for roads varies. In some, for instance North Carolina, the state is responsible for almost all roads outside of municipalities, while in others, such as New Jersey, the state is responsible for primarily the major multiple-lane roads. In addition, other features such as bridges also vary, with some states having many and others few.

The source of data for the "state-owned" mileage is Table HM-10, Highway Statistics 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm) and includes both State Highway Agency mileage and other jurisdiction mileage controlled by the state.

State Highway Agency (SHA) Mileage. The total numbers of miles and lane-miles for the SHA system is available for each state. From this data, the average lane-miles per centerline-mile are calculated and then

used to weight overall financial performance. The source of data for SHA mileage is Table HM-81, Highway Statistics 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm).

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 is collected for the first three categories (capital and bridge work, maintenance activities, administration) as well as for the total expenditures.

The source of all this data is Table SF-4, Highway Statistics 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm). These disbursements are divided by "mileage under state control" to arrive at a relative measure of expenditure per unit. The national average is the weighted average, obtained by summing the 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 being rated lowest.

Capital and Bridge Disbursements; 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, particularly on "capital" and "maintenance" actions. Most states use contracts with the private sector to build and reconstruct the system, although in some cases they may also use their own work forces for some major jobs. Most states also conduct maintenance largely with agency forces and the work is generally light in character, but some 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 two to three percent fewer funds than they collect, the difference resulting from timing differences and delays in getting projects completed. 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 Road Condition

Perhaps no measure is more fundamental to road performance than a measure of 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 this data, but most use mechanical or laser equipment driven over the road system. They often supplement this 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 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 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm), 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. 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 per 100 feet) would be classified as "excellent." (Delaware has no rural Interstate and is not rated on this measure).

Urban Interstate Poor-Condition Mileage. 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 connectors, off the Interstate system, connecting different regions. They can be U.S.-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 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.

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 rated structurally deficient) and maintain uniform records of inspections. This data source, titled the National Bridge Inventory (NBI), provides information on deficient bridges. Bridges are classified as "deficient" if their structural elements score poorly ("structural deficient") or if they are no longer functionally adequate ("functionally inadequate") for the road system. On average, about ½ of "deficient" bridges are in each category. 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, a December 2013 summary from the Inventory would represent, on average, bridge condition as of December 2012.

While deficient bridge data is in the NBI, we have used 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 2013 *Better Roads* Bridge Inventory (http://www.betterroads.com/the-state-of-the-nations-bridges/) contains data collected though October 2013.

Narrow Lanes on Rural Other Principal Arterials (ROPAs)

Narrow lanes on rural roads are a surrogate measure for system quality, since no data on other features such as sight distance, shoulder width or pavement edge drop-offs are readily available nationwide. The standard lane width for most major rural roads is 12 feet, and it is unlikely that a major rural road would be upgraded without widening its lanes to that standard.

The source of lane width data is Table HM-53, Highway Statistics 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm), which shows the mileage of roads, by functional class, in various lane-width categories, by state. For our purpose, we use the percentage of mileage on the ROPA system with less than 12-ft lanes, to adjust for different system lengths in different states. The national average is a weighted average across all states.

Urban Freeway Congestion

Urban freeway congestion is measured as the percent of the urban freeway system (Interstates plus freeways and expressways) that experiences operating speeds less than 85 percent of free-flow speeds during the peak periods (6:00–10:00 AM and 3:00–7:00 PM). This measure differs from the measure used in previous versions of this annual report. In prior reports, urban congestion was assessed for Interstates only (freeways and other expressways were not included) and was based on the ratio of traffic volume to the maximum

carrying capacity of each road section. This ratio was calculated from data in Table HM-61 or Table HM-42 of the Highway Statistics series, tables which are no longer being published.

There are multiple sources required to calculate the new measure. The base data are available in the 2012 *Urban Mobility Report Powered by INRIX Traffic Data (UMR)* and its supporting materials (http://mobility.tamu.edu/ums). This report, produced annually by the Texas A&M Transportation Institute, provides empirical congestion data for 100 cities across the nation (all "very large" and "large" cities with populations above one million, 33 "mid-size" cities with populations between 500,000 and 1,000,000, and 21 "small" cities with populations between 50,000 and 500,000). The congestion data for each city include the total freeway lane-miles and the percent of the system that is congested. The 2012 *UMR* (based on 2011 data) is the most recent so 2011 data is the latest congestion data available.[4]

The source of urbanized area background data is Table HM-71 Highway Statistics 2011 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm), which lists the 497 urbanized areas in the U.S. with populations above 50,000 and includes population, as well as mileage and vehicle-miles of travel (VMT) by functional class of the various highways and streets in each urban system. The non-*UMR* cities include three "mid-size" and 383 "small" cities. Since there are 497 urbanized areas in 2011 HM-71 but only 100 in the *UMR*, the *UMR* data must be "stretched" to apply to all non-*UMR* cities. To do this, we developed regression equations using two parameters known for all cities (population and freeway-miles) and one parameter known only for the *UMR* cities (congested freeway lane-miles).

For mid-size cities:[5]

Congested Freeway Lane-Miles = 0.0922 * Population (K) + 1.26 * Freeway-Miles

For small cities:[6]

Congested Freeway Lane-Miles = 0.0922 * Population (K) + 1.10 * Freeway-Miles

These equations show that congested freeway mileage increases with increasing population and increasing freeway mileage.

The estimates of congested freeway lane-miles resulting from the use of these regression equations did not always correspond with the actual number of freeway-miles (e.g., some cities had more lane-miles congested than they had freeway lane-miles). Affected locations tended to be cities with few or no freeway-miles; their congested lane mileage was adjusted to be in line with total lane mileage.

Many urbanized areas have freeway mileage in more than one state. For instance, the Charlotte, North Carolina region has freeway mileage in both North Carolina and South Carolina. In these cases, we spread the *congested* freeway lane mileage across the relevant states, using the freeway mileage based on urban area data in Table HM-72 Highway Statistics 2008 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm), which is the most recent available data. This dataset breaks out freeway mileage by state for those multi-state cities.

Once the congested freeway lane mileage is calculated for all urban areas and assigned by state for multi-state cities, we use MS Excel pivot tables to total the data by state. Then, we compare these data to state-level total urban freeway lane-mile data from Table HM-60 Highway Statistics 2011 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm). Finally, we express each state's congested lane-miles as a percent of the state's total urban freeway lane-miles, with the national average being the weighted average.

Compared to our prior method, this method has the effect of increasing the congestion in some rural states and in metropolitan areas that are not on the Interstate system. It also uses more current data and is more adaptable to changing federal reporting trends.

Fatality Rates

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 mileage. The sources of each are Tables FI-20 and VM-2, Highway Statistics 2012 (http://www.fhwa.dot.gov/policyinformation/statistics.cfm). Table FI-20 provides a count of fatalities by state and highway functional class and Table VM-2 provides an estimate of daily vehicle-miles of travel for each state by functional class. The national average fatality rates are the weighted averages across the states.

Percentages Not Actual Numbers

For all 11 of the ranked categories the affected number is divided by the total number to determine the percent. To calculate rural Interstate poor-condition mileage, the number of miles of rural Interstate pavement in poor condition is divided by the total number of miles of rural Interstate pavement to compute the percentage of rural Interstate pavement in poor condition. To calculate deficient bridges, the number of deficient bridges is divided by the total number of bridges to compute the percentage of deficient bridges. All rankings in this report are based on a percentage, not an absolute number.

Overall Ratings

The 2012 overall ratings for each state are developed in several steps:

- First, the relative performance of each state on each of 11 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)

  N = Number of measures (11 for 49 states, 10 for Delaware, which has no rural Interstate)

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

- For the four financial measures, these ratios are adjusted for the average width of each state's system, on the belief that states with wider roads (those with more lanes per mile, on average) should be given some credit for their extra per-centerline-mile costs.

  $$R'_{is} = R_{is}\,(L_s/\mathbf{L}),$$

  where L_s is the average SHA lanes-per-mile "i" for state "s", and **L** is the weighted average of the lanes-per-mile, over 50 states.

- Then, all 11 ratios (10 ratios for Delaware, which has no rural Interstate system) are averaged:

  $$\text{Performance Ratio for state "s"} = \left(\sum_{1}^{11} R'_{is}\right)/11$$

  This method essentially treats each of the 11 measures as equally important.

Overall

Since several agencies are included in each state's reports, this report should *not* be viewed as a cost-effectiveness study 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.

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This report does not represent an engineering analysis, standard, specification or legal statement, and is not to be construed as the practice of engineering. The Hartgen Group and its principal, David T. Hartgen, do not perform engineering work or practice engineering. The views expressed in this report are those of the authors and not necessarily the views of any organization.

Endnotes

[1] S. Davis et al, *Transportation Energy Data Book*, Edition 32, Oak Ridge National Laboratory, July 2013. At www.cta.ornl.gov/data.

[2] T. Lomax and D. Shrank, *2012 Urban Mobility Report* (College Station TX: Texas A&M University, March 2012). At www.tamu.edu.

[3] Eisenstein, P.A., "U.S. traffic fatalities drop sharply, reversing trend," NBC News Online, October 31, 2013, available at: http://www.nbcnews.com/business/autos/us-traffic-fatalities-drop-sharply-reversing-trend-f8C11503973

[4] While there are published 2012 INRIX congestion data and available 2012 HPMS data (both inputs to the *UMR*), the algorithms used in the *UMR* are too complex and resource intensive for the 2012 "total freeway lane-miles" and "percent of the freeway system congested" variables to be calculated "on the side." Instead, the 2012 congestion data will be included in the next annual performance report.

[5] R^2 = .914; p-value for population coefficient = .0383; p-value for freeway miles coefficient = .0000996

[6] R^2 = .901; p-value for population coefficient = .0633; p-value for freeway miles coefficient = .00113

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