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15TH ANNUAL PERFORMANCE OF STATE HIGHWAY SYSTEMS (1984–2004)

By David T. Hartgen, Ph.D., P.E., and Ravi K. Karanam
Project Director: Adrian T. Moore, Ph.D.



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Part I

Overview

This study tracks the performance of state-owned roads from 1984 to 2004. Twelve indicators – covering the states’ highway revenues and expenditures, pavement and bridge condition, congestion, accident rates, and narrow lanes - make up each state’s overall rating. Rankings are based on spending and performance data submitted to the federal government by the state highway agencies.

Over half of urban interstates remain congested and one-fourth of bridges are still rated deficient, according to analysis of government highway performance data. Delays in passing the new highway program slowed highway capital improvements and led directly to performance declines between 2003 and 2004. Congress’s passage of new federal highway legislation came just in time to avert declines in highway performance.

After six years of generally improving performance from 1998 to 2003, capital funding for the US highway system stalled and several key indicators turned down in 2004.

Expenditures for major highway improvements declined in 2004 for the first time in 21 years, as the states waited for congressional action on a new highway program. That action did not come until August 2005. With prices for construction materials also on the rise, the effective drop in capital funds was 6.3 percent. Attention to maintenance increased slightly but the effort was not enough to forestall declines in system performance. Congestion remained stubbornly resistant to improvement. Almost 52 percent of urban interstates were reported congested in 2004, virtually unchanged from 2003.

Even more dramatic was the worsening of the condition of the rural interstate. Between 2003 and 2004 about 92 miles fell into poor condition. The condition of the major rural highways also worsened. Although the urban interstate system improved slightly, the mileage improved was not enough to offset losses of rural roads.

Analysis of the 2004 data revealed some good news. The percentage of deficient bridges continued to improve, extending a long term trend, but one-fourth of bridges are still rated deficient. Fatality rates also improved.

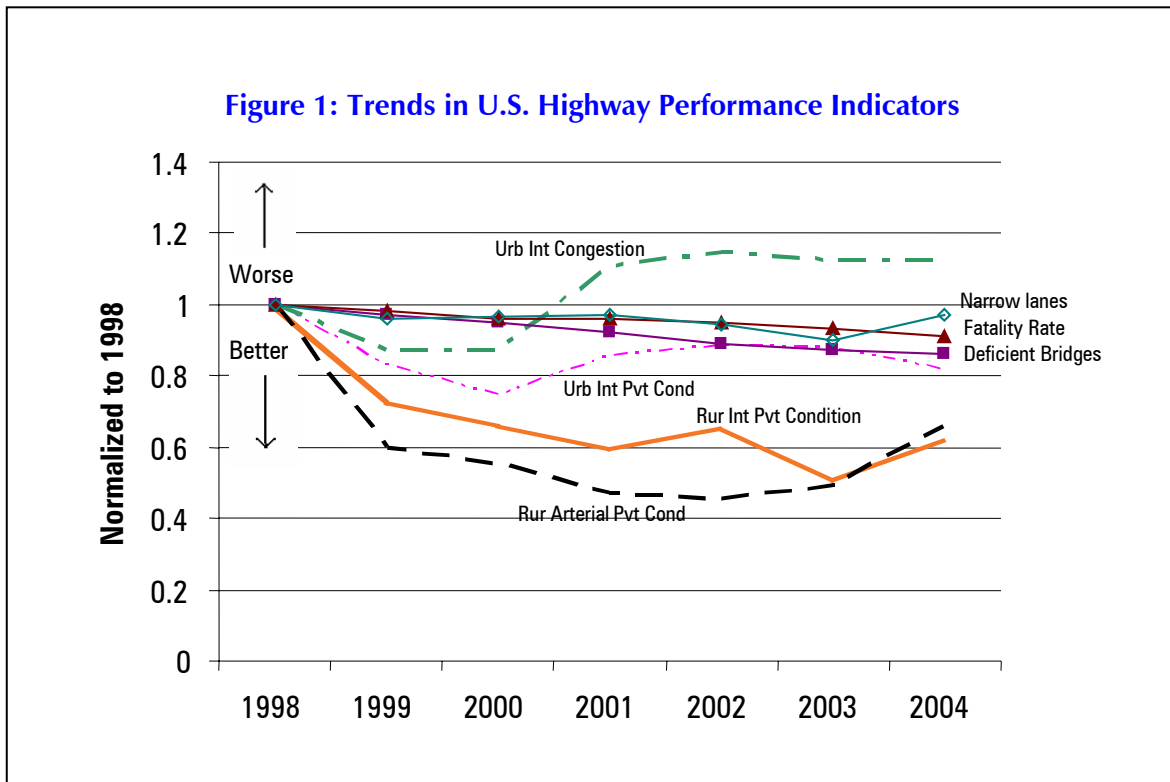


Table 1A: Expenditures and Performance of State-Owned Highways, 1998-2004				
Statistic	1998	2003	2004	Percent Change, 03-04
Total Revenues, All Sources, \$B	\$67.80	\$88.70	\$90.68	2.2
Total Expenditures, \$B	\$66.40	\$91.50	\$87.69	-4.1
Expenditures, Capital/Bridges, \$B	\$36.30	\$49.30	\$47.74	-3.2
Expenditures, Maintenance, \$B	\$11.40	\$14.10	\$14.29	1.3
Expenditures, Administration, \$B	\$4.70	\$6.50	\$6.32	-2.8
Highway Construction Price Index	126.9	149.8	154.4	3.1
Rural Interstate, Percent Poor Condition	3.25	1.64	2.02	23.1
Urban Interstate, Percent Poor Condition	8.69	7.62	7.13	-6.4
Rural Primary, Percent Poor Condition	1.42	0.76	0.94	23.7
Urban Interstate, Percent Congested	45.9	51.8	51.60	0.4
Bridges, Percent Deficient	29.0	25.4	25.03	-1.5
Fatality Rate per 100 Mil Miles Driven	1.58	1.48	1.44	-2.7
Rural Primary, Percent Narrow Lanes	11.04	9.94	10.72	7.8

The analysis revealed wide variation among the states in road performance. Just 4 states (**New York, Alabama, California, and Michigan**) have over half the poor rural interstate mileage in the country. And three states (**California, Minnesota and North Carolina**) have more than 70 percent of their urban interstates congested. The states also vary widely by fatality rates. Massachusetts reported the lowest rate, Mississippi the highest.

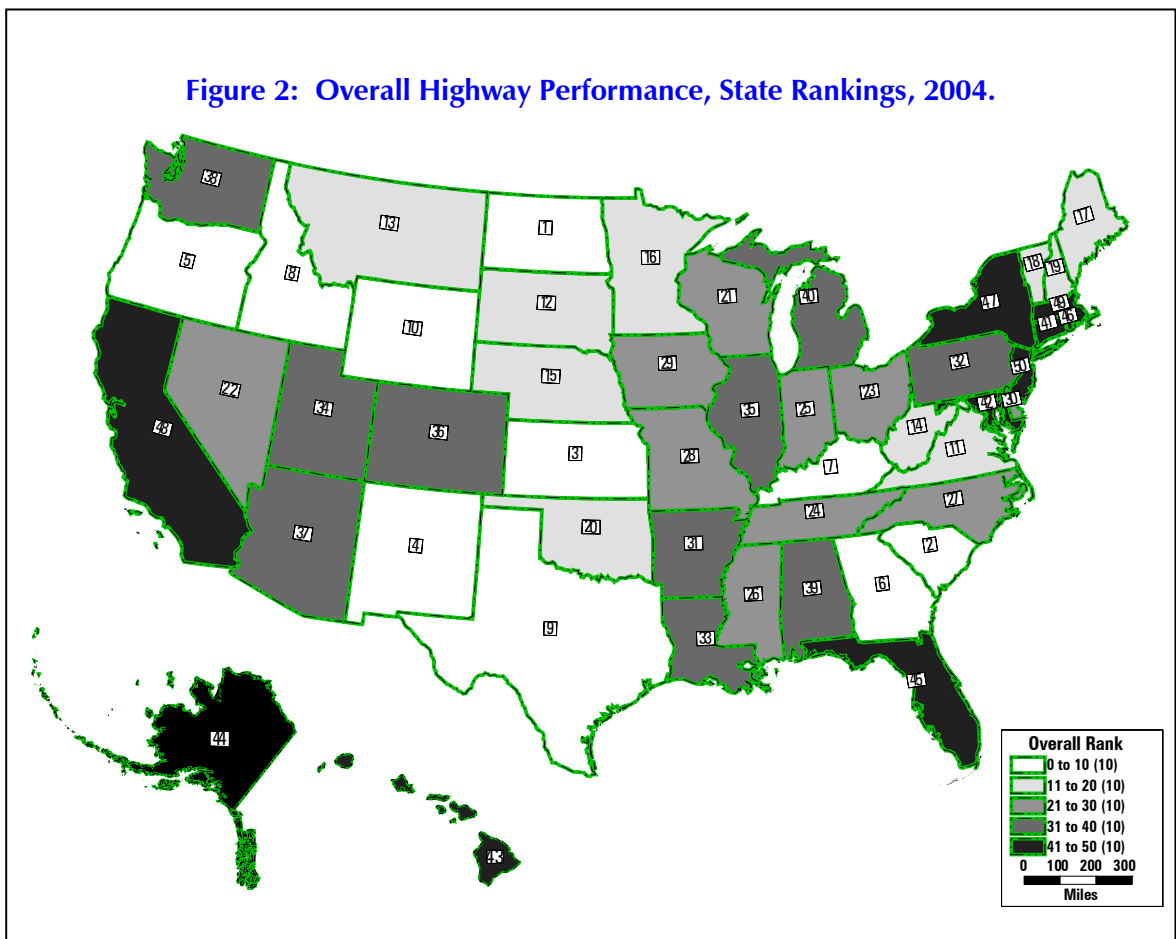
Congress passed new highway legislation in August 2005 which increased highway funding by about 40 percent - just in time to avert a looming drop in performance. Without it, the nation would be confronting tumbling road conditions. But the lack of progress in reducing congestion is cause for serious concern. It is simply unacceptable for half of the urban interstates to be congested. In order to make progress, states need to re-think their priorities and focus more on congestion reduction and mobility provision.

Part 2

Cost-Effectiveness Rankings of the States

This report continues an annual ranking of the state highway systems on costs versus effectiveness. Since the states have different budgets, system sizes and traffic, comparative performance depends on both system quality and on resources available. To determine relative performance the state highway budgets (per mile of responsibility) are compared with system performance, state by state. Highly ranked states typically have good-condition systems along with relatively thin budgets (Figure 2).¹

Figure 2: Overall Highway Performance, State Rankings, 2004.



This report continues an annual ranking of the state highway systems on costs versus effectiveness: comparative performance depends on both system quality and on resources available.

The following table shows the results for 2004. The top three states in overall cost-effectiveness - **North Dakota, South Carolina and Kansas** – are followed by **New Mexico, Oregon, Georgia, Kentucky, Idaho, Texas and Wyoming**.

Several states improved their rankings sharply from 2003:

- **Vermont** jumped from 35th to 18th after a sharp improvement in its rural principal arterial pavement condition, from 3.8 to 0.9 percent poor.
- **Oklahoma** moved up from 30th to 20th after a reduction in total expenditures from \$1.12 billion in 2003 to \$983 million in 2004, along with a significant improvement in urban interstate pavement condition from 20.9 percent poor to 13.7 percent poor.
- **Maine** improved from 27th to 17th by reducing its percentage of rural primary in poor condition from 2.5 percent to 1.5 percent.
- **Virginia** improved from 21st to 11th by reducing its urban interstate poor mileage from 3.8 to 2.7 percent, and its rural primary poor mileage from 0.8 to 0.1 percent.
- **West Virginia** also improved 10 spots, from 24th to 14th, by improving its rural primary mileage from 1.0 to 0.3 percent poor.
- **Arkansas** improved its rank from 41st to 31st by improving its rural primary from 1.4 to 0.5 percent poor.

Table 1B: State Ranks				
State	1998 Overall Cost-Effectiveness Rating	2003 Overall cost-Effectiveness Rank	2004 Overall cost-Effectiveness Rank	Change, 2003-2004
North Dakota	1	1	1	0
South Carolina	4	3	2	1
Kansas	11	10	3	7
New Mexico	31	5	4	1
Oregon	8	9	5	4
Georgia	6	4	6	-2
Kentucky	9	15	7	8
Idaho	5	11	8	3
Texas	7	6	9	-3
Wyoming	2	2	10	-8
Virginia	18	21	11	10
South Dakota	15	8	12	-4
Montana	3	7	13	-6

Table 1B: State Ranks				
State	1998 Overall Cost-Effectiveness Rating	2003 Overall cost-Effectiveness Rank	2004 Overall cost-Effectiveness Rank	Change, 2003-2004
West Virginia	22	24	14	10
Nebraska	17	18	15	3
Minnesota	32	14	16	2
Maine	12	27	17	10
Vermont	34	35	18	17
New Hampshire	16	25	19	7
Oklahoma	27	30	20	10
Wisconsin	29	23	21	2
Nevada	13	16	22	-6
Ohio	28	17	23	-5
Tennessee	26	22	24	-2
Indiana	23	19	25	-6
Mississippi	19	26	26	0
North Carolina	35	36	27	9
Missouri	14	34	28	6
Iowa	25	31	29	2
Delaware	38	39	30	-9
Arkansas	47	41	31	10
Pennsylvania	33	33	32	1
Louisiana	39	38	33	5
Utah	30	20	34	-14
Illinois	36	32	35	-3
Colorado	45	45	36	9
Arizona	20	28	37	-9
Washington	24	29	38	-9
Alabama	10	13	39	-26
Michigan	42	43	40	3
Connecticut	41	42	41	1
Maryland	37	37	42	-5
Hawaii	46	46	43	3
Alaska	21	12	44	-42
Florida	40	44	45	-1
Rhode Island	43	40	46	-6
New York	48	47	47	0
California	44	48	48	0
Massachusetts	49	49	49	0
New Jersey	50	50	50	0

States that significantly improved their ranking include Vermont, Oklahoma, Maine, Virginia, West Virginia and Arkansas. States that lost ground include Alaska, Alabama, and Utah.

On the other hand, several states lost ground between 2003 and 2004:

- **Alaska** slipped from 12th to 44th, because of large increases in the percent poor of rural interstate pavement and rural principal arterials from 0 to 2.1 percent, and 0.1 to 17.2 percent, respectively.
- **Alabama** slipped from 13th to 39th. The percent poor of rural interstate pavement increased sharply from 0 to 11.2 percent and urban interstate pavement poor percent increased 2.7 to 20.7 percent.
- **Utah** slipped from 20th to 34th because of sharp increases in the total receipts, which doubled from \$825 million in 2003 to \$1.6 billion in 2004 but no large improvements in performance.

Detailed data and trends in rankings for each of the states are shown in the tables accompanying this report:

Table 16: State Rankings, 1998-2004

Table 17: Comparative State Data, 2004

Part 3

Trends in Performance Indicators

Details on the trends of performance measures follow. Selected system condition measures are also shown in the attached maps.

A. System Extent

State-Controlled Miles: State-controlled miles include the State Highway Systems, state-agency toll roads, some ferry services, and state-owned systems serving universities and state parks. Nationwide, about 810,707 miles are under state control ([Table 2, Mileage](#)), about 1000 more than in 2003. The smallest state-owned road systems continue to be **Hawaii** (988 miles) and **Rhode Island** (1,113 miles); the largest in **Texas** (79,624 miles) and **North Carolina** (79,619 miles).

State Highway Agency Mileage: About 773,295 miles are the responsibility of the 50 state highway agencies ([Table 3, SHA Lane-Miles](#)). In most states these are generally the Interstates and other major US-numbered and State-numbered roads, but a few states also manage major portions of the rural road system. A few states (**New Jersey, Florida, California, and Massachusetts**) manage significantly wider roads.

B. Resources

Receipts for State-Administered Roads: The states obtain their road funds primarily from state-imposed road user fuel taxes and fees, the federal government, general funds, tolls, bonds and other financial initiatives. In 2004 the states received about \$90.68 billion for state-administered roads, up 2.3 percent from 2003 ([Table 4, Receipts for State-Administered Highways](#)). Since 1984, per-mile receipts for state-owned roads have increased about 182.1 percent. In 2004, receipts per mile of responsibility averaged \$111,854, and ranged from a low of \$27,017 per mile of responsibility for **South Carolina** to a high of \$ 1,273,414 for **New Jersey**.

Capital and Bridge Disbursements: For the first time in the 15-year history of this series, capital and bridge disbursements for state-owned roads declined. They totaled \$47.737 billion in 2004, about 3.1 percent lower than in 2003 ([Table 5, Capital and Bridge Disbursements](#)). This reflects the

slow-down in capital improvements as Congress debated the future of the federal highway program. But since 1984, per-mile capital and bridge disbursements have increased about 194.3 percent. On a per-mile basis, 2004 capital and bridge disbursements averaged \$58,884, down 3.2 percent from 2003. On a per-mile basis, 2004 capital and bridge disbursements ranged from a low of \$16,112 in **South Carolina** to a high of \$547,032 in **New Jersey**.

Maintenance Disbursements: Some funds were diverted to maintenance as the states waited. Maintenance disbursements increased 1.3 percent from 2003 to 2004, and accounted for about 16.3 percent of total disbursements (**Table 6, Maintenance Disbursements**). However, since 1984 per-mile maintenance disbursements have increased about 138.5 percent. On a per-mile basis 2004 maintenance disbursements per mile of responsibility averaged about \$17,633. The lowest per-mile maintenance disbursement was \$4,924 in **North Dakota**, the highest \$129,465 in **New Jersey**.

Administrative Disbursements: Administrative disbursements also turned down: they totaled \$6.319 billion in 2004, about 2.03 percent lower than in 2003 (**Table 7, Administrative Disbursements**). But administrative costs accounted for about 7.21 percent of total disbursements, up from 7.05 percent in 2003. Since 1984, per-mile administrative disbursements have increased about 198 percent. On a per-mile basis, 2004 administrative disbursements averaged \$7,795, ranging from a low of \$1,749 in **Arkansas** to a high of \$80,434 in **New Jersey**.

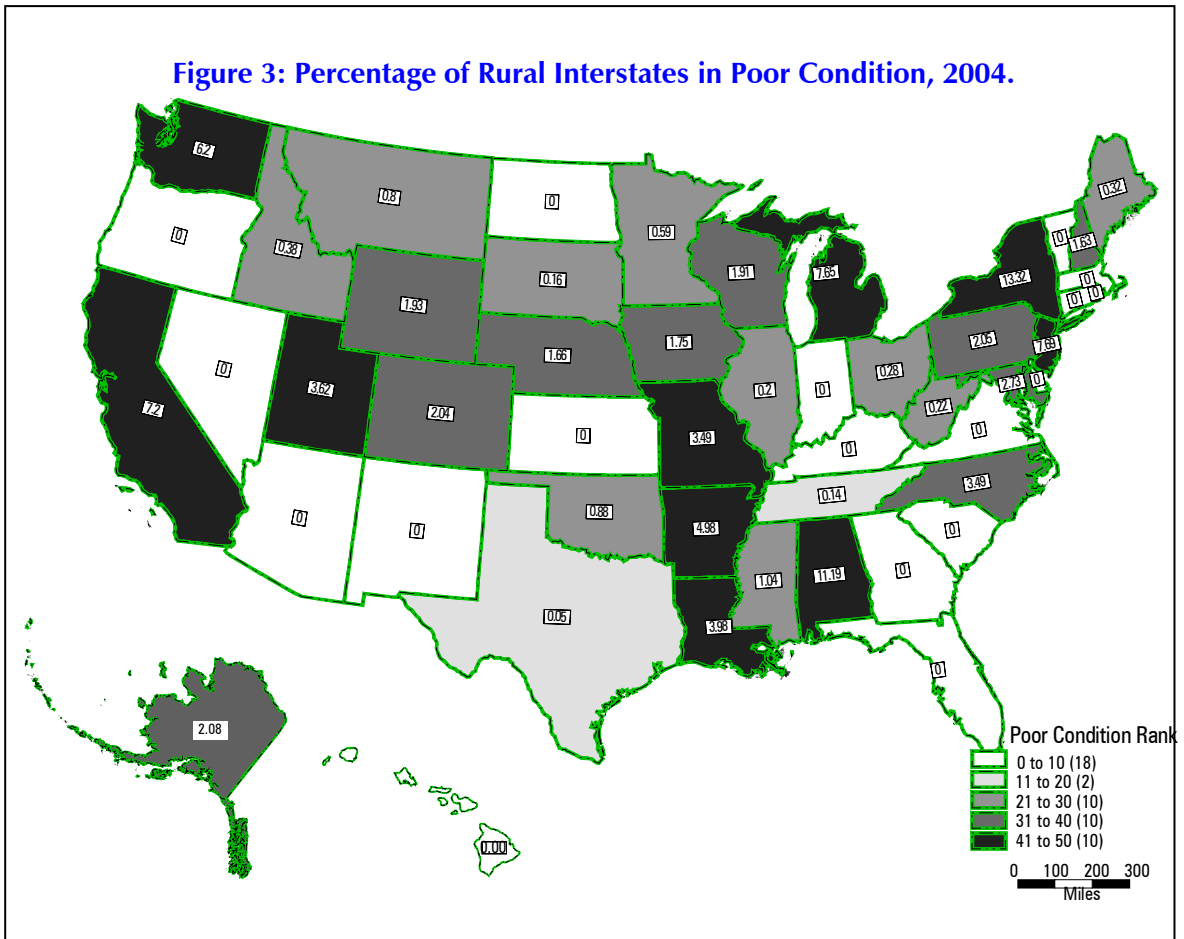
Total disbursements: Total state disbursement for highways also turned down. In total, the states disbursed about \$87.690 billion for state-owned roads in 2004, about 4.1 percent lower than in 2003 (**Table 8, Total Disbursements**). Since 1984, per-mile total disbursements have increased about 191 percent. On a per-mile basis, 2004 disbursements averaged \$108,166. The lowest disbursement per mile was \$28,543 in **South Carolina**, the highest \$1,181,613 in **New Jersey**.

C. System Performance

Rural Interstate Condition: Road condition is measured using special machines that determine the roughness of road surfaces. (A few states continue to use visual ratings). In a reversal from the improvement of most prior years, the condition of the rural interstate system worsened in 2004. About 2.02 percent US rural interstates – 632 miles out of 31,341 - were reported in poor condition in 2004 (**Table 9, Rural Interstate Condition**, and Figure 3). This is up slightly from 2003, when just 1.69 percent of rural interstates were rated poor. Nationwide, about 92 more miles were rated poor than in 2003. In spite of these reversals, since 1984 the percentage of poor-condition mileage has been substantially reduced.

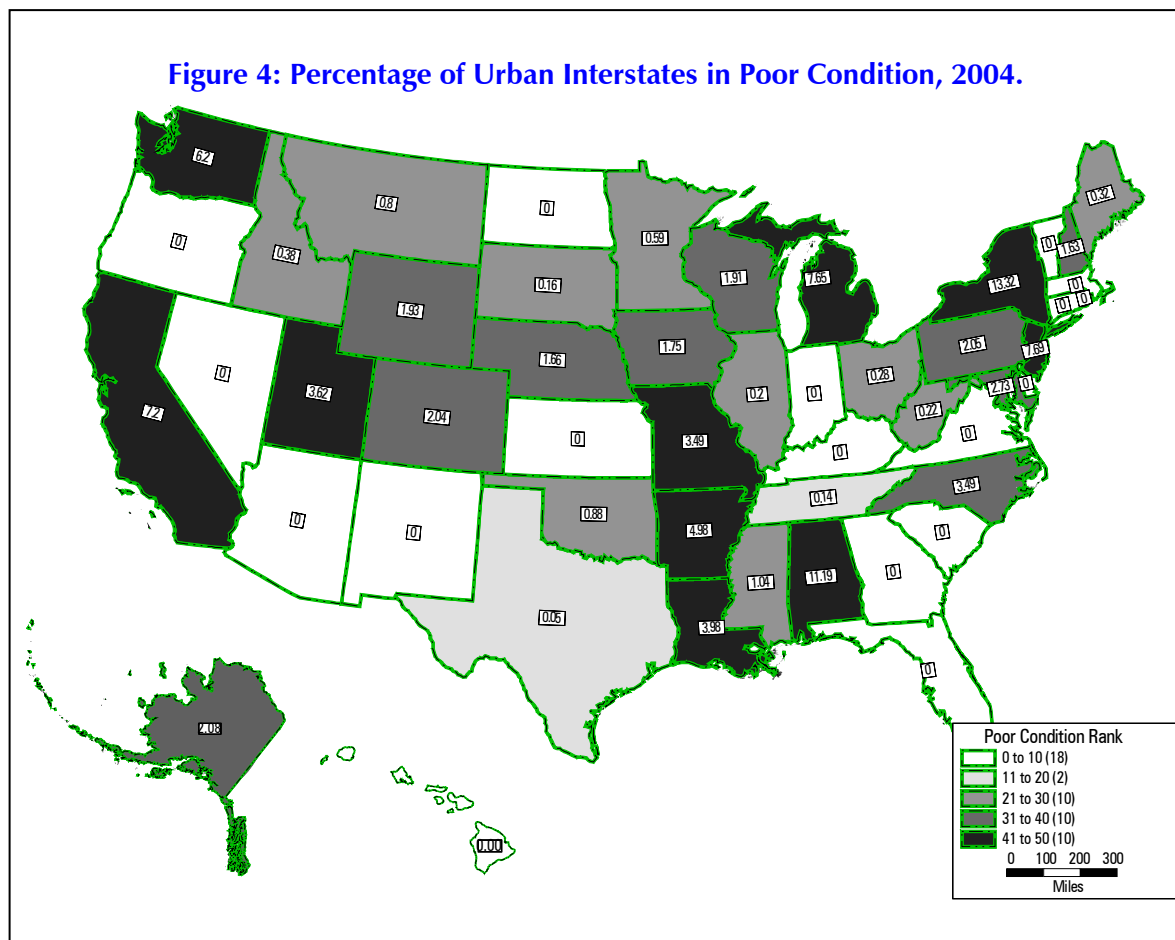
The amount of poor mileage varies widely. Seventeen states reported no poor mileage, and 11 more reported less than 1 percent poor mileage. But 6 states reported more than 5 percent poor mileage, and two states (**New York and Alabama**) reported more than 10 percent poor mileage. **Alabama** and **New York** also reported a significant increase in poor mileage from 2003 to 2004. Just 4 states (**New York, Alabama, California, and Michigan**) have over half the poor mileage in

the country. On the other hand, several states made great progress: both **Mississippi** and **Colorado** cut their poor-mileage rural interstate by more than half.



Urban Interstate Condition: The urban interstates consist of major multi-lane interstates in and near urban areas. In contrast to rural interstates, the condition of the urban interstate system improved slightly in 2004, to 7.13 percent poor from 7.62 percent poor in 2003 (Table 10, Urban Interstate Condition, and Figure 4).

The condition of the urban interstate also varies widely. Six widely scattered states reported no poor urban interstate mileage, while three states (**Hawaii, Alabama, and California**) reported more than 20 percent poor mileage. The percent poor in the state of Alabama shot up from 2.66 in 2003 to 20.74 in 2004. But just five states (**California, New York, Michigan, Alabama and New Jersey**) have over half of the poor-mileage urban interstate in the country. Since 1998, the percentage of poor urban interstate mileage has been reduced about 18 percent.

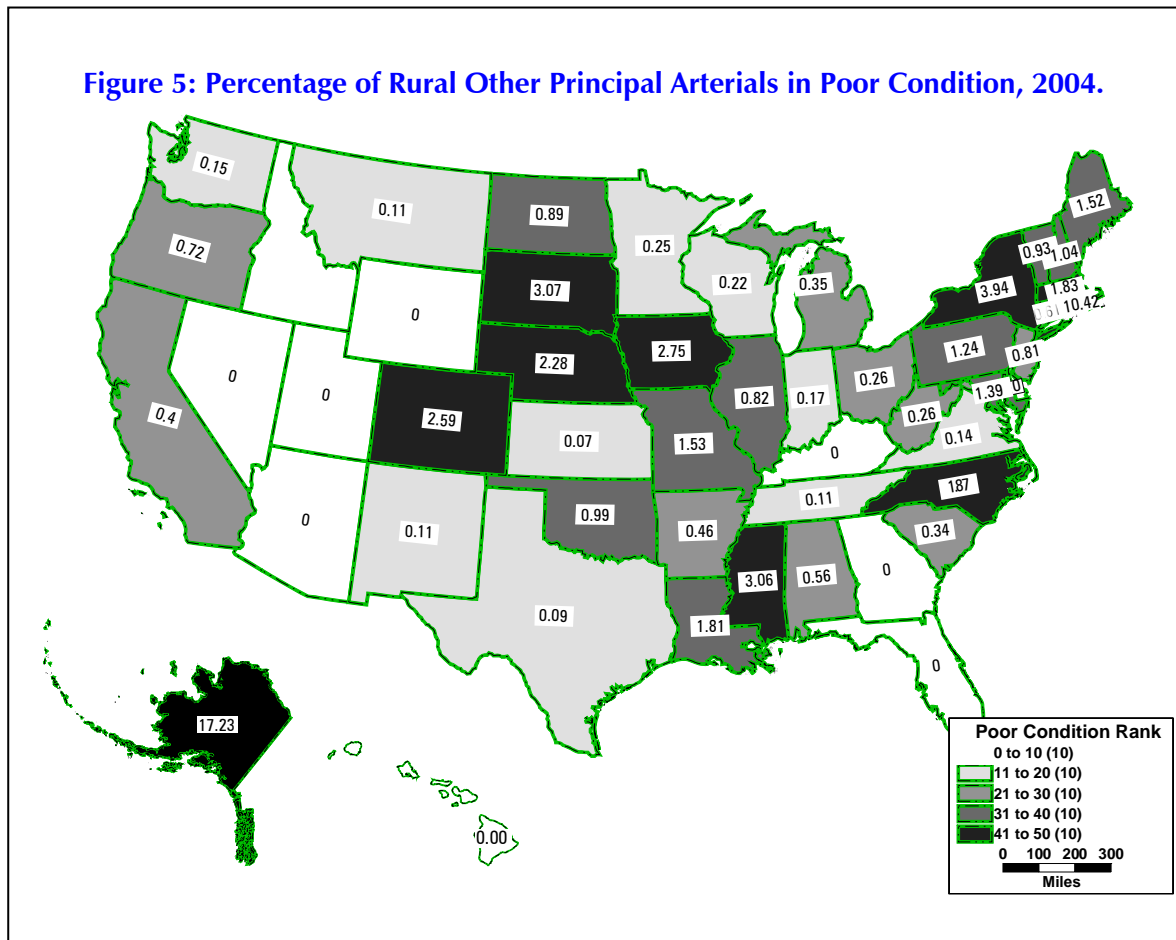


Rural Arterial Pavement Condition: As hinted in 2003, the condition of the major rural highways worsened slightly from 2003 to 2004. Overall, about 0.94 percent of the rural other principal arterial system – 892 miles out of 95,390 – was reported in poor condition (Table 11, Rural Primary Pavement Condition, and Figure 5). This compares with 0.76 percent, about 733 miles, in 2003. Since 1998, the percentage of poor rural primary mileage has decreased significantly, almost one-third. However, the continued decline from 2002 to 2004 means that, barring a significant re-focus under SAFETY-LU, progress in improving the rural primary system has ended.

The states also vary widely in condition. Nine states reported no poor rural primary mileage in 2004, whereas two states (**Rhode Island and Alaska**) reported large increases, from about 0 percent to over 10 percent, from 2003 to 2004. Three other states (**Mississippi, South Dakota and New York**) reported more than 3 percent poor. Just 6 states (**Alaska, Iowa, New York, South Dakota, Colorado, and Nebraska**) account for more than half the poor mileage in the country.

Urban Interstate Congestion: There is no generally accepted definition of traffic congestion, but in reporting to the federal government the states use the volume-to-capacity ratios that are determined by Transportation Research Board's Highway Capacity Manual. The congestion

measures for 2004 are not fully comparable with earlier years since most states increased the rated capacities of Urban Interstates based on the 1997 and 2000 Highway Capacity Manuals.

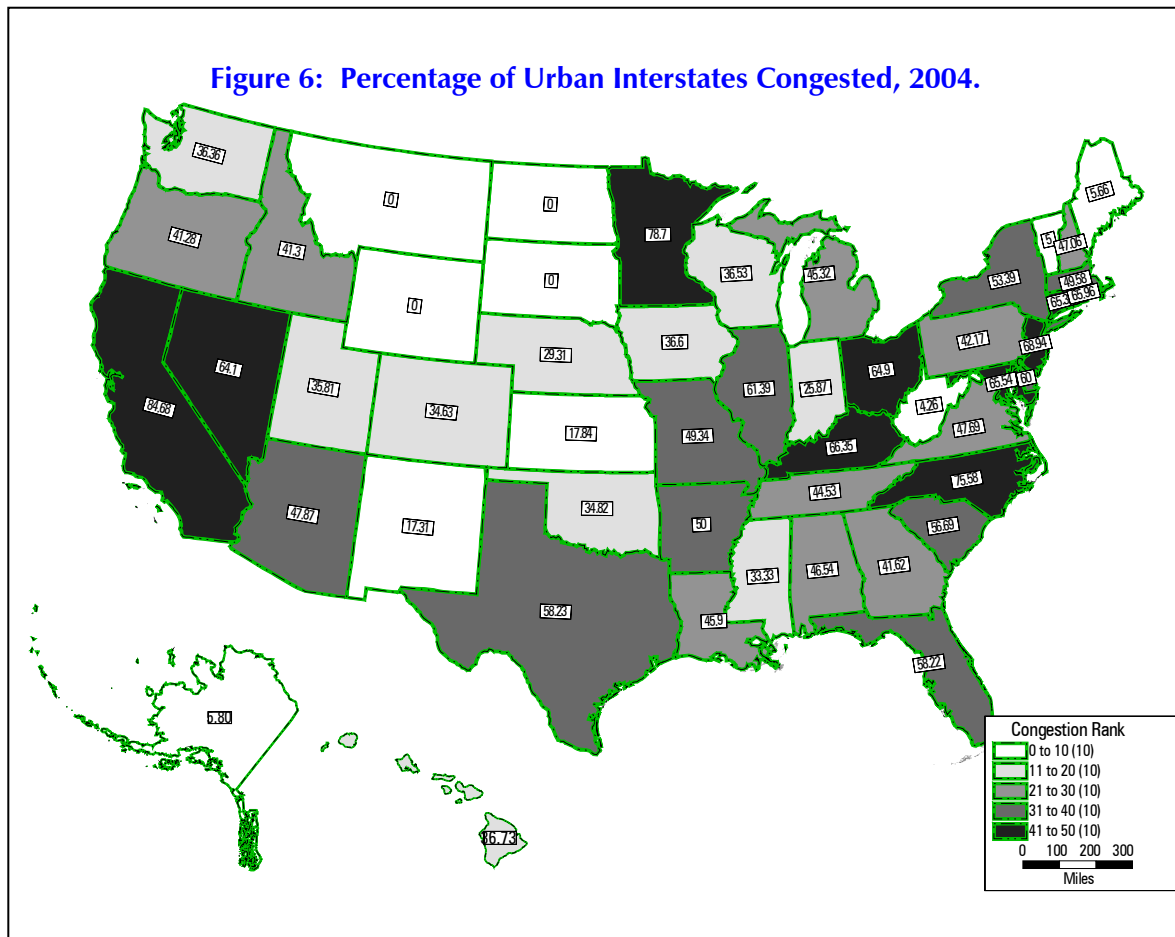


Nevertheless, the overall 2004 statistics (51.60 percent congested) show slight improvement from 2003 (51.78 percent congested), but a worsening from 45.93 percent reported for 1998 (Table 12, Urban Interstate Congestion, and Figure 6). For 2004, about 7702 miles out of 14,925 urban interstate miles were rated as having volume/capacity ratios greater than 0.70, the standard for mild congestion².

Congestion levels vary widely between states. Four rural states report no congested urban interstates. But 17 states report more than half of urban interstates congested, and three states (California 84.7 percent, Minnesota 78.7 percent and North Carolina 75.6 percent) report more than 70 percent of urban Interstates congested.

Seventeen states report more than half of urban interstates congested, and three states (California 84.7 percent, Minnesota 78.7 percent and North Carolina 75.6 percent) report more than 70 percent of urban Interstates congested.

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 condition of the nation's highway bridges continued to improve from 2003 to 2004. Of the 595,411 highway bridges in the current National Bridge Inventory, 149,004 – 25.03 percent – were reported deficient for 2004 ([Table 13, Deficient Bridges](#)), a slight improvement from 2003; in 1998 about 29.0 percent were rated deficient. However, progress is slow: at the current rate of improvement, it would take 70 years for deficient bridges to be improved.

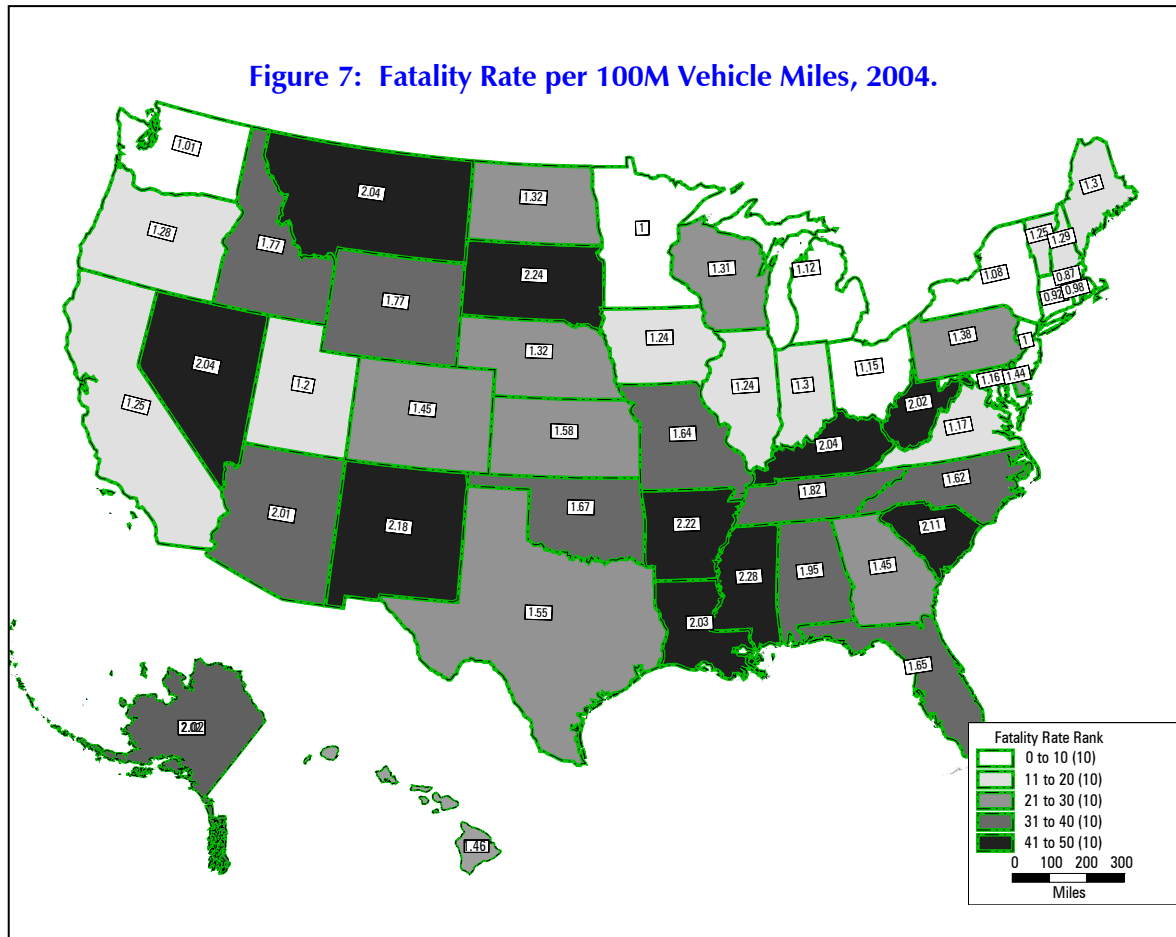
The percentage of deficient bridges varies widely between states. **Nevada** reported the lowest percentage of deficient bridges, 4.53 percent, while **Rhode Island** reported the highest, 57.16 percent.

Fatality rates: Even though some highway fatalities occur on other than state-owned roads, overall fatality rates are an important overall measure of each state's road performance.

The nation's highway fatality rate continues to inch downward ([Table 14, Fatality Rates](#), and [Figure 7](#)). For 2004, 42,593 fatalities were reported, very close to the 42,576 reported for 2003.

However, because travel continued to increase, the overall fatality rate was 1.440 fatalities per 100 million vehicle miles, down 3.5 percent from 1.475 in 2003.

There is also wide variation between states in fatality rates. For 2004, **Massachusetts** reported the lowest rate, 0.87, while **Mississippi** reported the highest, 2.282.



Narrow lanes: The width of lanes on major rural roads are a key indicator of sight visibility and design adequacy. The national design standard for lane width on major rural roads is generally 12 feet, and few if any, major rural would be improved without widening lanes to the standard.

In 2004, about 10.72 percent of rural other principal arterials – 10,276 miles out of 95,838 - had narrow lanes, less than 12 ft wide (**Table 15, Rural Primary Lane Widths**), somewhat higher than the 9.96 percent reported in 2003. Part of this apparent ‘increase’ may be due to more accurate measurement of lane widths, reclassifications of some rural primary roads to ‘urban’ at city edges, and a slight reduction in the number of miles measured.

The states also vary widely by percentage of narrow lanes. Seven states reported no narrow-lane mileage, while **West Virginia** (45.98 percent) reported the highest percentage of narrow lanes.

Part 4

Conclusion

The passage of the federal highway bill came just in time to stop a potentially dangerous worsening of state highway conditions. Roadways have limited useful life spans and constant maintenance is essential to keep them working and safe.

While progress is being made, over half of urban interstates remain congested and one-fourth of bridges are still rated deficient. Further investment, as well as wise prioritization, efficient disbursement of resources, and leverage of resources where available will be necessary to address the condition of state-owned roads.

About the Authors

David T. Hartgen, Ph.D., P.E. is Professor of Transportation Studies at the University of North Carolina at Charlotte, where he established the Center for Interdisciplinary Transportation Studies and now teaches and conducts research in transportation policy. He is the author of about 329 papers and reports on transportation policy and planning, is U.S. Editor of the international journal *Transportation*, and is active in professional organizations, particularly the Transportation Research Board. He holds engineering degrees from Duke University and Northwestern University, has taught at SUNY Albany, Union University, Syracuse University and lectures widely. He can be contacted at dthartge@email.uncc.edu, or by telephone at 704-687-5917. His Web site is <http://www.geoearth.uncc.edu/Dhartgen.htm>.

Ravi K. Karanam is graduate student in electrical engineering at the University of North Carolina at Charlotte . A graduate of Nehru Technological Institute in India , he is focusing on computer architecture, electronics and telecommunications technologies, embedded systems, and computational applications in the biomedical sciences.

Endnotes

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- ¹ Cost effectiveness for each state is computed by averaging its 12 performance ratios (ratio of each state's statistic to the national average, for 5 financial measures and 7 condition measures), then ranking the states. Ratios less than 1.0 mean that the state is better than average, ratios greater than 1.0 mean the state is worse than average.
 - ² FHWA uses 0.80 as the cutoff for 'congestion', but this ignores mild congestion in some rural states.



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 3415 S. Sepulveda Blvd., Suite 400
 Los Angeles, CA 90034
 310/391-2245
 310/391-4395 (fax)
www.reason.org