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Are Highways Crumbling? State and U.S. Highway Performance Trends, 1989–2008

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Project Director: Adrian T. Moore, Ph.D.

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Part 1

Introduction

Many reports and numerous media articles claim that the nation's highway infrastructure is "crumbling." For example, the American Society of Civil Engineers assigned an overall D grade to the nation's infrastructure (which includes waste, water, aviation, levee and transit systems, in addition to highways and bridges) and estimated that it would take a $2.2 trillion investment to bring it into a "state of good repair."[1] A New York-New Jersey-Connecticut region planning organization suggests the region would have a "third-world" infrastructure within a few decades if nothing is done.[2] And President Obama says that "crumbling" roads, bridges, airports and rail lines are hindering U.S. economic growth.[3] Conventional wisdom holds that our highways and bridges are in a sorry state of condition.

But is this conventional wisdom correct? Other studies paint a mixed picture. In its 2008 report to Congress on the condition of the transportation infrastructure, U.S. DOT notes that from 1997 to 2006, the physical condition of the National Highway System (and its bridges) actually *improved*, but urban and lower-class road systems did not fare quite as well.[4] Intercity, rural and small urban roads generally improved in condition while those in urban areas experienced some declines. The U.S. DOT report also noted improvements in fatality and injury rates but an increase in the amount of travel during congested conditions. Other studies note increasing highway repair needs as the basis for concerns about flagging revenue sources, but say little about whether the system is improving over time or how good it *should* be.[5]

The primary sources for most hard data on the condition of roads and bridges are the Highway Performance Monitoring System,[6] the National Bridge Inventory,[7] the Fatal Accident Reporting System,[8] and the Texas Transportation Institute's reports on urban congestion.[9] Each has its limitations and covers only a portion of its topic. The National Bridge Inventory is the most complete, reporting bridge condition and sufficiency data for all bridges since the 1970s. The Fatal Accident Reporting System reports only fatal accidents, not injuries or property-damage accidents. The TTI reports cover only the larger cities and only the higher-class roads. The Highway Performance Monitoring System also covers higher road classes but misses all local roads. In spite of these shortcomings, these data bases are sufficient to provide a high-level (but necessarily incomplete) picture of performance trends. This report uses these sources but recognizes that the findings are therefore necessarily incomplete.

To determine road and bridge conditions, this report uses information from these data systems that stretch back to 1989 and have been tracked annually in a series of periodic reports on state road conditions.[10] The report uses several widely accepted measures of performance:

- The percentage of rural interstates rated “poor” in condition;
- The percentage of urban interstates rated “poor” in condition;
- The percentage of rural primary roads (“other principal arterials”) rated “poor” in condition;
- The percentage of urban interstates rated “congested”;
- The percentage of bridges rated “deficient”;
- Highway fatality rates;
- Percentage of rural primary roads with lane widths less than 12 feet;
- Expenditures, per mile of responsibility, for state-administered highways.

Some studies use other measures. For instance, federal reports often use the percentage of roads in satisfactory condition, putting the focus on the proportion of the system that is satisfactory rather than inadequate. This report uses the above measures because they have been tracked for long periods of time in the professional literature and there is general consensus about their usefulness. Further, these eight dimensions of road performance are likely to be included in most assessments. They are also measures that the general public understands and cares about. Unfortunately other measures of performance, for instance travel times or opportunities within a given travel time or distance, are not readily available but if included would also likely show improvement. These measures, while certainly not perfect, substantially cover the primary concerns of citizens and officials regarding road performance.

Part 2

Analysis

A. State-Administered Mileage

Because each state is responsible for different amounts of road mileage, we must account for system size in measuring performance and expenditures. Some states have very large state-administered systems, while others have much smaller systems. In 2008 North Carolina had the largest state-administered system (80,214 miles, but with no county road system), while Hawaii had the smallest state-administered system (1,005 miles). The 2008 average state-administered mileage (state highway agency miles, plus toll roads and other smaller systems) is 16,312 miles. State-administered mileage has increased just 0.6 percent since 1989.

Table 1: State-Administered Highway Mileage

Ranked Biggest (1) to Smallest State System (50) 2008

State	1989	1999	2008	Rank
NC	77,439	78,748	80,214	1
TX	76,547	79,280	80,212	2
VA	55,727	57,767	57,957	3
PA	44,820	43,816	43,612	4
SC	41,406	41,708	41,620	5
WV	30,662	33,266	34,456	6
MO	32,391	32,409	33,677	7
KY	27,544	27,579	27,886	8
OH	20,480	22,035	20,394	9
GA	17,790	18,568	18,294	10
CA	18,320	18,271	18,273	11
WA	18,313	18,947	17,835	12
IL	17,419	17,020	16,747	13
LA	16,559	16,716	16,702	14
AR	16,178	16,367	16,431	15
U.S. Average	16,042	16,211	16,312	--
NY	16,323	16,398	16,302	16
TN	14,548	14,414	14,220	17
OK	12,947	13,454	13,490	18
MN	13,358	13,275	12,905	19
NM	11,982	11,578	12,166	20
FL	11,791	11,951	12,084	21
WI	12,509	11,886	11,839	22
IN	11,266	11,220	11,215	23
MT	8,202	7,082	11,135	24
AL	10,988	11,031	11,107	25
MS	10,422	10,681	11,062	26
KS	10,677	10,799	10,607	27
NE	10,291	10,277	10,208	28
CO	9,377	10,370	9,764	29
MI	9,543	9,725	9,688	30
IA	10,162	10,208	9,444	31
SD	7,930	7,853	8,895	32
ME	8,540	8,599	8,665	33
AK	12,233	6,083	8,453	34
OR	11,066	12,229	8,166	35
WY	6,614	7,945	7,854	36
ND	7,386	7,399	7,407	37
AZ	6,252	6,620	7,142	38
NV	5,206	5,629	5,921	39
UT	5,787	5,838	5,841	40
MD	5,375	5,394	5,407	41
DE	4,821	5,065	5,372	42
ID	5,112	4,959	4,959	43
CT	3,888	3,977	4,048	44
NH	4,057	4,035	4,025	45
MA	3,636	3,606	3,605	46
NJ	3,222	3,342	3,332	47
VT	2,812	2,842	2,840	48
RI	1,118	1,229	1,111	49
HI	1,069	1,042	1,005	50
Totals	802,105	810,532	815,594	--

B. Rural Interstate Condition

Rural interstates consist of all interstate highways outside of urbanized areas, about 30,200 miles.[11] In most states, road condition is measured using special machines that determine the roughness (bumpiness) of road surfaces. By convention, interstate pavements with roughness of more than 170 inches of vertical deviation per mile (about three inches per 100 feet) are considered in poor condition.[12] To compare states, we use the percentage of rural interstate miles rated "poor" as a measure of condition, which also adjusts proportionally for different system sizes.

States have made substantial progress in improving the condition of the rural interstates (Table 2). **Overall, the percentage of rural interstates rated in poor condition was reduced by over two-thirds, from 6.60% in 1989 to 1.93% in 2008.** However, this progress seems to have slowed recently: the improvement since 1999 has been just 0.4 percentage points. Most states made improvements or held their own regarding rural interstate condition. Five states (Missouri, Rhode Island, Idaho, Nevada and Wisconsin) reduced their percentage of poor rural interstates from over 20% to near 0% in two decades. Thirty-seven states made progress or held their own. On the other hand, 11 states reported worse condition, usually by small amounts. But two states reported conditions worsening more than five percentage points: New York, +6.1 and California, +10.0. In 2008, just four states had more than 5% of rural interstates in poor condition: California (16.3%), Alaska (10.7%), New Jersey (6.2%), and New York (6.1%).

Table 2: Percent of Rural Interstates in Poor Condition

Ranked From Most Improved Condition (1) to Most Deterioration In Condition (50) 1989-2008

State	1989	1999	2008	Change in Percent Poor, 1999-2008	Change in Percent Poor, 1989-2008	Rank
MO	28.2	1.4	0.0	-1.4	-28.2	1
RI	23.8	0.0	0.0	0.0	-23.8	2
ID	24.5	1.5	1.3	-0.2	-23.2	3
NV	22.0	1.9	0.0	-1.9	-22.0	4
WI	20.3	1.1	3.3	2.3	-17.0	5
AK	26.4	4.5	10.7	6.3	-15.6	6
VA	13.7	0.1	0.0	-0.1	-13.7	7
MT	13.7	1.1	0.4	-0.7	-13.4	8
AZ	12.5	0.2	0.0	-0.2	-12.5	9
GA	10.5	0.0	0.0	0.0	-10.5	10
OR	9.7	0.0	0.0	0.0	-9.7	11
NE	9.7	2.1	0.0	-2.1	-9.7	12
NH	9.4	0.0	0.0	0.0	-9.4	12
VT	9.8	3.2	1.4	-1.8	-8.4	14
SC	7.4	0.9	0.2	-0.7	-7.3	15
FL	7.2	0.3	0.0	-0.3	-7.2	16
KS	7.2	0.7	0.0	-0.7	-7.2	17
PA	6.5	2.6	0.4	-2.2	-6.1	17
U.S.	6.60	2.35	1.93	-0.4	-4.7	–
TN	4.0	0.0	0.1	0.1	-3.8	19
MD	3.6	0.0	0.0	0.0	-3.6	20
ME	3.5	0.0	0.0	0.0	-3.5	21
IA	5.7	0.2	2.2	2.1	-3.5	21
CO	5.9	0.5	2.6	2.1	-3.3	23
IN	3.3	0.0	0.0	0.0	-3.3	23
MN	6.7	0.1	3.7	3.5	-3.0	25
IL	2.6	0.8	0.0	-0.8	-2.6	26
NJ	8.7	7.2	6.2	-1.1	-2.6	26
OH	2.7	0.2	0.6	0.3	-2.2	28
MA	1.2	0.6	0.0	-0.6	-1.2	29
TX	1.1	0.0	0.0	0.0	-1.1	30
AR	4.1	32.5	3.1	-29.3	-0.9	31
KY	0.5	0.0	0.0	0.0	-0.5	32
NM	0.3	4.6	0.0	-4.6	-0.3	33
ND	0.2	0.0	0.0	0.0	-0.2	34
CT	0.0	4.9	0.0	-4.9	0.0	35
MS	1.4	4.8	1.4	-3.4	0.0	35
SD	0.0	1.9	0.0	-1.9	0.0	35
WV	1.6	5.5	1.7	-3.8	0.1	38
WY	0.0	0.0	0.1	0.1	0.1	38
OK	2.2	3.3	2.6	-0.7	0.4	40
NC	1.0	4.2	1.7	-2.5	0.7	41
UT	0.0	1.4	1.0	-0.5	1.0	42
LA	0.0	10.2	1.5	-8.8	1.5	43
MI	1.0	6.5	3.0	-3.5	1.9	44
WA	0.2	0.4	2.1	1.7	2.0	45
AL	0.0	0.5	2.2	1.7	2.2	46
NY	0.0	10.7	6.1	-4.6	6.1	47
CA	6.3	5.9	16.3	10.4	10.0	48
DE	*	*	*	NA	NA	–
HI	*	*	0.0	NA	NA	–

Notes: "*" indicates no rural Interstates; NA indicates not applicable

C. Urban Interstate Condition

The urban interstates consist of major multi-lane facilities in and near urban areas, about 16,300 miles in total. These facilities typically carry high traffic volume, so sections in poor condition would have a disproportionately adverse impact on users. Our measure of urban interstate condition is the percentage of each state's urban interstate with roughness greater than 170 inches per mile; by convention this level is considered "poor condition" in most federal summaries.

Significant progress has also been made in improving the condition of the urban interstates (Table 3). **Overall, the percentage of urban interstates rated in poor condition was reduced modestly, from 6.6% in 1989 to 5.4% in 2008. Unlike rural interstates, most of this improvement came in the last decade.** In 1989 13 states reported more than 10% of their urban interstates in poor condition, but by 2008 this had been reduced to seven states. About half (27 of 50 states) reported some improvement of their urban interstate condition over two decades. Of the rest, 13 experienced little or no worsening, but 10 reported worsening of five percentage points or more. In 2008 seven states continued to show a significant problem (above 10% "poor condition"): Hawaii (25.0 %), California (24.7%), Vermont (17.5%), New Jersey (17.7%), Oklahoma (13.3%), New York (11.3%) and Louisiana (10.4%).

Table 3: Percent of Urban Interstates in Poor Condition

Ranked From Most Improved Condition (1) to Most Deterioration In Condition (50) 1989-2008

ST	1989	1999	2008	Change in Percent Poor, 1999-2008	Change in Percent Poor, 1989-2008	Rank
NV	47.8	0.0	1.6	1.6	-46.2	1
MO	46.7	7.8	1.3	-6.5	-45.4	2
AK	22.0	1.9	1.4	-0.4	-20.6	3
RI	20.4	2.1	0.0	-2.1	-20.4	4
TN	17.4	2.9	1.4	-1.5	-16.0	5
KY	14.7	6.6	0.5	-6.2	-14.2	6
AZ	12.6	0.0	0.0	0.0	-12.6	7
OR	12.1	0.7	1.2	0.5	-11.0	8
VA	13.4	4.8	3.2	-1.7	-10.3	9
OH	11.3	2.2	1.6	-0.5	-9.6	10
KS	9.4	1.2	0.0	-1.2	-9.4	11
GA	7.5	0.5	0.0	-0.5	-7.5	12
CO	12.8	0.5	6.6	6.1	-6.2	13
WV	8.9	4.3	3.0	-1.2	-5.9	14
MT	6.4	1.8	3.3	1.5	-3.1	15
WI	10.5	2.9	7.5	4.6	-2.9	16
NE	2.7	4.5	0.0	-4.5	-2.7	17
SC	3.4	3.2	0.8	-2.4	-2.7	17
TX	4.1	2.0	1.5	-0.4	-2.6	19
NM	2.1	12.0	0.0	-12.0	-2.1	20
ME	1.9	0.0	0.0	0.0	-1.9	21
FL	1.7	1.2	0.0	-1.2	-1.7	22
ID	9.2	5.9	7.9	2.0	-1.3	23
MA	1.3	1.7	0.0	-1.7	-1.3	23
U.S.	6.55	7.21	5.37	-1.8	-1.2	--
PA	2.4	5.7	1.5	-4.2	-0.9	25
IA	9.5	14.3	8.6	-5.7	-0.9	26
AR	4.9	25.9	4.4	-21.5	-0.5	27
ND	0.0	0.0	0.0	0.0	0.0	28
MN	1.4	0.9	1.4	0.5	0.0	28
NH	2.3	2.1	2.6	0.5	0.4	30
WA	2.1	3.4	2.7	-0.7	0.6	31
MS	2.4	3.9	3.4	-0.5	0.9	32
AL	0.0	2.3	1.7	-0.6	1.7	33
UT	0.0	4.8	1.9	-2.9	1.9	34
IN	0.8	1.9	2.8	0.9	2.0	35
NC	0.0	11.1	2.1	-9.1	2.1	36
MD	4.5	7.8	7.0	-0.8	2.5	37
CT	0.9	7.8	4.0	-3.8	3.1	38
WY	4.0	2.3	7.3	5.0	3.3	39
IL	1.9	6.6	5.8	-0.8	3.9	40
DE	0.0	28.2	5.0	-23.2	5.0	41
MI	1.3	10.0	6.9	-3.1	5.6	42
SD	0.0	16.0	6.6	-9.4	6.6	43
NJ	11.0	7.0	17.7	10.7	6.7	44
LA	2.1	19.3	10.4	-8.9	8.2	45
NY	2.2	24.2	11.3	-12.9	9.1	46
OK	3.4	20.1	13.3	-6.8	9.9	47
VT	2.9	0.0	17.5	17.5	14.6	48
CA	4.1	16.7	24.7	8.0	20.7	49
HI	0.0	*	25.0	NA	25.0	50

Notes: "*" indicates not reported; NA indicates not applicable

Generally the states initially reporting high percentages of poor urban interstates were the ones making the most progress in reducing that percentage. Two states (Nevada and Missouri) initially reported nearly 50% of urban interstates in poor condition, but were able to reduce that percentage to near 1%, no small achievement. Other states with significant percentages of poor pavement also reduced that mileage to near zero. But there are some exceptions: New Jersey initially reported 11.0% poor in 1989 but worsened substantially to 17.7% poor. California, initially reporting just 4.1% poor, worsened to 24.7% in 2008. Hawaii, initially reporting no poor mileage, then worsened to 25% poor in 2008.

This suggests that the complexities and costs of repairing urban interstates have slowed improvements, but that the system also benefited from designated federal funding. Although progress has been slower than for rural interstates, it has been visible particularly in the last decade.

D. Rural Primary Pavement Condition

The rural primary ("Other Principal Arterial") system consists of about 94,400 miles connecting urban regions. These roads form the backbone system supporting the interstate system and are important for access to many smaller communities. By convention the cutoff for "poor condition" pavement is 220 inches of roughness per mile (about four inches of vertical deviation per 100 feet), effectively allowing rural other principal arterials to become rougher than interstates before being rated "poor."

Dramatic progress has been made in improving the condition of the rural other principal arterials (Table 4). **Overall, the percentage of rural arterials rated in poor condition has been improved substantially, from 2.6% in 1989 to 0.5% in 2008.** However, progress appears to have slowed since most of the improvement, about 1.7%, came between 1989 and 1999.

Of the 50 states, 34 improved their percentage of rural principal arterials in poor condition between 1989 and 2008. Three states (Alaska, Montana and Idaho) reduced their percentage of poor pavement by more than 10%, a significant achievement for large systems. In 1989 there were four states with greater than 10% rural principal arterials rated poor; by 2008 only two—Alaska (10.5%) and Rhode Island (10.2%).

Table 4: Percent of Rural Principal Arterials in Poor Condition

Ranked From Most Improved Condition (1) to Most Deterioration In Condition (50) 1989-2008

State	1989	1999	2008	Change in Percent Poor, 1999-2008	Change in Percent Poor, 1989-2008	Rank
AK	34.0	0.0	10.5	10.5	-23.4	1
MT	16.7	0.3	0.0	-0.3	-16.7	2
ID	12.1	0.1	0.1	0.0	-12.0	3
ME	9.5	0.8	2.3	1.5	-7.2	4
VA	6.8	0.5	0.1	-0.4	-6.8	5
NE	7.2	1.4	0.6	-0.8	-6.6	6
MO	5.1	1.4	0.1	-1.3	-5.0	7
NV	4.4	0.0	0.3	0.3	-4.1	8
GA	4.1	0.0	0.0	0.0	-4.1	9
WI	3.9	2.5	0.3	-2.2	-3.5	10
OR	3.4	0.0	0.2	0.1	-3.2	11
ND	3.3	0.0	0.4	0.3	-2.9	12
AZ	3.3	1.7	0.4	-1.3	-2.8	13
FL	2.7	0.0	0.0	0.0	-2.7	14
TN	2.9	0.1	0.3	0.3	-2.5	15
LA	2.8	1.8	0.8	-1.0	-2.0	16
RI	12.2	0.0	10.2	10.2	-2.0	16
U.S.	2.58	0.85	0.53	-0.3	-2.0	–
NC	2.1	0.9	0.4	-0.5	-1.7	18
SD	3.3	4.3	1.6	-2.7	-1.7	18
TX	1.6	0.2	0.2	0.0	-1.4	20
KS	1.4	0.1	0.0	0.0	-1.4	20
PA	2.0	0.8	0.6	-0.2	-1.3	22
SC	1.5	0.3	0.2	-0.1	-1.3	22
MI	1.1	1.3	0.2	-1.1	-0.9	24
OK	2.1	0.8	1.6	0.8	-0.6	25
CO	1.2	0.7	1.0	0.3	-0.2	26
MD	0.6	0.7	0.5	-0.3	-0.1	27
NM	0.2	2.8	0.1	-2.7	-0.1	27
WY	0.4	0.2	0.3	0.2	-0.1	27
MN	0.2	0.3	0.1	-0.2	0.0	30
AL	0.0	0.0	0.0	0.0	0.0	30
DE	0.0	0.5	0.0	-0.5	0.0	30
IN	0.0	0.1	0.0	-0.1	0.0	30
KY	0.1	0.0	0.2	0.1	0.0	30
WA	0.0	0.1	0.1	0.0	0.1	35
NH	0.0	1.1	0.3	-0.8	0.3	36
MS	0.0	0.5	0.4	-0.1	0.4	37
OH	0.0	0.3	0.4	0.1	0.4	37
UT	0.1	0.0	0.6	0.6	0.5	39
AR	0.2	0.9	0.8	-0.1	0.6	40
VT	0.3	5.4	0.9	-4.4	0.6	41
MA	0.0	1.0	0.6	-0.4	0.6	42
CT	0.0	0.4	0.6	0.2	0.6	43
NY	0.0	3.9	0.7	-3.2	0.7	44
NJ	0.0	10.9	0.8	-10.2	0.8	45
IL	0.0	1.3	1.0	-0.3	1.0	46
WV	0.0	0.4	1.0	0.7	1.0	46
CA	0.0	0.1	1.1	1.0	1.1	48
IA	0.0	2.0	1.7	-0.3	1.7	49
HI	0.0	0.0	2.7	2.7	2.7	50

Most states seem to have a strong "fix it first" policy regarding the rural other principal arterial system. Almost all states with a significant percentage of poor pavement in 1989 reported completing repairs by 2008; only two states (Alaska and Rhode Island) reported some remaining poor mileage. But 13 states, led by Hawaii, initially reported no poor mileage but later reported some. This suggests, as with the interstate system, some likely "rotation" among the states, as those with poor-condition pavement attend to it and others with fewer problems spend funds elsewhere.

E. Urban Interstate Congestion

In reporting to the federal government, the states use peak-hour volume-to-capacity ratios calculated using the Highway Capacity Manual.[13] Congestion percentages for 2008 are not totally comparable with 1989, since rated capacities have been increased. The specific definition used here is the percentage of urban interstate mileage that is reported to have peak-hour volume-capacity ratios of 0.70 or higher. This cutoff assigns moderate congestion to some rural states, because the use of a higher cut-off (for instance, 0.80) would favor smaller rural states that have only modest congestion.

Less progress has been made in reducing urban interstate congestion (Table 5). **Overall, the percentage of mileage rated "congested" improved slightly, from 52.6% in 1989 to 48.6% in 2008, about 4.0 percentage points.** This is contrary to public perception and to other reports that show urban congestion generally rising during the same period.[14] The improvement seems to be concentrated in the 1990s: between 1999 and 2008, the percentage of congested urban interstates actually *worsened* (increased) by 8.5 percentage points.

Moreover, some of the overall improvement may be attributed to the recent economic slowdown. Nationally, traffic volumes peaked in 2007 then fell about 1.9% between 2007 and 2008.[15] In 2009 travel rebounded 1.9% and 2010 saw another 0.7% increase. So without the current recession, the table would probably show fewer states making progress between 1999 and 2008.

Table 5: Percent of Urban Interstates Congested

Ranked From Biggest Reduction in Congestion (1) to Biggest Increase in Congestion (50) 1989-2008

State	1989	1999	2008	Change in Percent Congested, 1999-2008	Change in Percent Congested, 1989-2008	Rank
DE	68.3	31.0	24.4	-6.6	-43.9	1
MA	68.5	39.2	41.6	2.4	-26.9	2
VA	64.8	37.9	37.9	-0.1	-26.9	3
AK	30.0	15.4	4.3	-11.0	-25.7	4
MO	67.3	47.2	43.9	-3.2	-23.3	5
SC	71.8	47.7	50.0	2.3	-21.8	6
WA	50.6	46.4	31.2	-15.2	-19.4	7
FL	65.2	43.5	47.9	4.5	-17.3	8
NE	56.8	23.9	41.0	17.1	-15.8	9
NY	61.1	34.4	46.0	11.6	-15.1	10
WV	22.2	1.1	7.5	6.4	-14.7	11
MD	83.5	61.9	69.2	7.3	-14.3	12
UT	54.1	15.2	40.6	25.3	-13.5	13
NC	73.5	47.4	60.9	13.5	-12.6	14
OR	51.5	48.2	39.2	-9.0	-12.3	15
CT	79.0	50.6	66.7	16.1	-12.3	16
WI	56.5	32.2	44.2	12.1	-12.2	17
NH	47.7	35.4	35.5	0.1	-12.2	18
TN	59.1	49.0	47.8	-1.1	-11.2	19
GA	57.0	18.6	46.0	27.4	-11.0	20
SD	10.9	0.0	0.0	0.0	-10.9	21
NJ	74.6	42.2	63.8	21.6	-10.8	22
ME	11.3	14.8	2.9	-11.9	-8.4	23
IL	48.3	45.5	42.8	-2.7	-5.5	24
U.S.	52.6	40.1	48.6	8.5	-4.0	--
KS	26.4	19.5	22.9	3.4	-3.5	25
HI	50.0	34.7	47.9	13.2	-2.1	26
MI	70.1	39.7	68.1	28.5	-2.0	27
CO	49.3	40.6	47.6	7.0	-1.7	28
TX	50.1	48.9	48.6	-0.3	-1.5	29
MT	0.0	0.0	0.0	0.0	0.0	30
ND	0.0	0.0	0.0	0.0	0.0	31
WY	0.0	0.0	0.0	0.0	0.0	32
NM	18.1	20.4	18.7	-1.7	0.6	33
CA	78.9	68.7	79.8	11.1	0.9	34
VT	0.0	0.0	2.5	2.5	2.5	35
PA	37.0	29.1	42.3	13.2	5.3	36
LA	38.0	31.7	44.8	13.1	6.8	37
RI	49.0	55.1	56.0	0.9	7.0	38
NV	45.7	48.7	54.4	5.7	8.7	39
OK	27.1	0.0	37.1	37.1	10.0	40
IN	13.2	15.8	23.3	7.6	10.2	41
AZ	34.6	22.4	46.3	23.9	11.6	42
OH	47.8	56.8	63.1	6.3	15.2	43
AR	26.8	24.3	45.4	21.1	18.6	44
MS	8.1	21.9	29.8	7.9	21.7	45
ID	13.2	20.0	35.2	15.2	22.0	46
AL	31.0	28.3	53.7	25.4	22.7	47
IA	14.6	17.8	38.8	21.0	24.2	48
KY	28.8	38.8	62.7	23.9	33.9	49
MN	41.5	66.2	77.7	11.4	36.2	50

Twenty-nine states, led by Delaware, reduced urban interstate congestion between 1989 and 2008. Six states (DE, MA, VA, AK, MO and SC) reported improvements greater than 20 percentage points. On the other hand, 18 states reported a worsening of urban interstate congestion. The greatest increase, 36.2 percentage points, was reported by Minnesota, followed by Kentucky, Iowa, Alabama, Idaho and Mississippi. These are not the states with the greatest current congestion, but those with the greatest two-decade increases.

F. Deficient Bridges

Federal law mandates the uniform inspection of all bridges for structural and functional adequacy at least every two years. Bridges are rated "deficient" if they are deemed either "functionally obsolescent," for instance being too narrow for current traffic, or "structurally deficient" in condition. About one-half of deficient bridges are in each group.[16] Funds are allocated to states based on estimated costs to repair deficient bridges.

The nation has made considerable progress in reducing the backlog of deficient bridges over the past two decades (Table 6). **The percentage of bridges rated deficient nationwide has been reduced by about 14 percentage points, from 37.8% to 23.7%.** However, the rate of reduction seems to be slowing, since in the last 10 years, the percentage of deficient bridges has been reduced by about 4.5 percentage points, or about 0.45 percentage points per year. At this rate, it would take about 52 years to exhaust the backlog of deficient bridges nationwide. Further, since most of that money is spent on structurally deficient bridges, the percentage of functionally obsolescent bridges has not reduced as much.

The progress in meeting bridge deficiencies has been quite widespread. Of the 50 states, 40 registered improvement in the percentage of deficient bridges over 20 years. They are led by Mississippi and Nebraska, reporting an improvement of 31.7 and 31.5 percentage points, respectively. Nine states, led by Colorado, cut their percentage of deficient bridges by half or better. On the other hand, 10 widely scattered states reported a worsening percentage of deficient bridges. They are led by Hawaii and Alaska at 14.3 and 10.5 percentage point increases, respectively. Arizona reported the highest relative increase, a more than doubling of its percentage of deficient bridges, but from a very low 1989 base of just 5.4%.

Table 6: Percent Deficient Bridges

Ranked From Biggest Reduction in Deficient Bridges (1) to Biggest Increase in Deficient Bridges (50) 1989-2008

State	1989	1999	2008	Change in Percent Deficient, 1999-2008	Change in Percent Deficient, 1989-2008	Rank
MS	56.3	30.7	24.7	-6.0	-31.7	1
NE	55.1	29.1	23.6	-5.5	-31.5	2
ND	51.7	25.7	21.0	-4.7	-30.6	3
MO	59.6	36.1	29.5	-6.6	-30.1	4
AL	49.1	30.1	23.0	-7.1	-26.1	5
WV	61.3	41.0	36.4	-4.6	-24.9	6
CT	60.6	29.2	36.1	6.9	-24.5	7
OK	53.3	39.9	29.2	-10.7	-24.1	8
TN	40.5	26.1	17.7	-8.3	-22.7	9
IN	43.1	25.1	22.0	-3.1	-21.1	10
KY	49.5	32.6	28.5	-4.2	-21.1	10
CO	34.2	14.3	13.8	-0.5	-20.4	12
IA	47.3	28.6	26.9	-1.6	-20.4	12
AR	40.7	27.5	20.8	-6.7	-19.9	14
KS	39.0	25.6	19.9	-5.7	-19.2	15
NC	48.5	34.0	30.4	-3.6	-18.1	16
WI	29.9	18.0	14.3	-3.7	-15.6	17
IL	32.2	20.5	16.9	-3.6	-15.2	18
LA	43.9	34.1	29.4	-4.7	-14.5	19
GA	33.3	24.7	18.9	-5.7	-14.4	20
SD	39.0	29.3	24.8	-4.5	-14.2	21
U.S.	37.8	28.2	23.7	-4.5	-14.0	--
NV	25.0	6.6	11.0	4.3	-14.0	22
VT	49.3	37.6	35.4	-2.2	-13.8	23
NH	44.5	32.1	30.8	-1.3	-13.7	24
TX	32.6	26.0	19.0	-7.0	-13.6	25
NY	47.8	38.9	37.1	-1.8	-10.7	26
MN	24.0	15.1	13.4	-1.7	-10.6	27
ME	36.7	33.5	27.8	-5.7	-8.9	28
MI	32.9	36.1	24.4	-11.7	-8.5	29
FL	25.4	22.0	17.8	-4.1	-7.5	30
MT	24.3	25.6	17.6	-8.0	-6.7	31
DE	24.8	18.4	18.8	0.4	-6.0	32
VA	31.8	24.5	26.1	1.6	-5.8	33
WA	31.5	22.0	26.1	4.1	-5.3	34
CA	22.8	18.2	18.9	0.7	-3.9	35
MD	29.5	28.8	26.0	-2.7	-3.5	36
NM	17.9	20.4	16.1	-4.3	-1.7	37
NJ	28.5	28.6	27.4	-1.1	-1.0	38
WY	13.7	15.5	13.5	-2.0	-0.2	39
PA	38.9	39.2	38.7	-0.5	-0.1	40
OR	22.5	23.3	23.0	-0.2	0.5	41
SC	20.6	22.3	22.8	0.4	2.1	42
OH	19.4	38.8	22.8	-16.0	3.4	43
UT	10.9	21.7	16.0	-5.7	5.0	44
AZ	5.4	5.3	11.5	6.1	6.1	45
ID	12.7	17.0	19.0	2.0	6.2	46
RI	47.1	61.6	53.4	-8.2	6.3	47
MA	27.3	37.9	36.4	-1.5	9.0	48
AK	12.2	23.3	22.8	-0.5	10.5	49
HI	23.7	48.2	38.0	-10.2	14.3	50

Two states have notable histories. Rhode Island, with initially 47.1% percent of bridges deficient, reported a further worsening 19 years later, to 53.4% deficient; it is the only state initially worse than the national average of 37.8% to report further worsening two decades later. And Colorado was the only state in the top 12 improvers that was *both* better than the U.S. average initially, *and* reported further improvement 19 years later.

This analysis does not review additional dimensions of the deficient bridge problem. For instance, it does not address functional classes, geography or climate, traffic or truck use, materials or designs, repair/maintenance policies, age or condition differences between state-owned and locally owned bridges. These dimensions might account for some of the variation between states in overall deficient-bridges trends. Nevertheless, it does show that the percentage of deficient bridges has substantially decreased nationwide and in most states over the past two decades.

G. Fatality Rates

The U.S. has significantly reduced fatality rates over the past two decades (Table 7). **Between 1989 and 2008, the U.S. fatality rate improved from 2.16 fatalities per 100 million vehicle-miles (MVM) to 1.25 fatalities per 100 MVM, a drop of about 42%**. Data for 2009 and 2010 also show continued improvement, to 1.13 in 2009 and 1.09 in 2010.[17] This improvement has been felt in all states: every one of the 50 states reported improvement between 1989 and 2008, and all but three states (Oregon, Kentucky and Delaware) reported improvements from 1999 to 2008. The overall rate has also dropped precipitously in recent years, much more than the recent decline in travel. Nineteen states reported declines of one or more fatality per 100 MVM between 1989 and 2008, and one state (New Mexico) reported a decline of more than two fatalities per 100 MVM. The U.S. as a whole saw fatalities per 100 MVM decline by almost one (0.91), and with VMT in the three trillion-mile range in 2008, this equates to about 27,000 lives saved annually. Medical advances have undoubtedly played an important role in this downward trend. However, better highway conditions and improved safety have also made a significant contribution.

Table 7: Highway Fatality Rate per 100 Million Vehicle Miles

Ranked From Biggest Reduction in Fatality Rates (1) to Lowest Reduction in Fatality Rates (50) 1989-2008

State	1989	1999	2008	Change in Rate, 1999-2008	Change in Rate, 1989-2008	Rank
NM	3.40	2.06	1.39	-0.66	-2.01	1
NV	3.27	2.01	1.56	-0.45	-1.71	2
MS	3.17	2.66	1.79	-0.87	-1.38	3
AR	3.17	2.07	1.81	-0.26	-1.36	4
ID	2.83	1.99	1.52	-0.47	-1.31	5
WV	3.13	2.08	1.83	-0.25	-1.30	6
FL	2.74	2.06	1.50	-0.56	-1.24	7
NY	2.13	1.22	0.92	-0.31	-1.21	8
SC	3.04	2.41	1.85	-0.56	-1.19	9
OR	2.42	1.19	1.24	0.05	-1.18	10
IL	2.15	1.42	0.98	-0.44	-1.17	11
UT	2.18	1.63	1.06	-0.57	-1.12	12
CA	2.15	1.19	1.05	-0.14	-1.10	13
MI	2.04	1.44	0.96	-0.48	-1.08	14
NE	2.15	1.64	1.09	-0.55	-1.06	15
VT	2.01	1.31	1.00	-0.31	-1.01	16
NC	2.42	1.71	1.41	-0.31	-1.01	17
OH	2.10	1.36	1.10	-0.26	-1.00	18
AZ	2.52	2.19	1.52	-0.67	-1.00	19
SD	2.27	1.82	1.32	-0.50	-0.95	20
IA	2.28	1.68	1.34	-0.34	-0.94	21
U.S.	2.16	1.55	1.25	-0.30	-0.91	--
AL	2.52	2.03	1.63	-0.40	-0.89	22
TN	2.38	1.98	1.49	-0.49	-0.89	23
AK	2.16	1.67	1.27	-0.40	-0.89	24
HI	1.92	1.21	1.04	-0.17	-0.88	25
PA	2.24	1.52	1.36	-0.16	-0.88	26
WA	1.81	1.20	0.94	-0.26	-0.87	27
WI	1.90	1.31	1.05	-0.26	-0.85	28
MA	1.51	0.80	0.67	-0.13	-0.84	29
NH	1.90	1.19	1.07	-0.12	-0.83	30
MN	1.62	1.22	0.79	-0.43	-0.83	31
MD	1.87	1.20	1.07	-0.13	-0.80	32
GA	2.16	1.53	1.37	-0.16	-0.79	33
MO	2.19	1.64	1.41	-0.23	-0.78	34
CO	1.91	1.54	1.15	-0.39	-0.76	35
CT	1.55	1.01	0.83	-0.17	-0.72	36
NJ	1.49	1.11	0.80	-0.31	-0.69	37
VA	1.69	1.19	1.00	-0.19	-0.69	38
RI	1.48	1.06	0.79	-0.27	-0.69	39
TX	2.10	1.67	1.44	-0.23	-0.66	40
KY	2.40	1.70	1.74	0.04	-0.66	41
KS	1.95	1.94	1.30	-0.64	-0.65	42
IN	1.73	1.45	1.15	-0.30	-0.58	43
ME	1.64	1.28	1.06	-0.22	-0.58	44
WY	2.21	2.42	1.68	-0.74	-0.53	45
DE	1.80	1.17	1.35	0.18	-0.45	46
OK	1.97	1.74	1.54	-0.19	-0.43	47
LA	2.31	2.24	2.02	-0.22	-0.29	48
MT	2.19	2.24	2.12	-0.12	-0.07	49
ND	1.38	1.64	1.33	-0.31	-0.05	50

H. Narrow Lanes on Rural Primaries

Narrow lanes on major rural roads are a key measure of sight visibility and design adequacy. The national design standard for lane width on major rural roads is generally 12 feet.

Overall, **the proportion of narrow lanes on the rural primary (Rural Other Principal Arterial) system has improved about 3.3 percentage points, from 12.9% narrow lanes in 1993 to 9.6% narrow lanes in 2008** (Table 8). However the rate of improvement seems to have slowed, since the 1999–2008 change was just 1 percentage point. Thirty-eight states, led by Hawaii, reported improvements. On the other hand, 10 states, led by West Virginia, reported increases in the percentage of narrow lanes. Since most re-constructions involve lane-width widening, this would likely occur only if roads were re-measured and found to be narrow or if roads were reclassified to rural other principal arterials from other lower rural classes.

Table 8: Percent of Rural Other Principal Arterials with Narrow Lanes

Ranked From Biggest Reduction in Narrow Lanes (1) to Largest Increase in Narrow Lanes (50) 1989-2008

State	1993	1999	2008	Change in Percent Narrow Lanes, 1999-2008	Change in Percent Narrow Lanes, 1993-2008	Rank
HI	80.0	39.7	32.4	-7.3	-47.6	1
RI	22.6	13.8	2.1	-11.7	-20.5	2
AR	41.8	30.8	26.0	-4.8	-15.7	3
NJ	15.5	1.3	0.0	-1.3	-15.5	4
OH	22.9	19.8	10.9	-8.9	-12.0	5
WI	11.0	6.5	1.0	-5.5	-10.0	6
MI	23.5	22.0	14.0	-8.0	-9.5	7
KS	8.1	5.0	0.2	-4.8	-8.0	8
TN	27.9	25.5	20.5	-5.0	-7.4	9
FL	13.9	7.2	6.7	-0.5	-7.1	10
AL	10.6	4.2	3.7	-0.5	-6.8	11
ND	6.6	4.2	0.0	-4.2	-6.6	12
MN	11.7	8.4	5.9	-2.5	-5.9	13
IA	9.0	0.8	3.4	2.6	-5.6	14
MT	6.6	3.0	1.0	-2.0	-5.5	15
NM	10.2	7.0	5.1	-2.0	-5.1	16
KY	22.9	16.2	18.0	1.9	-4.8	17
SD	3.9	1.2	0.0	-1.2	-3.9	18
NE	4.8	4.2	0.9	-3.3	-3.9	18
LA	14.9	14.6	11.2	-3.5	-3.7	20
U.S.	12.9	10.6	9.6	-1.0	-3.3	–
OR	8.4	2.6	5.2	2.6	-3.2	21
ID	3.6	1.0	0.5	-0.4	-3.0	22
ME	27.4	28.4	24.5	-3.9	-2.9	23
NH	4.6	5.0	2.2	-2.8	-2.4	24
SC	6.2	6.0	3.9	-2.1	-2.3	25
OK	5.7	4.6	3.4	-1.2	-2.2	26
IL	15.6	22.8	13.4	-9.4	-2.2	26
WA	39.5	41.6	37.3	-4.3	-2.2	26
MO	17.0	14.8	14.9	0.1	-2.1	29
PA	41.5	35.3	39.6	4.4	-1.9	30
MA	6.5	4.8	4.8	0.0	-1.7	31
CO	15.0	10.2	13.3	3.1	-1.7	31
CT	2.3	0.0	0.6	0.6	-1.6	33
DE	1.4	1.3	0.0	-1.3	-1.4	34
WY	1.8	1.7	1.2	-0.5	-0.6	35
IN	6.9	6.5	6.4	-0.1	-0.4	36
AZ	0.4	0.2	0.0	-0.2	-0.4	36
VA	29.3	30.4	29.2	-1.2	-0.1	38
NV	0.0	0.0	0.0	0.0	0.0	39
UT	0.0	0.0	0.0	0.0	0.0	39
CA	5.8	5.2	5.9	0.8	0.1	41
AK	5.5	3.6	5.8	2.2	0.3	42
MD	5.3	4.9	5.7	0.7	0.4	43
TX	5.6	5.1	7.8	2.8	2.2	44
GA	1.2	2.2	3.5	1.3	2.3	45
NC	18.7	15.4	21.1	5.7	2.4	46
VT	18.6	26.1	23.1	-3.0	4.5	47
MS	2.7	1.4	7.3	5.9	4.6	48
NY	23.2	22.0	33.7	11.7	10.5	49
WV	23.4	44.2	35.2	-9.0	11.9	50

I. Expenditures for State-Administered Highways

The ability of a state to make progress in road performance depends partially on its resources. All things being equal, one would expect states with more resources per mile of responsibility to be in better shape and to have improved the most.

Expenditures on the state-controlled highway system increased significantly from 1989 to 2008. **The states disbursed about $118 billion for state-owned roads in 2008, up 182% from 1989, $42 billion.** Average per-mile total disbursements have increased about 177% from $52,000 to $145,000 (Table 9).

Adjusted for inflation, these disbursements show an increase of about 60%, from $48,000 to $77,000 per mile. Texas and Florida reported the largest increases, 174% and 150% respectively. Two states (Connecticut and Delaware) reported decreases of 35% and 22%, respectively.

Table 9: Total Disbursements, per Mile of Responsibility ($K)

Ranked From Largest Increase in Spending Per Mile (1) to Largest Decrease in Spending Per Mile (50) 1989-2008

	Nominal				Inflation Adjusted (1987 = 100)				
State	1989	1999	2008	Percent Change, 1989-2008	1989	1999	2008	Percent Change, 1989-2008	Rank
TX	40.5	56.2	192.9	376.6	37.1	38.3	101.8	174.5	1
FL	154.9	311.1	671.4	333.5	141.9	212.1	354.2	149.6	2
OR	38.8	57.1	149.4	285.2	35.5	38.9	78.8	121.8	3
WA	45.5	66.8	167.6	268.4	41.7	45.5	88.4	112.2	4
CA	155.8	279.3	545.9	250.4	142.7	190.5	288.0	101.8	5
IN	64.4	102.6	221.8	244.1	59.0	70.0	117.0	98.2	6
CO	44.6	97.0	147.2	230.2	40.8	66.1	77.7	90.2	7
ID	38.9	61.6	128.1	229.4	35.6	42.0	67.6	89.7	8
GA	62.1	94.0	201.9	225.4	56.8	64.1	106.5	87.4	9
ND	16.3	43.2	50.1	206.8	15.0	29.4	26.4	76.7	10
MO	21.4	40.0	64.6	202.5	19.6	27.3	34.1	74.2	11
AK	29.4	67.6	86.3	193.6	26.9	46.1	45.5	69.1	12
MA	226.7	1150.2	662.0	192.0	207.7	784.3	349.3	68.2	13
NC	14.6	29.4	42.7	192.0	13.4	20.0	22.5	68.2	14
IL	113.8	130.8	330.7	190.6	104.2	89.2	174.5	67.4	15
KS	39.1	86.9	112.0	186.3	35.9	59.2	59.1	64.9	16
NY	141.9	283.7	402.1	183.3	130.0	193.4	212.2	63.2	17
MS	35.9	73.3	100.9	181.2	32.9	50.0	53.2	62.0	18
U.S.	52.4	85.9	145.1	177.1	48.0	58.6	76.6	59.6	–
ME	29.9	50.5	82.3	174.7	27.4	34.4	43.4	58.2	19
NV	55.9	89.1	153.1	173.7	51.2	60.7	80.8	57.6	20
UT	64.7	159.9	176.9	173.4	59.3	109.0	93.3	57.4	21
SC	12.7	19.2	34.3	170.4	11.6	13.1	18.1	55.7	22
AR	20.8	36.1	55.2	165.0	19.1	24.6	29.1	52.6	23
OH	60.0	96.1	158.4	164.1	54.9	65.5	83.6	52.1	24
WI	57.6	93.9	152.2	164.1	52.8	64.0	80.3	52.1	25
VT	43.9	71.6	115.6	163.1	40.2	48.9	61.0	51.5	26
KY	29.6	49.5	76.9	160.1	27.1	33.8	40.6	49.8	27
MI	91.4	166.2	229.0	150.6	83.7	113.4	120.8	44.3	28
NE	26.3	44.3	63.4	141.0	24.1	30.2	33.4	38.8	29
NH	66.9	93.1	160.9	140.6	61.3	63.5	84.9	38.6	30
HI	178.1	320.5	420.7	136.3	163.1	218.6	222.0	36.1	31
LA	63.1	71.7	148.8	135.7	57.9	48.9	78.5	35.7	32
MN	57.7	71.5	129.4	124.3	52.8	48.8	68.3	29.2	33
OK	52.8	79.8	117.2	121.9	48.4	54.4	61.8	27.8	34
MT	25.9	57.4	56.7	119.4	23.7	39.1	29.9	26.4	35
PA	60.9	90.0	130.6	114.4	55.8	61.3	68.9	23.5	36
WY	34.6	44.1	73.1	111.5	31.7	30.1	38.6	21.8	37
VA	28.9	44.5	60.8	110.2	26.5	30.3	32.1	21.1	38
AZ	123.9	206.9	259.4	109.3	113.5	141.1	136.9	20.6	39
SD	22.5	40.5	45.3	101.6	20.6	27.6	23.9	16.1	40
NM	32.7	59.6	65.5	100.2	29.9	40.7	34.5	15.3	41
MD	201.2	207.0	401.5	99.5	184.3	141.2	211.8	14.9	42
WV	17.8	27.9	35.0	96.5	16.3	19.1	18.5	13.2	43
NJ	588.8	812.9	1140.0	93.6	539.4	554.3	601.5	11.5	44
RI	191.4	256.9	361.1	88.6	175.4	175.1	190.5	8.6	45
AL	69.9	79.4	127.3	82.2	64.0	54.1	67.1	4.9	46
IA	52.6	75.8	93.0	76.9	48.2	51.7	49.1	1.9	47
TN	52.9	77.6	93.3	76.4	48.5	52.9	49.2	1.6	48
DE	94.3	100.0	127.2	34.8	86.4	68.2	67.1	-22.4	49
CT	293.1	264.3	330.0	12.6	268.5	180.2	174.1	-35.2	50

J. Performance versus Expenditures

Table 10 and Figure 1 summarize performance by state. The table groups the states first by the number of the seven rated areas in which they showed improvement or no change in performance, and then by the total disbursements per highway mile over the study period (1989–2008).

Most states (37 of 50) improved or maintained their performance on five or more measures. And most states (38 of 50) also spent *less* than the national average, per mile of responsibility. **Interestingly, those states that spent the most money did not make the most improvement, and states with relatively few resources also made progress.** For instance, California spent about twice as much as the average state (per mile of responsibility), but its performance improved in just two of the seven measures (deficient bridges and fatality rate). Hawaii and New York also spent two to two and a half times the national average but improved in just three of seven measures. Conversely, 10 states (led by North Dakota, Virginia and Missouri) spent less than the national average per mile of responsibility but improved on all seven measures, and only one state (Florida) improved on all seven measures and spent more than the national average.

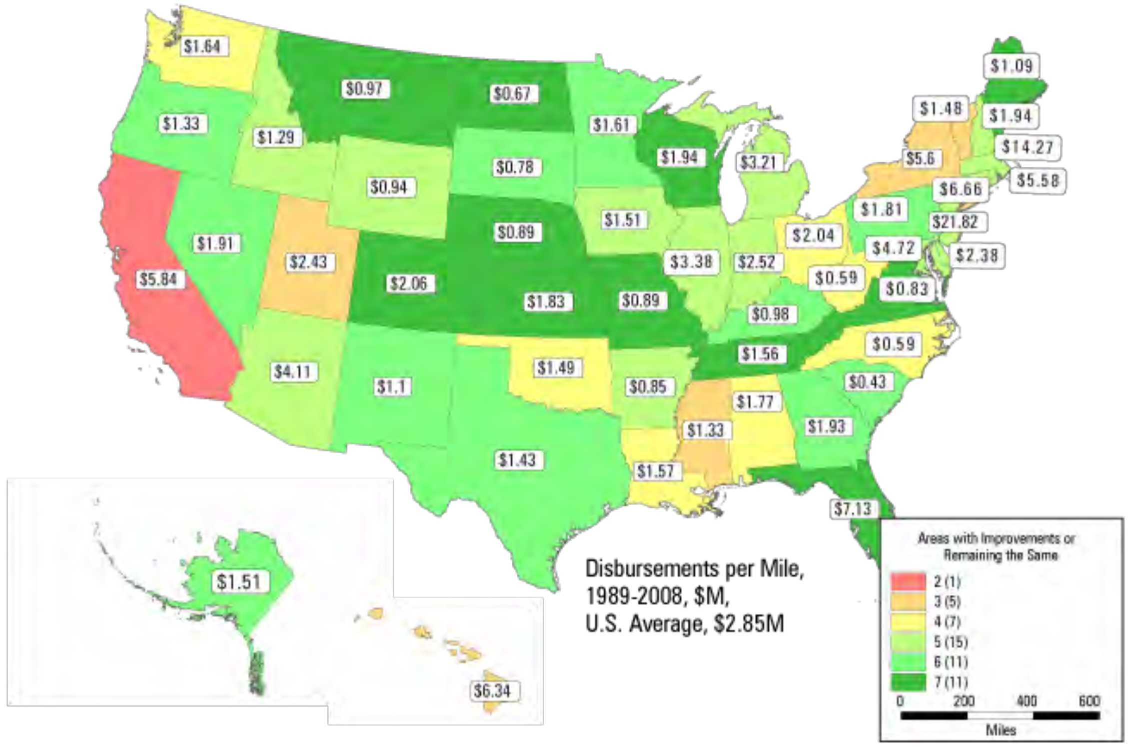
Table 10: Performance Summary by State, 1989-2008

State	2008 Miles	Change in Percentage or Rate, 1989-2008							Measures Improved	Total Disbursements/ Mile ($M), 1989-2008
		Rural Int % Poor	Urban Int % Poor	Rural Primary % Poor	Urban Int % Cong	Deficient Bridges	Fatality Rate	Rural Primary Narrow Lanes		
U.S.	16,312	-4.7	-1.2	-2.0	-4.0	-14.0	-0.91	-3.3	7	2.85
ND	7,407	-0.2	0.0	-2.9	0.0	-30.6	-0.05	-6.6	7	0.67
VA	57,957	-13.7	-10.3	-6.8	-26.9	-5.8	-0.69	-0.1	7	0.83
MO	33,677	-28.2	-45.4	-5.0	-23.3	-30.1	-0.78	-2.1	7	0.89
NE	10,208	-9.7	-2.7	-6.6	-15.8	-31.5	-1.06	-3.9	7	0.89
MT	11,135	-13.4	-3.1	-16.7	0.0	-6.7	-0.07	-5.5	7	0.97
ME	8,665	-3.5	-1.9	-7.2	-8.4	-8.9	-0.58	-2.9	7	1.09
TN	14,220	-3.8	-16.0	-2.5	-11.2	-22.7	-0.89	-7.4	7	1.56
KS	10,607	-7.2	-9.4	-1.4	-3.5	-19.2	-0.65	-8.0	7	1.83
WI	11,839	-17.0	-2.9	-3.5	-12.2	-15.6	-0.85	-10.0	7	1.94
CO	9,764	-3.3	-6.2	-0.2	-1.7	-20.4	-0.76	-1.7	7	2.06
FL	12,084	-7.2	-1.7	-2.7	-17.3	-7.5	-1.24	-7.1	7	7.13
SC	41,620	-7.3	-2.7	-1.3	-21.8	2.1	-1.19	-2.3	6	0.43
SD	8,895	0.0	6.6	-1.7	-10.9	-14.2	-0.95	-3.9	6	0.78
KY	27,886	-0.5	-14.2	0.0	33.9	-21.1	-0.66	-4.8	6	0.98
NM	12,166	-0.3	-2.1	-0.1	0.6	-1.7	-2.01	-5.1	6	1.10
OR	8,166	-9.7	-11.0	-3.2	-12.3	0.5	-1.18	-3.2	6	1.33
TX	80,212	-1.1	-2.6	-1.4	-1.5	-13.6	-0.66	2.2	6	1.43
AK	8,453	-15.6	-20.6	-23.4	-25.7	10.5	-0.89	0.3	6	1.51
MN	12,905	-3.0	0.0	0.0	36.2	-10.6	-0.83	-5.9	6	1.61
PA	43,612	-6.1	-0.9	-1.3	5.3	-0.1	-0.88	-1.9	6	1.81
NV	5,921	-22.0	-46.2	-4.1	8.7	-14.0	-1.71	0.0	6	1.91
GA	18,294	-10.5	-7.5	-4.1	-11.0	-14.4	-0.79	2.3	6	1.93
AR	16,431	-0.9	-0.5	0.6	18.6	-19.9	-1.36	-15.7	5	0.85
WY	7,854	0.1	3.3	-0.1	0.0	-0.2	-0.53	-0.6	5	0.94
ID	4,959	-23.2	-1.3	-12.0	22.0	6.2	-1.31	-3.0	5	1.29
IA	9,444	-3.5	-0.9	1.7	24.2	-20.4	-0.94	-5.6	5	1.51
NH	4,025	-9.4	0.4	0.3	-12.2	-13.7	-0.83	-2.4	5	1.94
DE	5,372	NA	5.0	0.0	-43.9	-6.0	-0.45	-1.4	5	2.38
IN	11,215	-3.3	2.0	0.0	10.2	-21.1	-0.58	-0.4	5	2.52
MI	9,688	1.9	5.6	-0.9	-2.0	-8.5	-1.08	-9.5	5	3.21
IL	16,747	-2.6	3.9	1.0	-5.5	-15.2	-1.17	-2.2	5	3.38
AZ	7,142	-12.5	-12.6	-2.8	11.6	6.1	-1.00	-0.4	5	4.11
MD	5,407	-3.6	2.5	-0.1	-14.3	-3.5	-0.80	0.4	5	4.72
RI	1,111	-23.8	-20.4	-2.0	7.0	6.3	-0.69	-20.5	5	5.58
CT	4,048	0.0	3.1	0.6	-12.3	-24.5	-0.72	-1.6	5	6.66
MA	3,605	-1.2	-1.3	0.6	-26.9	9.0	-0.84	-1.7	5	14.27
NJ	3,332	-2.6	6.7	0.8	-10.8	-1.0	-0.69	-15.5	5	21.82
NC	80,214	0.7	2.1	-1.7	-12.6	-18.1	-1.01	2.4	4	0.59
WV	34,456	0.1	-5.9	1.0	-14.7	-24.9	-1.30	11.9	4	0.59
OK	13,490	0.4	9.9	-0.6	10.0	-24.1	-0.43	-2.2	4	1.49
LA	16,702	1.5	8.2	-2.0	6.8	-14.5	-0.29	-3.7	4	1.57
WA	17,835	2.0	0.6	0.1	-19.4	-5.3	-0.87	-2.2	4	1.64
AL	11,107	2.2	1.7	0.0	22.7	-26.1	-0.89	-6.8	4	1.77
OH	20,394	-2.2	-9.6	0.4	15.2	3.4	-1.00	-12.0	4	2.04
MS	11,062	0.0	0.9	0.4	21.7	-31.7	-1.38	4.6	3	1.33
VT	2,840	-8.4	14.6	0.6	2.5	-13.8	-1.01	4.5	3	1.48
UT	5,841	1.0	1.9	0.5	-13.5	5.0	-1.12	0.0	3	2.43
NY	16,302	6.1	9.1	0.7	-15.1	-10.7	-1.21	10.5	3	5.60
HI	1,005	NA	25.0	2.7	-2.1	14.3	-0.88	-47.6	3	6.34
CA	18,273	10.0	20.7	1.1	0.9	-3.9	-1.10	0.1	2	5.84

Notes: Green text indicates gains or no change; pink indicates losses.

Green shading indicates disbursements below the U.S. average; pink indicates above average disbursements.

Figure 1: Performance Summary by State, 1989-2008



Part 3

National Summary and Policy Implications

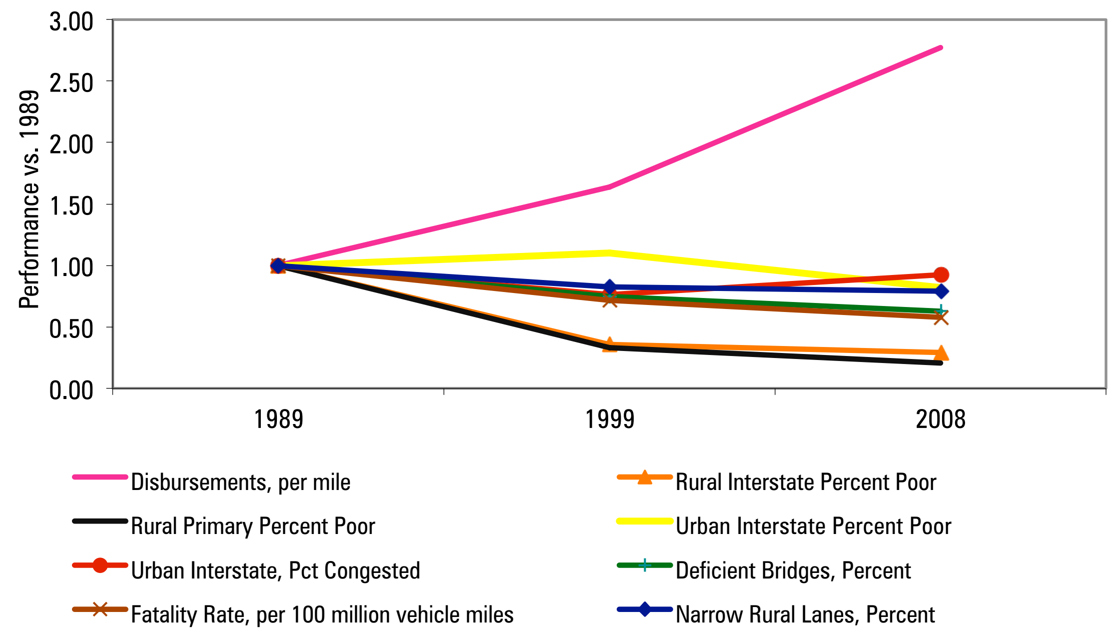
The higher level facilities (interstates, freeways, and U.S. and state numbered highways) have seen dramatic improvement in performance in the last two decades, especially in rural pavement condition and highway fatality rates, but also in bridge condition and even in one measure of urban interstate congestion. Table 11 and Figure 2 summarize this progress.

Table 11: Performance of State Owned Highways, 1989-2009

	1989	1999	2008	1989–08 Percent Change	1989–08 Change
Mileage under State Control	802,105	810,532	815,594	1.7	13,489
Highway Construction Price Index (1987=100)	107.7	136.5	202.56	88.1	94.9
Performance					
Rural Interstate, Percent Poor Condition*	6.60	2.35	1.93	-70.8	-4.7
Urban Interstate, Percent Poor Condition*	6.55	7.21	5.37	-18.0	-1.2
Rural Arterial, Percent Poor Condition*	2.58	0.85	0.53	-79.5	-2.1
Urban Interstate, Percent Congested*	52.59	40.15	48.61	-7.6	-4.0
Bridges, Percent Deficient*	37.76	28.25	23.72	-37.2	-14.0
Fatality Rate per 100 Million Miles Driven*	2.16	1.55	1.25	-42.1	-0.9
Rural Primary, Percent Narrow Lanes*	12.90	10.63	9.62	-25.4	-3.3
Financial					
Total Revenues, All Sources, $B	42.67	71.01	124.04	190.7	81.4
Total Expenditures, $B	42.01	69.65	118.36	181.7	76.4
Expenditures, Capital/Bridges, $B	23.04	41.26	62.91	173.0	39.9
Expenditures, Maintenance, $B	7.77	11.96	18.71	140.8	10.9
Expenditures, Administration, $B	3.29	4.74	10.78	227.7	7.5

*weighted U.S. average

Figure 2: Trends in U.S. Highway Performance, 1989-2008



It is important to distinguish between performance of systems versus that of individual elements. All individual elements of common "systems" (houses, cars, personal health, etc.) deteriorate and eventually fail, even if "maintained." Yet, in the aggregate, each of these systems may be in better shape than in the past. The same is true for highways: **while individual system elements (road sections, bridges, pavements) are continuously deteriorating over time, the *overall condition of the state-owned highway system appears to be improving*, and has possibly never been in better shape. In short, the U.S. highway infrastructure is not "crumbling."**

Despite this overall improvement, many issues are in need of attention. First among these is variation in performance between states. Not all states have seen successes on every measure. In four of the seven key indicators, about one-third of the states reported declines in performance, and in two measures, about 10 states reported declines. While these states were not always the same, several appear more than once. Missouri, Idaho and Rhode Island are among the top five improvers on three measures, and two other states are listed twice. But California, New York and Hawaii are among the bottom five decliners on three indices, and five other states are listed twice. This suggests that some states are having difficulties in improving and maintaining their highway systems to the same level as other states.

A second issue is the apparent slowdown in performance improvement. Six of the seven indicators show less progress in the past decade compared to the 1990s, suggesting more difficulty in making progress in the future. If federal funds tighten, as seems likely, progress may slow further.

A third issue is the measures themselves. This study focuses on features in unsatisfactory ("poor," "narrow," "deficient," "congested") condition, since officials and the public tend to focus on deficiencies. Other measures, for instance the percentage of mileage or traffic in "good" or "satisfactory" condition, are not reviewed here but are sometimes used in national studies.[18] Although some progress has been made on defining national performance measures, no national consensus has been reached on how to track performance, with the exception of bridges and fatal accidents. Agreement on measures would obviously be a positive step in charting progress.

Another important issue is the likely variation in performance by functional class. The improvements reported here, for the higher road systems, are probably not applicable to lower functional classes or city streets and county roads. Although hard evidence is lacking, particularly for local roads, they are probably in worse shape than higher systems and may be worse than in the past. This may partially explain the apparent discrepancy between citizens' views and empirical evidence: citizens' impressions of the highway system as a whole may be based largely on the condition of these lower level roads. While most of the traffic is carried by the higher roads, the lower roads are often the first and last facilities motorists use on each trip and may disproportionately affect their overall impression. The lack of comparative data on the performance of these systems is a serious drawback.

Then there is the cost side. The steady improvements in the higher level systems have been accompanied by significant expenditures: per-mile disbursements adjusted for inflation are up 60% since 1989. The states with the most room to improve, i.e., the ones with the poorest scores in 1989, tend to be the states that have made the most progress. Therefore, much of the "low-hanging fruit" may have already been picked. Many of the more readily solvable problems have been addressed, and the challenges remaining will require increased focus and perhaps lead to slower progress in the future. This will probably require better targeting of increasingly limited resources. A recent study of urban congestion needs, for instance, estimates that about $553 billion would be needed over 20 years to effectively remove extreme congestion in the nation's cities.[19] Although this is a significant amount, it is only about one-half the estimated *federal* expenditure over the same period, and only about one-sixth of the total amount likely to be spent on roads nationwide over the same period. Focusing federal funds on those problems of national significance would allow local funds to be targeted at such issues as local congestion.

The following actions would foster additional understanding of this complex problem:

- Determine measures and goals for road performance. How should performance be measured? How good should roads be? Should all roads be equal in condition regardless of functional class or location? The failure of the federal government and the states to agree on common measures or to define goals for road performance is a significant weakness in our data systems.
- Encourage states to learn from neighbors and peers in similar circumstances regarding policies that are effective in improving performance in a cost-effective manner.
- Determine appropriate government responsibilities for various road systems. It may no longer be possible for the federal government to extensively assist localities in repairs for all systems.

- Avoid rushing to judgment. Base policy decisions on good data gathered comparatively and analyzed carefully.
- Avoid the use of terms like “crumbling infrastructure.” They misrepresent the facts and feed an alarmist mentality. Instead, report progress and identify shortcomings in a balanced fashion.
- Determine how to measure other attributes of road performance such as accessibility improvements, job creation and environmental impact. Road system access to jobs, goods and services has been a key element in the nation’s economic progress but it is rarely measured or considered in system performance. Measures that track these features are also needed.

The debate on how to continue the positive trends in the nation’s highway infrastructure is one that needs to occur now, especially given increasingly intense competition for diminishing financial resources. It will take resolve, good policy and effective management to continue these trends.

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