Form R 350 (1/1/87)

Standard Title Page -- Report on State Project

1693

Report No.	Report Date	No. Pages	Type Report: Update	Project No. : 9245-061-940
VTRC 90-R15	June 1990	59	Period Covered: Through 1989	Contract No.:

Title and Subtitle STATUS REPORT:
The Impact of the 65 mph Speed Limit on Virginia's Rural Interstate Highways Through 1989

Author(s)
Jernigan, Jack D. and Lynn, Cheryl W.

Performing Organization Name and Address

Virginia Transportation Research Council
Box 3817, University Station
Charlottesville, Virginia 22903-0817

Sponsoring Agencies' Names and Addresses

Va. Dept. of Transportation
1221 E. Broad Street
Richmond, Virginia 23219

University of Virginia
Charlottesville
Virginia 22903

Key Words
Speeds
Speed Limit
65 mph Speed Limit
Rural Interstate Highways
Speed Differential
Safety
Regression Analysis

Supplementary Notes Also sponsored by: Virginia Department of Motor Vehicles, P.O. Box 27412, Richmond, VA 23269

*Third in a series of six reports.

Abstract

In April 1987, Congress passed the Surface Transportation and Uniform Relocation Assistance Act (STURAA), which permitted states to raise their maximim speed limit on rural interstate highways (rural interstates) to 65 mph. Since then, 40 states, including Virginia, have adopted a 65 mph maximum speed limit. Virginia's 65 mph speed limit became effective for passenger cars on July 1, 1988, and for commercial buses on July 1, 1989. The findings presented in this report summarize 18 months of experience with the 65 mph speed limit in Virginia.

STATUS REPORT

THE IMPACT OF THE 65 MPH SPEED LIMIT ON VIRGINIA'S RURAL INTERSTATE HIGHWAYS THROUGH 1989

Submitted to the Secretaries of Transportation and Public Safety

and

The Joint Secretarial Task Force on
Interstate Highway Speed Limits

Jack D. Jernigan
Research Scientist

and

Cheryl W. Lynn
Research Scientist

(The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.)

Virginia Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Transportation and the University of Virginia)

Charlottesville, Virginia

June 1990
VTRC 90-R15

SAFETY RESEARCH ADVISORY COMMITTEE

P. S. MCCREREY, Chairman, Director, Planning & Program Development, Department of Motor Vehicles

R. J. BRIETENBACH, Director, Transportation Safety Training Center, Virginia Commonwealth University

V. M. BURGESS, Transportation Safety Administrator, Department of Motor Vehicles

P. B. FERRARA, Ph.D., Director, Division of Forensic Science

J. T. HANNA, Special Assistant to the Commissioner, Transportation Safety, Department of Motor Vehicles

C. P. HEITZLER, JR., Program Manager, Department of Information Technology

T. A. JENNINGS, Safety/Technology Transfer Coordinator, FHWA

B. G. JOHNSON, Supervisor, Dirver Education, Department of Education

P. J. LANTEIGNE, Operations & Tactics Bureau, Virginia Beach Police Department

B. D. LEAP, Driver Services Administrator, Department of Motor Vehicles

C. W. LYNN, Research Scientist, Virginia Transportation Research Council

R. P. MINOR, Commander, Traffic Division, Fairfax County Police Department

S. E. NEWTON, Commander, Albemarle County Police Department

J. T. PHIPPS, Director, Roanoke Valley Alcohol Safety Action Project

Lt. Col. C. M. ROBINSON, Director, Bureau of Administrative and Technical Services, Virginia Department of State Police

F. F. SMALL, Assistant State Traffic Engineer, VDOT

J. A. SPENCER, Assistant Attorney General, Office of the Attorney General

E. W. TIMMONS, Director of Public Affairs, Tidewater AAA of Virginia, Norfolk, Virginia

THE JOINT SECRETARIAL TASK FORCE ON INTERSTATE HIGHWAY SPEED LIMITS

Oscar K. Mabry, Chairman
Deputy Secretary,
Office of the Secretary of Transportation

David R. Gehr, Assistant Chief Engineer
Virginia Department of Transportation

Lt. Col. L. A. Graham, Director
Bureau of Field Operations,
Virginia Department of State Police

William H. Leighty, Deputy Commissioner
Virginia Department of Motor Vehicles

EXECUTIVE SUMMARY

In April 1987, Congress passed the Surface Transportation and Uniform Relocation Assistance Act (STURAA), which permitted states to raise their maximum speed limit on rural interstate highways (rural interstates) to 65 mph. Since then, 40 states, including Virginia, have adopted a 65 mph maximum speed limit. Virginia's 65 mph speed limit became effective for passenger cars on July 1, 1988, and for commercial buses on July 1, 1989. The findings presented in this report summarize 18 months of experience with the 65 mph speed limit in Virginia.

Findings

Speed

1. Seven states have not raised their rural interstate speed limit: Connecticut, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island. In addition, Alaska and Delaware do not have any roadways classified as rural interstates, and Hawaii has only 5 miles so classified.

2. When the STURAA was passed, the average speed on Virginia's rural interstates was 59.9 mph. After the increase in the speed limit, the average speed increased 3.6 mph (to 63.5 mph) and the 85th percentile speed 5.0 mph (from 65.0 to 70.0 mph).

3. The average speed on rural interstates in the other states that raised their maximum speed limit increased 3.7 mph (from 60.7 to 64.4 mph), and the 85th percentile speed 4.2 mph (from 66.7 to 70.9 mph).

4. On rural interstates in states not raising their speed limit to 65 mph, the average speed increased 2.4 mph (from 58.9 to 61.3 mph) and the 85th percentile speed 2.3 mph (from 65.9 to 68.2 mph).

5. On Virginia's urban interstate highways (urban interstates), which are posted at 55 mph, the average speed increased 5.2 mph (from 53.5 to 58.7 mph) and the 85th percentile speed 7.0 mph (from 61.0 to 68.0 mph).

6. In the other states that increased their speed limit on rural interstates, the average speed on urban interstates posted at 55 mph increased 1.4 mph (from 58.0 to 59.4 mph) and the 85th percentile speed 1.9 mph (from 64.2 to 66.1 mph).

Truck Speed Differential

7. According to a daytime radar survey of speeds taken in Virginia in 1989, trucks were traveling about 5 mph slower than cars. Because of this difference in speeds, it was anticipated that collisions between cars and trucks would increase; however, they did not.

Fatal Crash and Fatalities

8. In other states retaining the 55 mph speed limit, fatal crashes on rural interstates increased 17.3% and fatalities 11.1%. On other urban interstates, fatal crashes increased 25.9% and fatalities 27.4%.

9. In other states raising their rural interstate speed limit, fatal crashes on these roadways increased 32.2% and fatalities 34.7%. On urban interstates, fatal crashes increased 4.9% and fatalities 4.1%.

10. On Virginia's rural interstates, fatal crashes increased 47.5% (from 40 to 59) and fatalities 43.2% (from 44 to 63). However, given historical trends, fatalities and fatal crashes in 1986 and 1987 were unusually low.

11. On Virginia's urban interstates, fatal crashes increased 4.9% (from 41 to 43) and fatalities 4.3% (from 47 to 49).

Summary

In Virginia, fatal crashes and fatalities increased on average more than they did in other states that raised their maximum speed limit to 65 mph. It is tempting to conclude that the change in the maximum speed limit caused these increases. However, other factors cannot be ruled out. For instance, weather conditions, changes in traffic volume, trip type, or vehicle mix could account for some of the increase. Thus, although increases in speed, fatal crashes, and fatalities occurred, the change in the maximum speed limit may not account for the increases.

THE IMPACT OF THE 65 MPH SPEED LIMIT ON VIRGINIA'S RURAL INTERSTATE HIGHWAYS THROUGH 1989

Jack D. Jernigan
Research Scientist

and

Cheryl W. Lynn
Research Scientist

INTRODUCTION

In 1974, Congress established the 55 mph national maximum speed limit (NMSL) as an energy conservation measure in response to the OPEC oil embargo. In addition to reducing the consumption of fuel oil, the 55 mph NMSL helped to reduce drastically the number of deaths on the nation's highways (Transportation Research Board, 1984). Prior to the establishment of the 55 mph NMSL, higher speed limits were common on the nation's interstate, primary, and unposted secondary highways. For more than a decade, the 55 mph NMSL remained, but as energy constraints lessened and fuel prices decreased in the 1980s, public pressure began to mount for a lessening of federal control. One federal policy, the federal speed compliance monitoring program, dictated that states maintain a 50 percent minimum level of compliance with the 55 mph speed limit or risk having as much as 10% of their federal-aid highway funds impounded. Many states were concerned that because the federal compliance monitoring program included rural interstate highways (rural interstates), for which the level of compliance was the lowest, their highway funding was in jeopardy.

In response to public pressure for higher speed limits and pressure from the states to avoid the threat of losing highway funds, Congress passed the Surface Transportation and Uniform Relocation Assistance Act (STURAA) in April 1987. The act included a provision to allow states to increase the maximum limit to 65 mph, without penalty, for interstate highways outside urbanized areas with a population of 50,000 or more.

During 1987, 38 states increased the maximum speed limit on at least part of their rural interstates. In 1988, Georgia became the 39th state to increase the rural interstate speed limit to 65 mph. Passage of the STURAA came after Virginia's General Assembly had adjourned for the year, and Governor Gerald L. Baliles determined that the issue should be considered during the 1988 session of the General Assembly.

In an attempt to provide the administration and the General Assembly with the data necessary to make an informed decision, Secretary of Transportation and Public Safety Vivian E. Watts created a task force to study the issue. The Joint Secretarial Task Force on Interstate Highway Speed Limits was composed of a representative from the Secretary's office, one from the Virginia Department of Motor Vehicles, one from the Virginia Department of State Police, and one from the Virginia Department of Transportation (VDOT). The Safety of Transportation Systems Team of the Virginia Transportation Research Council (VTRC) served as staff for the task force. Although the task force made no recommendations on whether to increase the speed limit, it produced a report that included background information concerning speed control and speed zoning as well as estimates of the positive and negative effects of raising the speed limit in the Commonwealth.

The speed limit issue received considerable attention in the 1988 session of the General Assembly and was covered extensively by the media. After much heated debate and a number of proposals being passed and defeated in committee, the issue was resurrected and a bill to increase the rural interstate speed limit was passed. On July 1, 1988, the speed limit on most of Virginia's rural interstates was raised from 55 mph to 65 mph for passenger vehicles but remained at 55 mph for commercial buses and large trucks. A year later, however, the speed limit for commercial buses was raised to 65 mph, although the truck speed limit remained at 55 mph.

PURPOSE AND SCOPE

The task force recommended in 1988 that the VTRC staff monitor the impact of the revised speed limit on Virginia's highways for five years, the period authorized by the Virginia statute for the higher speed limit to be in effect. This report is the second in a series that will provide updates on the impact of the 65 mph speed limit. Because of the short time that has elapsed since the implementation of the higher speed limit (only 18 months), there are insufficient data to link changes in speeds, fatal crashes, and fatalities to the change in the speed limit alone. Normally, at least three years of data are required to determine that changes are not the result of other factors (such as changes in alcohol-related crashes, pedestrian crashes, or traffic volume) or of normal fluctuations in the data. Further, most of the comparisons made of accident data are based on changes in absolute numbers. Later reports will also compare accident rates to aid in the meaningful interpretation of the causes and extent of changes. Thus, the data and analyses provided in this report are preliminary, and any conclusion based on these data would be inappropriate.

METHODOLOGY

This report concentrates on changes in travel speeds, fatal crashes, and fatalities that occurred on rural interstates after the implementation of the 65 mph speed limit. Data for urban interstate highways (urban interstates) are compared to data for rural interstates in an attempt to determine whether similar patterns emerge for these highways even though the urban interstates have a 55 mph maximum speed limit.

In Virginia, speed data were collected from the permanent sites used in the federal compliance monitoring program. Although the federal government no longer requires that speeds be monitored on interstate highways posted at 65 mph, the VDOT elected to continue to collect data at these stations. Speed data for other states were solicited by contacting the state agency responsible for conducting the federal compliance monitoring survey and were supplemented by data from published sources (Federal Highway Administration [FHWA], 1988a, 1988b; Partyka, 1989). About half of the states with a 65 mph rural interstate speed limit no longer monitor speeds on these highways, thus the speed data for other states' rural interstates are based on a self-selected sample. Most states were able to provide speed data for urban interstates because the federal compliance monitoring program is still in effect for highways with a 55 mph speed limit. Generally, this report compares speed data for the spring quarter (April to June) for the years between 1986 and 1989. However, because of the limited amount of data, a few states were compared across other time periods. Appendix A provides a detailed list of the states and time periods that were used for comparison.

In addition to speed data collected for all vehicle types, daytime radar speed surveys were conducted before and after the increase in Virginia's rural interstate speed limit. The radar survey allowed the study team to distinguish between the speeds of cars and trucks, which have different speed limits.

The VDOT has made a special effort to track fatalities and fatal crashes on interstate highways and therefore was able to provide the study team with up-to-date information. Data for injury and property damage crashes, however, are too voluminous to track manually on a daily basis and therefore will not be available until after the deadline for this report. Likewise, because other states tabulate their data on a calendar-year basis, the latest crash data available are for the 1988 calendar year.

Because all 40 states that changed the rural interstate speed limit to 65 mph did so on a date other than January 1, all states will have a year of transition during which the speed limit changed. The study team elected to compare the calendar year immediately prior to the transition year with the calendar year following the transition year. Thus, with the exception of Georgia, which like Virginia did not raise its speed limit until 1988, the "before" year in the fatality and fatal

crash analysis section is 1986 and the "after" year, 1988. In Virginia and Georgia, the "before" year is 1987 and the "after" year, 1989. Because conditions other than the maximum speed limit also change from year to year, great caution must be used in making cross-year comparisons.

Finally, a regression model was calculated, estimating the number of rural interstate fatalities from annual average speed and vehicle miles of travel (VMT). The years 1966 through 1987 were used as the baseline data for the model, and projections were made for 1988 and 1989 based on this model.

SPEEDS AND CRASHES ON INTERSTATE HIGHWAYS

Speeds

Rural Interstates

Actual speeds on Virginia's rural interstates increased after the implementation of the 65 mph speed limit, but substantially less than the 10 mph increase in the legal limit. In Virginia, as in many other states, speeds on rural interstates increased between 1986 and 1987 as the passage of the STURAA became inevitable. In the spring of 1986, the average speed traveled on Virginia's rural interstates was 56.3 mph and the 85th percentile speed was 62.0 mph. During the spring of 1987, the baseline time period used in the initial report of the task force, the average speed traveled on rural interstates had increased to 59.9 mph and had further increased to 63.5 mph by the spring of 1989. However, as can be seen in Figure 1, the average speed was still lower than 65 mph. The 85th percentile speed (the speed at or below which 85 percent of vehicles travel) was 65 mph in the spring of 1987 but had increased to 70 mph during the same time period in 1989.

These speed figures may seem lower than what many people have observed while driving on rural interstates; however, these data represent an average based on 24-hour surveys conducted in varying weather and traffic conditions. At night and during inclement weather, people tend to drive more slowly than on sunny days.

One's subjective experience is also not a reliable reflection of actual travel speeds. For instance, some members of the media have had reporters travel on rural interstates (usually on a sunny day when speeds are highest) with the vehicle's cruise control set at 65 mph and count the number of vehicles passing their car and the number of vehicles they pass. In this sort of "experiment," the only vehicles the reporters

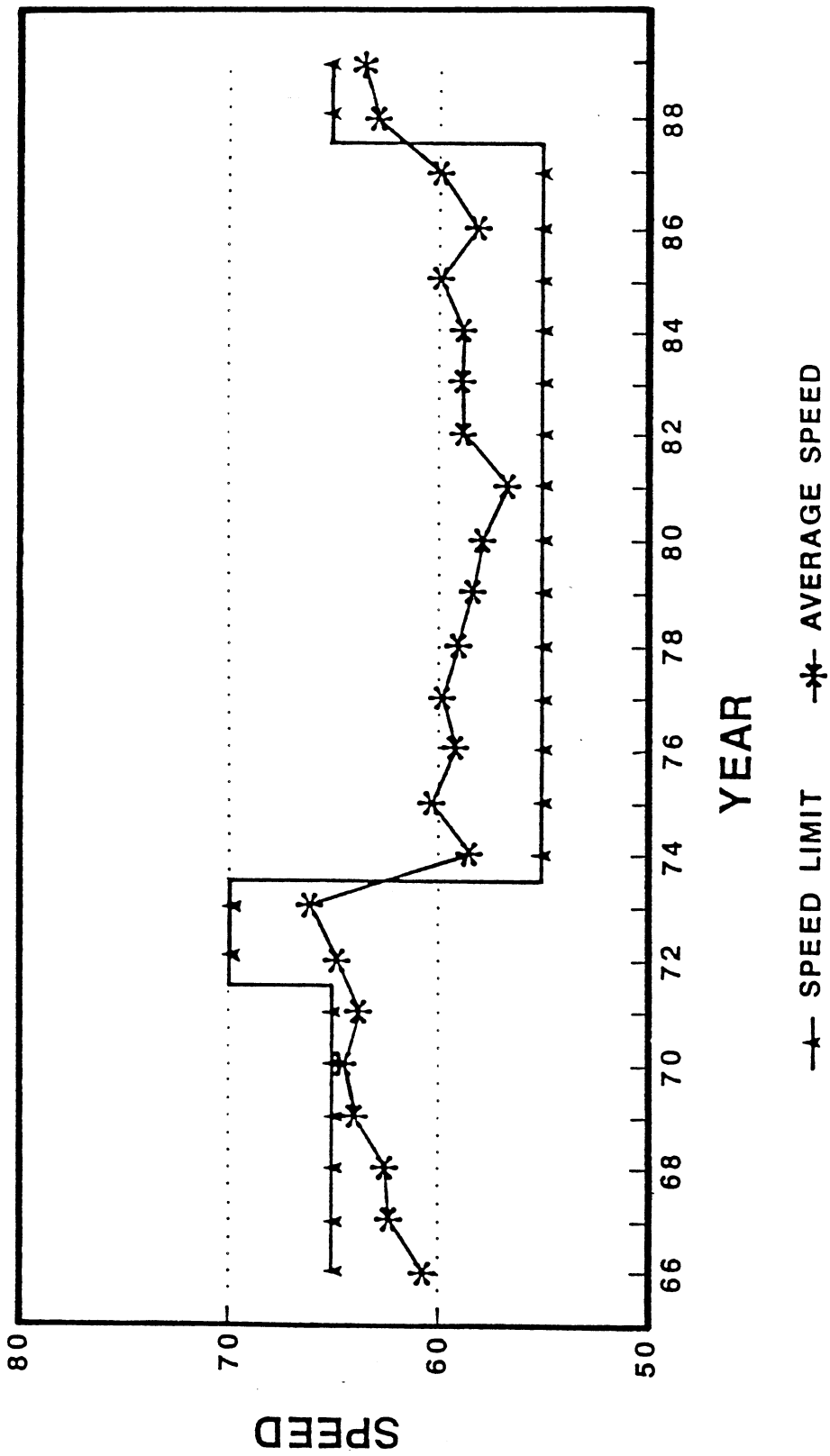

Figure 1. Average rural interstate speed vs. speed limit in Virginia, 1966-1989.

would encounter would be those traveling either substantially faster or slower than they were traveling. Thus, the reporters would never encounter vehicles traveling at a similar speed; that is, they would not catch up with vehicles traveling at similar speeds and vice versa. Hence, surveys such as these tend to detect only abnormal rather than normal travel speeds at a time and under conditions where speeds are generally at their highest.

Table 1 shows how average and 85th percentile speeds on Virginia's rural interstates compare with the mean of those speeds for other states. (State-specific data are listed in Appendix A.) Only 10 states do not have a 65 mph speed limit on rural interstates, but only 7 of those states have more than a handful of rural interstate miles. The sample of states retaining the 55 mph limit had an average rural interstate speed of 58.9 mph in 1986 and 61.3 mph in 1989. The 85th percentile speed in these states increased from 65.9 mph in 1986 to 68.2 mph in 1989. Thus, both average and 85th percentile speeds were up 2.4 mph and 2.3 mph, respectively, in states that did not increase the rural interstate speed limit.

In the sample of states other than Virginia that increased the rural interstate speed limit, the average speed in 1986 was 60.7 mph and the 85th percentile speed was 66.7 mph. By 1989, the speed on rural interstates posted at 65 mph had increased to 64.4 mph and the 85th percentile speed had increased to 70.9 mph. Thus, in states that increased the speed limit, the average rural interstate speed was up by 3.7 mph and the 85th percentile speed was up by 4.2 mph.

In Virginia, the average rural interstate speed in the spring of 1986 was 56.3 mph and the 85th percentile speed was 62.0 mph. These speeds had increased to 63.5 mph and 70.0 mph, respectively, by 1989--an increase of 7.2 mph in the average speed and 8.0 mph in the 85th percentile speed. However, even though Virginia's increase in speeds was greater than that of other states, the actual average and 85th percentile speeds on Virginia's rural interstates remained lower than those for other states with a 65 mph rural interstate speed limit. Further, of the 19 other states in the sample with a 65 mph rural interstate speed limit, only 4 reported lower average speeds than Virginia and 6 reported lower 85th percentile speeds.

On Virginia's rural interstates, average speeds were only 3.6 mph higher and 85th percentile speeds 5.0 mph higher in 1989 than in 1987, the year Congress passed the STURAA. As reported in the initial report of the task force, Virginia's rural interstate speed increased between the spring of 1986 and 1987 by 3.6 mph for the average speed and 3.0 mph for the 85th percentile speed. Therefore, even without action by the General Assembly, travel speed had increased on Virginia's rural interstates.

TABLE 1

Average and 85th Percentile
Rural Interstate Speeds[1]

States with a 55 mph Rural Interstate Speed Limit
(n = 6)

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	58.9	59.7	60.6	61.3	+2.4
85th percentile	65.9	66.3	67.8	68.2	+2.3

States with a 65 mph Rural Interstate Speed Limit
(n = 19)

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	60.7	61.7	63.1	64.4	+3.7
85th percentile	66.7	68.7	69.2	70.9	+4.2

Virginia

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	56.3	59.9	60.1	63.5	+7.2
85th percentile	62.0	65.0	66.0	70.0	+8.0

[1]States not collecting or submitting data are excluded from this table. Thus, not all states in each category are included in each comparison throughout this report.

Urban Interstates

Like rural interstate speeds, urban interstate speeds have increased, but generally not by as much. Table 2 shows that in the sample of states in which both urban and rural interstate speed limits are 55 mph, the average urban interstate speeds was 59.1 mph in 1986 and 60.4 mph in 1989. The 85th percentile speeds in these states increased from 65.6 mph in 1986 to 67.8 mph in 1989. (State-specific data are listed in Appendix B.) Thus, between 1986 and 1989 in states that did not change the speed limit on rural interstates, the average urban interstate speed increased 1.3 mph and the 85th percentile speed increased 2.2 mph.

In states that increased the rural interstate speed limit, the average urban interstate speed was 58.0 mph in 1986 and 59.4 in 1989, and the 85th percentile speed increased from 64.2 mph in 1986 to 66.1 mph in 1989. Hence, the average urban interstate speed increased 1.4 mph and the 85th percentile speed 1.9 mph. Even though the increase in the urban interstate speed was similar in states that increased the rural interstate speed limit and in those that did not, the average and 85th percentile urban interstate speeds were lower in the states that had a 65 mph rural interstate speed limit.

In Virginia, the increases in average and 85th percentile speeds on urban interstates were greater than for other states. The average speed went from 53.5 to 58.7 mph, and the 85th percentile speed increased from 61.0 to 68.0 mph. Hence, in Virginia, the increase in the urban interstate average speed was 5.2 mph and in the 85th percentile, 7.0 mph. However, the average speed in Virginia was lower than that for other states, although the 85th percentile speed was higher.

The distribution of speeds also changed. Speed variance is a measure of the distribution of speeds on a section of highway; low speed variance indicates a more uniform travel speed than higher speed variance. Speed theory suggests that as speed variance increases, the number of interactions between vehicles increases, thereby increasing the overall accident potential. Thus, with the introduction of a differential speed system (where the maximum speed limit for trucks remained at 55 mph but the limit for passenger cars was increased), it was anticipated that speed variance would also increase. As seen in Table 3, speed variance, in fact, did increase in Virginia.

At survey sites on the rural interstates, speed variance increased an average of 36.4% after the speed limit was raised. This is the opposite of what occurred when interstate speed limits were lowered to 55 mph in the early 1970s. At that time, as mean interstate speeds decreased, so did speed variance. Interestingly, at urban interstate survey sites, speed variance also increased by 39.3%. Thus, speed variance increased on both rural and urban interstates in Virginia after the implementation of the 65 mph speed limit on rural interstates.

TABLE 2

Average and 85th Percentile Speeds for Urban Interstates[1]

States with a 55 mph Rural Interstate Speed Limit
(n = 7)

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	59.1	58.5	59.0	60.4	+1.3
85th percentile	65.6	65.7	66.5	67.8	+2.2

States with a 65 mph Rural Interstate Speed Limit
(n = 27)

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	58.0	58.1	58.7	59.4	+1.4
85th percentile	64.2	65.1	65.0	66.1	+1.9

Virginia

	mph				
Speeds	1986	1987	1988	1989	86-89 Change
Average	53.5	53.7	59.5	58.7	+5.2
85th percentile	61.0	63.0	66.0	68.0	+7.0

[1]States not collecting or submitting data are excluded throughout this table. Thus, not all states in each category are included in each comparison throughout this report.

TABLE 3

Radar Survey of Speeds on Virginia's Interstate Highways
(Spring 1988 v. Fall 1989)

		Before (mph)		After (mph)		Percent Change	
Site Location		Mean	Variance	Mean	Variance	Mean	Variance
Urban							
I-64	Cars	60.51	12.67	60.79	17.41	0.46	37.37
	Trucks	57.95	11.90	58.44	13.20	0.85	10.90
	Total	59.59	13.99	60.17	17.97	0.97	28.47
I-64	Cars	60.70	14.82	64.15	19.35	5.68	30.54
	Trucks	58.18	24.21	61.93	11.45	6.45	-52.70
	Total	59.96	18.66	63.52	17.99	5.94	-3.60
I-95	Cars	62.18	19.89	64.05	29.65	3.01	49.06
	Trucks	58.68	13.91	61.12	16.95	4.16	21.83
	Total	60.63	20.25	63.23	27.49	4.29	35.75
I-95	Cars	59.22	15.05	64.10	24.53	8.24	62.94
	Trucks	57.74	12.25	59.48	22.42	3.01	83.02
	Total	58.70	14.52	62.40	28.54	6.30	96.61
Rural							
I-64	Cars	62.54	19.89	68.23	21.21	9.10	6.63
	Trucks	59.26	15.37	61.91	12.42	4.47	-19.17
	Total	61.73	20.70	66.10	27.17	7.08	31.24
I-64	Cars	61.37	17.31	68.51	16.82	11.63	-2.81
	Trucks	57.03	14.90	62.60	20.35	9.77	36.58
	Total	60.30	19.98	66.88	25.60	10.91	28.12
I-85	Cars	62.54	19.89	67.79	16.37	8.39	-17.70
	Trucks	59.26	15.37	61.89	11.43	4.44	-25.62
	Total	61.73	20.70	65.79	22.44	6.58	8.39
I-95	Cars	61.76	19.62	68.67	14.81	11.19	-24.53
	Trucks	59.55	11.76	68.87	15.06	15.65	28.01
	Total	61.24	18.66	65.61	29.40	7.14	57.54
I-95	Cars	62.00	19.71	68.19	18.17	9.98	-7.83
	Trucks	59.69	11.22	61.63	17.54	3.25	56.29
	Total	61.13	17.64	65.90	27.66	7.80	56.80

Crashes

Fatal Crashes and Fatalities on Interstate Highways

The study team again cautions the reader that there are insufficient data to link changes in the numbers of fatal crashes and fatalities to the change in the speed limit. Generally, both fatal crashes and fatalities increased nationwide subsequent to the implementation of the 65 mph speed limit. However, these increases may be due in part or in total to other factors or normal fluctuations in the data.

The data in Table 4 show that fatal crashes on rural interstates in states that did not increase the speed limit increased 17.3% and fatalities increased 11.1% in the calendar year before and after the change in the speed limit. (See Appendix C for state-specific data.) In states that increased the speed limit, fatal crashes on rural interstates increased 32.2% and fatalities increased 34.7% in the calendar years before and after the change in the speed limit. Thus, fatalities and fatal crashes on rural interstates increased more in states that raised their speed limit than in those that did not.

In Virginia, fatal crashes increased from 40 in 1987 to 59 in 1989, and fatalities from 44 to 63. Thus, Virginia had a 47.5% increase in fatal crashes and a 43.2% increase in fatalities.

On urban interstates in states not increasing the maximum speed limit to 65 mph, fatal crashes and fatalities rose by 25.9% and 27.4%, respectively between 1986 and 1988. (Table 5 lists the summary data, and Appendix D lists state-specific data.) Increases in urban interstate crashes in states raising the rural interstate speed limit were much lower, with fatal crashes increasing only 4.9% and fatalities only 4.1%. In Virginia, between 1987 and 1989 (one year before and one year after the speed limit increase), fatalities increased 4.9% and fatal crashes increased 4.3%. Like other states that increased the rural interstate speed limit, Virginia's percentage increases in fatal crashes and fatalities on urban interstates were less than in states that retained the 55 mph speed limit for rural interstates.

Characteristics of Fatal Crashes on Rural Interstates

Tables 6 and 7 show the breakdown of fatal crashes and fatalities in Virginia by month for the years 1985 to 1989. Compared with the average in the three years prior to the implementation of the higher speed limit, a substantial portion of the 1989 increase in fatal crashes and fatalities occurred during May and October and there were several months in which there was either no change or a reduction. Hence, increases in fatal crashes and fatalities were not evenly distributed across the year.

TABLE 4

Fatal Crashes and Fatalities on Rural Interstates[1]

	55-mph States (86-88) (n = 8)	65-mph States (86-88) (n = 38)	Virginia (87-89)
Changes in fatal crashes	+17.3%	+32.2%	+47.5%
Changes in fatalities	+11.1%	+34.7%	+43.2%

TABLE 5

Fatal Crashes and Fatalities on Urban Interstates[1]

	55-mph States (86-88) (n = 9)	65-mph States (86-88) (n = 37)	Virginia (87-90)
Changes in fatal crashes	+25.9%	+4.9%	+4.9%
Changes in fatalities	+27.4%	+4.1%	+4.3%

[1]States not collecting or submitting data are excluded from this table. Thus, not all states in each category are included in each comparison throughout this report.

TABLE 6

Fatal Crashes on Virginia's Rural Interstates
by Month: 1985-1989

	1985	1986	1987	1988	1989	85-87 Avg.	89 Diff.
Jan.	2	3	3	3	3	2.7	+0.3
Feb.	1	1	4	4	4	2.0	+2.0
Mar.	3	5	3	3	2	3.7	-1.7
Apr.	4	1	1	5	2	2.0	0.0
May	2	3	4	5	9	3.0	+6.0
June	5	3	2	6	6	3.3	+2.7
July	6	2	4	5	6	4.0	+2.0
Aug.	7	6	5	6	5	6.0	-1.0
Sept.	5	6	5	5	8	5.3	+2.7
Oct.	6	7	2	12	9	5.0	+4.0
Nov.	5	1	7	6	4	4.3	-0.3
Dec.	4	2	0	5	2	2.0	0.0
TOTALS	50	40	40	65	59	43.3	+15.7

TABLE 7

Fatalities on Virginia's Rural Interstates by Month:
1985-1989

	1985	1986	1987	1988	1989	85-87 Avg.	89 Diff.
Jan.	2	4	3	3	3	3.0	0.0
Feb.	1	1	5	5	4	2.3	+1.7
Mar.	4	5	3	3	2	4.0	-2.0
Apr.	5	1	1	6	2	2.3	+0.3
May	4	3	4	5	10	3.7	+6.3
June	6	3	3	6	7	4.0	+3.0
July	6	3	6	7	6	5.0	+1.0
Aug.	8	7	5	8	5	6.7	-1.7
Sept.	5	7	5	7	8	5.7	+2.3
Oct.	8	7	2	13	11	5.7	+5.3
Nov.	6	1	7	8	4	4.7	-0.7
Dec.	4	2	0	7	2	2.0	0.0
TOTALS	59	44	44	78	63	49.0	+14.0

Various characteristics of fatal crashes occurring on rural interstates are summarized in Table 8. Interestingly, the percentage of all crashes that involved speeding as a contributing factor remained relatively constant between 1987 and 1989 compared to other characteristics. (However, the speeds defined as excessive changed when the speed limit was increased from 55 to 65 mph). The categories expected to increase because of the differential speed limit for cars and trucks (rear end, sideswipe, and truck involved) all declined over this time period as did the percentage of crashes involving pedestrians and alcohol. The only categories to increase in representation between 1987 and 1989 were accidents involving running off the road and driving the wrong way. Additional analyses will be necessary to determine if there is a causal relationship between these crash types and the increased speed limit.

Table 9 shows the distribution of fatal crashes on Virginia's rural interstates by route. These data show that in each year the majority of all rural interstate fatal crashes occurred on I-81 and I-95, which should be expected considering the length and traffic volumes on these routes. Fatal crashes on I-81 and I-95 each increased by three to four crashes in 1989 as compared with the three-year average from 1985 to 1987.

Fatal crashes between 1987 and 1989 increased disproportionately on both I-77 and I-85 as compared with other interstate routes; however, such a disproportionate increase was not apparent in 1988. On I-77, the three-year average was 2.0 fatal crashes per year, but in 1989 there were 5 fatal crashes on this route. Likewise, on I-85, where the three-year average was 1.7 fatal crashes per year, there were 7 fatal crashes in 1989.

Generally, the data in Table 9 indicate that the increase in fatal crashes was not route specific; that is, a part of the overall increase in fatal crashes was distributed across most of the routes. Although there are insufficient data to determine whether the disproportionate increases in fatal crashes on I-77 and I-85 represent more than normal fluctuations of the data, the study team will continue to monitor these routes closely.

Relationship Between Average Speed and Fatalities

In order to determine how average speed is related to the number of fatalities on Virginia's rural interstates, a multiple regression analysis was conducted using data from 1966 to 1987. (The data used in the multiple regression analysis are listed in Appendix E.) Table 10 shows that after controlling for VMT, there was a significant positive relationship between the annual average speed on Virginia's rural interstates and fatalities on those highways in a given year. Thus, as average speeds increase, fatalities increase.

TABLE 8

Configuration of Fatal Crashes
on Rural Interstates

	1987 (% of all crashes)	1988 (% of all crashes)	1989 (% of all crashes)
Run off road	30 (75.0)	39 (60.0)	50 (84.7)
Read end	10 (25.0)	12 (18.5)	8 (13.6)
Sideswipe (same direction)	5 (12.5)	8 (12.3)	6 (10.2)
Pedestrian	6 (15.0)	7 (10.8)	5 (8.5)
Wrong way	1 (2.5)	8 (12.3)	3 (5.1)
Truck involved	27 (67.5)	20 (30.8)	10 (16.9)
Alcohol	8 (20.0)	14 (21.6)	9 (15.3)
Speeding	8 (20.0)	16 (24.6)	13 (22.0)
TOTAL CRASHES	40	65	59

Note: Individual categories add up to more than the total because more than one factor could be involved in one crash (e.g., an alcohol-related run-off-road crash).

TABLE 9

Fatal Crashes on Virginia's Rural Interstates
by Route

Route	1985	1986	1987	1988	1989	85-87 Avg.	89 Change
64	4	8	7	9	7	6.3	+0.7
66	2	3	3	6	2	2.7	-0.7
77	3	1	2	2	5	2.0	+3.0
81	17	14	16	26	19	15.7	+3.3
85	1	3	1	3	7	1.7	+5.3
95	21	11	11	19	18	14.3	+3.7
295	2	0	0	0	1	0.7	+0.3
TOTAL	50	40	40	65	59	43.3	+15.7

TABLE 10

Regression Analysis of VMT and
Average Speed on Traffic Fatalities

Dependent Variable: Annual Rural Interstate Fatalities
in Virginia

Multiple R	.859	F	26.725
R Square	.738	Sig	0.000
Adjusted R Square	.710		
Standard Error	9.623		

Variable	b	Standard Error	Sig.
Average speed	3.9107	.980	0.001
VMT (millions)	-0.0069	0.0028	0.023
(Constant)	-143.5876	66.5638	0.044

Interestingly, there is a significant negative correlation between VMT and fatalities, which means that as traffic has increased, fatalities have decreased--the opposite of what would normally be expected. A possible explanation for this relationship may be found in the fact that VMT has increased relatively steadily over the years and is therefore closely associated with annual improvements in highway and vehicle safety. At least since the late 1960s, highways and vehicles have been designed to reduce fatalities in crashes. Hence, increases in fatalities that might be expected with increased VMT may be offset by the effects of annual improvements in highway and vehicle safety. (Figure 2 shows the actual number of annual fatalities on rural interstates as compared with the projected numbers of fatalities using only average speed and VMT as predictor variables.)

The regression model estimates that a 1 mph increase in the annual average speed on Virginia's rural interstates is associated with an increase of approximately 4 deaths on those highways, all other factors being equal. Based on the 95% confidence range, an increase of 1 mph in the average speed would be associated with between 2 and 6 deaths on Virginia's rural interstates. Thus, if all other factors were held constant, this model would predict that the 3.6 mph increase in the average speed on Virginia's rural interstates from 1987 to 1989 would have been associated with an increase of between 7 and 22 rural interstate fatalities. In fact, there was an increase of 19 fatalities.

However, the real world experience shows that not only did the average speed change, but between 1987 and 1989, VMT also increased. The regression model estimates that an increase of 1 billion VMT on rural interstate highways is associated with a decrease of approximately 7 deaths on rural interstates annually. The 95% confidence range estimates that an increase of 1 billion VMT has been associated with between 4 and 10 fewer deaths on Virginia's rural interstates. Thus, given the increase in average travel speeds and VMT, the model predicted that there would be 56 fatalities in 1989, 7 fewer than the actual total of 63.

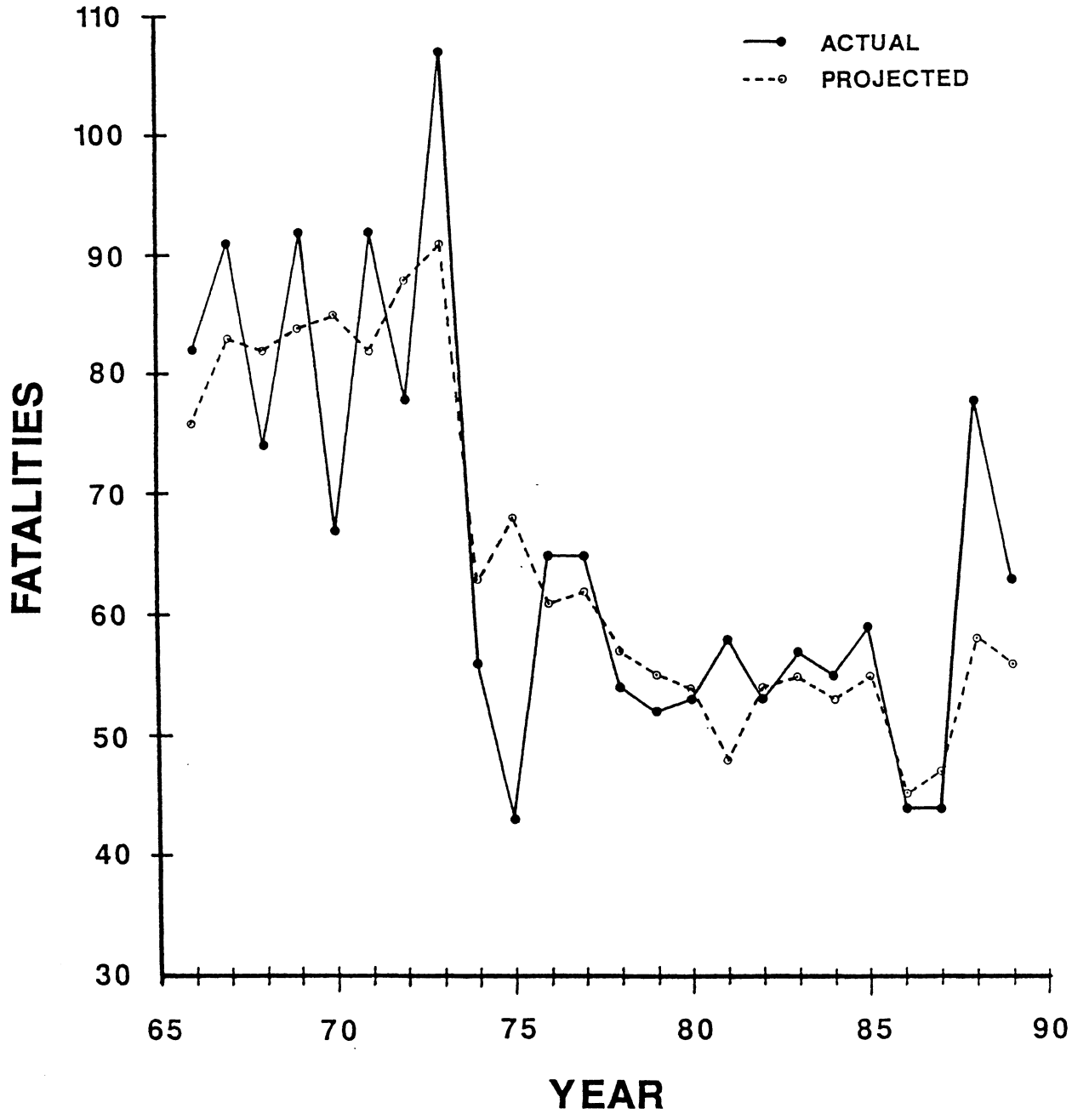

Figure 2. Actual and projected fatalities on Virginia's rural interstates, 1966-1989.

DISCUSSION

A comprehensive examination of the data indicates that profound changes in speed, fatal crashes, and fatalities occurred on Virginia's interstates in 1989 as compared with time periods when the maximum speed limit was 55 mph. It is premature to speculate that the change in the speed limit caused these changes because adequate time has not passed and adequate data have not been collected to rule out the influence of other factors.

During the early to mid-1980s, Virginia was among the states with the lowest average and 85th percentile travel speeds on rural interstates. In 1989, the average and 85th percentile speeds on Virginia's rural interstates had become more similar to those of other states with a 65 mph speed limit than they were when all states were subject to the 55 mph NMSL. In the spring of 1986, a time before a change in national policy had become likely, the average speed on Virginia's rural interstates was 56.3 mph and the 85th percentile speed was 62.0 mph. By the spring of 1989, almost a year after Virginia's rural interstate speed limit was increased to 65 mph, the average speed had increased to 63.5 mph and the 85th percentile speed to 70 mph. However, half of the increase in the average speed and 3 mph of the increase in the 85th percentile speed had already occurred by the spring of 1987--before the General Assembly had even considered raising the speed limit on rural interstates but after Congress had cleared the path for states to do so.

A regression model of annual average speed and VMT on fatalities shows that there is a significant positive relationship between average speed and the annual number of fatalities. Thus, it was anticipated that an increase in speeds, which would likely follow an increase in the speed limit, would be associated with an increase in fatalities on Virginia's rural interstates. In fact, fatal crashes and fatalities did increase in 1988 and 1989 as compared with 1986 and 1987. However, 1986 and 1987 were years during which fatalities on Virginia's rural interstates were at their lowest levels since 1975. Thus, the increase in fatal crashes and fatalities may appear larger when compared to recent years as opposed to comparisons with historical trends.

Speed theory suggests that the speed limit differential for trucks would have increased speed variance on rural interstates, thereby increasing collisions between passenger vehicles and trucks. A daytime radar survey of passenger vehicle and truck speeds indicated that speed variance increased in 1989 as compared with the spring of 1988, when all vehicles had a speed limit of 55 mph. However, accident data indicate that fatal accidents involving trucks did not increase after the speed limit for passenger vehicles was raised to 65 mph.

In conclusion, it appears that after the implementation of the 65 mph speed limit, there was an increase in average and 85th percentile

speeds and fatal crashes and fatalities on Virginia's rural interstates. These increased in most states that increased the rural interstate speed limit to 65 mph as well as in those that retained a 55 mph speed limit. However, Virginia's increases in fatal crashes and fatalities exceeded those for other states, and speeds increased more in Virginia than in other states, thereby closing the gap between average speeds in Virginia and in other states.

On a more positive note, fatal crashes involving trucks did not increase in Virginia between 1987 and 1989. Also, it appears that in Virginia, as in the other states that increased the speed limit on rural interstates, there was no dramatic increase in fatalities on urban interstates.

As more time passes, the answer to the following question will become more apparent: "What was the impact of the 65 mph speed limit on Virginia's rural interstates, exclusive of other factors?" Thus, the members of the Joint Secretarial Task Force on Interstate Highway Speed Limits and the staff of the Safety Team of the VTRC will continue to monitor changes that may be related to the 65 mph speed limit.

REFERENCES

Federal Highway Administration. 1988a. Highway safety performance: 1986: Fatal and injury accident rates on public roads in the United States. Report No. FHWA-SA-88-007. Washington, D.C.

Federal Highway Administration. 1988b. Highway safety performance: 1987: Fatal and injury accident rates on public roads in the United States. Report No. FHWA-SA-89-003. Washington, D.C.

Partyka, Susan A. 1989. Report to Congress on the effects of the 65 mph speed limit through 1988. National Highway Traffic Safety Administration, Washington, D.C.

Transportation Research Board. 1984. 55: A decade of experience. Special Report No. 204. Washington, D.C.

1722

APPENDIX A

Rural Interstate Speed Data for Selected States

1724

APPENDIX A

Rural Interstate Speed Data For Selected States

State	mph 1986	1987	1988	1989	86-89 Change
States with a 55 mph Rural Interstate Speed Limit					
Connecticut					
Average speed	54.8	51.9	57.1	62.9	+8.1
85th percentile	64.0	58.5	64.5	69.2	+5.2
Maryland					
Average speed	59.0	58.4	59.9	60.8	+1.8
85th percentile	65.0	65.7	67.4	67.9	+2.9
Massachusetts					
Average speed	55.3	63.6	60.8	62.0	+6.7
85th percentile	61.0	69.6	68.5	69.3	+8.3
New York					
Average speed	63.1	64.5	65.4	63.3	+0.2
85th percentile	68.5	69.3	69.9	69.4	+0.9
Pennsylvania					
Average speed	62.0	61.6	61.4	60.8	-1.2
85th percentile	70.0	70.0	69.6	67.5	-2.5
Rhode Island					
Average speed	59.4	58.0	58.7	58.0	-1.4
85th percentile	66.8	64.7	66.7	65.9	-0.9
States with a 65 mph Rural Interstate Speed Limit					
Alabama					
Average speed	63.8	63.0	66.7	66.1	+2.3
85th percentile	69.8	69.6	72.7	72.2	-2.4
Arizona					
Average speed	60.9	63.5	58.7	64.3	+3.4
85th percentile	66.9	69.0	64.6	70.3	+3.4

continues

Appendix A (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
Arkansas					
Average speed	58.9	63.2	63.4	64.2	-5.3
85th percentile	64.6	69.9	69.3	70.1	+5.5
California					
Average speed	61.2	62.8	64.2	61.3	+0.1
85th percentile	66.7	68.7	72.3	68.9	+2.2
Colorado					
Average speed	58.8	60.2	61.3	62.0	+3.2
85th percentile	64.7	66.1	67.7	68.3	+3.6
Florida					
Average speed	64.6	--	66.2	66.7	+2.1
85th percentile	70.7	--	72.5	72.5	+1.8
Georgia					
Average speed	61.5	60.6	--	63.9	+2.4
85th percentile	66.5	70.6	--	69.9	+3.4
Illinois[1]					
Average speed	59.0	62.1	63.3	--	--
85th percentile	64.8	68.4	69.7	--	--
Indiana[1]					
Average speed	62.9	64.9	64.1	--	--
85th percentile	68.1	65.7	70.9	--	--
Iowa[1]					
Average speed	60.3	59.6	62.5	--	--
85th percentile	66.1	64.8	67.7	--	--
Kansas					
Average speed	58.4	57.8	57.1	67.0	+8.6
85th percentile	64.3	67.0	64.2	73.8	+9.5
Kentucky[1]					
Average speed	57.6	--	63.5	--	--
85th percentile	63.8	--	72.2	--	--
Michigan					
Average speed	64.1	61.7	64.1	65.7	+1.6
85th percentile	70.9	68.4	70.9	72.4	+1.5

continues

Appendix A (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
Mississippi					
Average speed	60.6	64.1	61.1	60.7	+0.1
85th percentile	67.1	68.7	67.6	66.7	-0.4
Nevada					
Average speed	59.4	--	63.1	64.3	+4.9
85th percentile	67.5	--	70.4	71.2	+3.7
North Carolina					
Average speed	58.2	59.8	62.9	63.1	+4.9
85th percentile	65.1	65.8	69.1	68.9	+3.8
North Dakota[1]					
Average speed	59.7	62.9	--	--	--
85th percentile	61.5	68.3	--	--	--
Ohio					
Average speed	59.5	60.2	61.5	64.1	+4.6
85th percentile	65.4	66.2	67.5	72.8	+7.4
Oklahoma[1]					
Average speed	56.5	62.0	63.1	--	--
85th percentile	63.0	67.0	69.0	--	--
Oregon					
Average speed	61.7	61.7	64.6	64.3	+2.6
85th percentile	67.1	67.7	69.7	71.6	+4.5
South Carolina					
Average speed	61.9	63.8	67.9	66.6	+4.7
85th percentile	67.6	72.1	73.0	73.0	+5.4
South Dakota					
Average speed	59.6	64.9	63.7	64.6	+5.0
85th percentile	63.0	68.1	67.4	71.1	+8.1
Tennessee					
Average speed	63.4	61.5	62.3	63.9	+0.5
85th percentile	69.2	67.7	68.3	69.7	+0.5
Texas[1]					
Average speed	60.3	64.9	64.1	--	--
85th percentile	66.4	73.5	73.0	--	--

continues

Appendix A (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
Washington[1]					
Average speed	58.5	62.8	63.9	--	--
85th percentile	64.9	69.6	70.3	--	--
West Virginia[1]					
Average speed	59.1	62.2	--	--	--
85th percentile	65.7	68.5	--	--	--
Wisconsin					
Average speed	59.8	59.5	62.9	66.2	+6.4
85th percentile	65.7	75.0	68.0	73.1	+7.4
Vermont					
Average speed	57.9	60.1	63.3	64.0	+6.1
85th percentile	64.4	66.7	70.4	71.4	+7.0

[1]Not summarized in Table 1.

APPENDIX B

Average and 85th Percentile Speeds on Urban Interstate Highways

1730

APPENDIX B

Average And 85TH Percentile Speeds On
Urban Interstate Highways

State	mph 1986	1987	1988	1989	86-89 Change
States with a 55 mph Rural Interstate Speed Limit					
Connecticut					
Average speed	58.1	55.8	53.3	62.0	+3.9
85th percentile	64.4	62.6	59.5	68.5	+4.1
Delaware					
Average speed	57.7	58.5	60.0	58.7	+1.0
85th percentile	64.8	65.7	69.2	65.4	+0.6
Hawaii[1]					
Average speed	60.0	58.5	60.3	--	--
85th percentile	67.3	66.1	68.0	--	--
Maryland					
Average speed	58.3	57.5	58.1	58.7	+0.4
85th percentile	64.8	65.9	64.8	67.7	+2.9
Massachusetts					
Average speed	58.9	59.2	58.2	62.0	+2.8
85th percentile	65.5	66.7	64.7	69.3	+3.8
New York					
Average speed	61.0	62.4	63.6	61.6	+0.6
85th percentile	66.9	68.3	68.9	69.0	+2.1
Pennsylvania					
Average speed	60.9	58.4	59.7	60.3	-0.6
85th percentile	67.2	65.5	69.1	67.2	0.0
Rhode Island					
Average speed	58.5	57.4	59.8	59.2	+0.7
85th percentile	65.6	65.1	69.0	67.5	+1.9

continues

Appendix B (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
States with a 55 mph Rural Interstate Speed Limit					
Alabama					
Average speed	58.9	59.4	58.4	61.2	+2.3
85th percentile	60.4	66.9	60.5	68.3	+7.9
Arkansas					
Average speed	57.5	55.8	59.3	59.6	+2.1
85th percentile	63.1	64.0	65.4	66.4	+3.3
Arizona[1]					
Average speed	--	58.7	55.4	58.9	--
85th percentile	--	64.4	62.5	65.5	--
Colorado					
Average speed	56.3	54.6	56.6	56.6	+0.3
85th percentile	61.9	61.7	62.8	63.0	+1.1
Georgia					
Average speed	59.2	59.1	61.6	62.2	+3.0
85th percentile	64.8	66.2	69.5	70.8	+6.0
Idaho					
Average speed	56.7	59.4	57.3	58.7	+2.9
85th percentile	64.0	64.6	63.5	64.8	+0.8
Illinois					
Average speed	56.8	55.3	56.3	64.0	+7.2
85th percentile	--	--	--	--	--
Iowa[1]					
Average speed	54.5	56.2	56.5	--	--
85th percentile	59.5	61.7	62.0	--	--
Kansas					
Average speed	64.0	62.1	63.9	62.5	-1.5
85th percentile	72.0	69.0	70.4	69.3	-2.7
Kentucky[1]					
Average speed	54.8	54.2	57.8	--	+3.0
85th percentile	64.7	62.2	64.7	--	0.0
Maine					
Average speed	59.0	58.0	56.7	58.1	-0.9
85th percentile	65.7	65.1	64.0	65.2	-0.5

continues

Appendix B (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
Michigan					
Average speed	61.8	62.1	62.6	63.3	+1.5
85th percentile	68.3	70.1	69.6	71.3	+3.0
Minnesota					
Average speed	57.2	56.8	56.5	58.1	+0.9
85th percentile	60.4	61.7	60.8	63.7	+3.3
Mississippi					
Average speed	58.8	60.8	57.0	57.1	-1.7
85th percentile	65.9	67.2	64.5	63.8	-2.1
Missouri					
Average speed	59.1	58.8	58.2	58.2	-0.9
85th percentile	67.4	65.3	65.2	65.6	-1.8
Montana (annual)					
Average speed	57.2	57.5	57.7	59.1	+1.9
85th percentile	66.9	64.1	64.4	65.8	-1.1
Nebraska					
Average speed	58.0	60.8	58.1	60.9	+2.9
85th percentile	62.6	65.0	63.3	65.9	+3.3
Nevada					
Average speed	56.7	57.6	57.8	58.4	+1.7
85th percentile	63.3	64.5	65.1	65.7	+2.4
North Carolina					
Average speed	55.9	55.1	57.3	56.3	+0.4
85th percentile	62.9	61.4	62.9	62.3	-0.6
North Dakota					
Average speed	58.6	60.3	58.7	59.1	+0.5
85th percentile	64.7	67.0	64.8	65.0	+0.3
Ohio					
Average speed	60.2	58.5	59.9	59.9	-0.3
85th percentile	65.7	66.7	66.9	66.4	+0.7
Oklahoma[1]					
Average speed	--	--	--	--	--
85th percentile	61.0	63.0	63.0	--	--

continues

Appendix B (Continued)

State	mph 1986	1987	1988	1989	86-89 Change
Oregon					
Average speed	58.3	60.6	54.3	62.5	+4.2
85th percentile	64.5	65.7	58.3	71.6	+7.1
South Carolina					
Average speed	57.1	59.8	62.7	62.0	+4.9
85th percentile	62.6	67.1	67.9	68.0	+5.4
South Dakota					
Average speed	57.4	55.9	55.7	53.0	-4.4
85th percentile	60.8	58.3	60.6	58.1	-2.7
Tennessee					
Average speed	58.7	59.2	60.9	58.7	+0.0
85th percentile	65.1	65.9	69.0	68.0	+2.9
Texas					
Average speed	55.7	56.7	60.3	61.2	+5.5
85th percentile	63.2	63.6	67.6	68.4	+5.2
Vermont					
Average speed	55.0	59.3	58.1	59.2	+4.2
85th percentile	60.5	65.2	64.5	65.3	+4.8
West Virginia					
Average speed	55.8	54.3	60.2	57.5	+1.7
85th percentile	63.7	63.9	66.8	63.8	+0.1
Wisconsin					
Average speed	57.7	52.8	60.3	61.3	+3.6
85th percentile	62.6	63.6	66.3	67.2	+4.6
Wyoming					
Average speed	58.1	59.1	58.6	56.2	-1.9
85th percentile	65.4	67.9	65.4	64.3	-1.1

[1]Not summarized in Table 2.

APPENDIX C

Fatal Crashes and Fatalities on Rural Interstates

1736

APPENDIX C

Fatal Crashes And Fatalities On Rural Interstates

State	mph 1986	1987	1988	86-88 Change (%)
States with a 55 mph Rural Interstate Speed Limit				
Alaska[1]				
Fatal crashes	58	52	60	+2 (+3.4)
Fatalities	68	57	67	-1 (-1.5)
Connecticut				
Fatal crashes	11	12	6	-5 (-45.5)
Fatalities	16	14	6	-10 (-62.5)
Hawaii				
Fatal crashes	1	1	0	-1 (-100.0)
Fatalities	1	1	0	-1 (-100.0)
Maryland				
Fatal crashes	18	19	20	+2 (+11.1)
Fatalities	20	23	26	+6 (+30.0)
Massachusetts				
Fatal crashes	12	13	17	+5 (+41.7)
Fatalities	18	14	20	+2 (+11.1)
New Jersey				
Fatal crashes	8	13	10	+2 (+25.0)
Fatalities	9	13	15	+6 (+66.7)
New York				
Fatal crashes	31	45	37	+6 (+19.4)
Fatalities	37	54	41	+4 (+10.8)
Pennsylvania				
Fatal crashes	56	68	72	+16 (+28.6)
Fatalities	68	88	81	+13 (+19.1)
Rhode Island				
Fatal crashes	2	4	1	-1 (-50.0)
Fatalities	2	4	1	-1 (-50.0)

continues

Appendix C (Continued)

State	mph 1986	1987	1988	86-88 Change (%)
States with a 65 mph Rural Interstate Speed Limit				
Alabama				
Fatal crashes	62	53	57	-5 (-8.1)
Fatalities	74	61	67	-7 (-9.5)
Arizona				
Fatal crashes	96	126	116	+20 (+20.8)
Fatalities	105	156	127	+22 (+21.0)
Arkansas				
Fatal crashes	25	30	31	+6 (+24.0)
Fatalities	27	35	42	+15 (+55.6)
California				
Fatal crashes	194	227	231	+37 (+19.1)
Fatalities	233	266	255	+22 (+ 9.4)
Colorado				
Fatal crashes	56	53	57	+1 (+1.8)
Fatalities	72	55	67	-5 (-6.9)
Florida				
Fatal crashes	105	96	153	+48 (+45.7)
Fatalities	127	111	182	+55 (+43.3)
Georgia[1]				
Fatal crashes	99	104	106	+7 (+ 7.1)
Fatalities	111	115	128	+17 (+15.3)
Idaho				
Fatal crashes	24	32	31	+7 (+29.2)
Fatalities	27	31	35	+8 (+29.6)
Illinois				
Fatal crashes	50	51	67	+17 (+34.0)
Fatalities	55	62	84	+29 (+52.7)
Indiana				
Fatal crashes	47	54	63	+18 (+38.3)
Fatalities	52	61	74	+22 (+42.3)
Iowa				
Fatal crashes	12	21	28	+16 (+133.3)
Fatalities	13	23	35	+22 (+169.2)

continues

Appendix C (Continued)

State	mph 1986	1987	1988	86-88 Change (%)
Kansas				
Fatal crashes	9	19	12	+3 (+ 25.0)
Fatalities	10	26	15	+5 (+ 50.0)
Kentucky				
Fatal crashes	32	32	43	+11 (+ 34.4)
Fatalities	36	36	75	+39 (+108.3)
Louisiana				
Fatal crashes	43	59	53	+10 (+ 23.3)
Fatalities	46	79	58	+12 (+ 26.1)
Maine				
Fatal crashes	17	8	19	+2 (+ 11.8)
Fatalities	18	9	19	+1 (+ 5.6)
Michigan				
Fatal crashes	57	71	91	+34 (+ 59.6)
Fatalities	58	85	104	+46 (+ 79.3)
Minnesota				
Fatal crashes	10	19	19	+9 (+ 90.0)
Fatalities	10	23	23	+13 (+130.0)
Mississippi				
Fatal crashes	34	41	53	+19 (+ 55.9)
Fatalities	43	48	63	+20 (+ 46.5)
Missouri				
Fatal crashes	58	53	54	-4 (- 6.9)
Fatalities	71	63	65	-6 (- 8.5)
Montana				
Fatal crashes	28	21	25	-3 (- 10.7)
Fatalities	32	25	26	-6 (- 18.8)
Nebraska				
Fatal crashes	12	12	20	+8 (+ 66.7)
Fatalities	14	15	27	+13 (+ 92.9)
Nevada				
Fatal crashes	22	35	32	+10 (+ 45.5)
Fatalities	26	39	37	+11 (+ 42.3)

continues

Appendix C (Continued)

State	mph 1986	1987	1988	86-88 Change (%)
New Hampshire				
Fatal crashes	9	9	19	+10 (+111.1)
Fatalities	11	10	23	+12 (+109.1)
New Mexico				
Fatal crashes	58	101	78	+20 (+ 34.5)
Fatalities	66	119	90	+24 (+ 36.4)
North Carolina				
Fatal crashes	40	58	75	+35 (+ 87.5)
Fatalities	46	71	93	+47 (+102.2)
North Dakota				
Fatal crashes	6	4	10	+4 (+ 66.7)
Fatalities	6	4	11	+5 (+ 83.3)
Ohio				
Fatal crashes	49	57	64	+15 (+ 30.6)
Fatalities	59	61	67	+8 (+ 13.6)
Oklahoma				
Fatal crashes	39	38	43	+4 (+ 10.3)
Fatalities	54	45	53	-1 (- 1.9)
Oregon				
Fatal crashes	30	21	34	+4 (+ 13.3)
Fatalities	32	25	40	+8 (+ 25.0)
South Carolina				
Fatal crashes	40	61	36	-4 (- 10.0)
Fatalities	46	78	45	-1 (- 2.2)
South Dakota				
Fatal crashes	4	11	20	+16 (+400.0)
Fatalities	4	17	26	+22 (+550.0)
Tennessee				
Fatal crashes	53	70	74	+21 (+ 39.6)
Fatalities	60	85	93	+33 (+ 55.0)
Texas				
Fatal crashes	164	195	236	+72 (+ 43.9)
Fatalities	200	242	285	+85 (+ 42.5)

continues

Appendix C (Continued)

State	mph 1986	1987	1988	86-88 Change (%)
Utah				
Fatal crashes	41	40	47	+6 (+14.6)
Fatalities	45	45	56	+11 (+24.4)
Washington				
Fatal crashes	26	30	40	+14 (+53.8)
Fatalities	29	32	46	+17 (+58.6)
West Virginia				
Fatal crashes	24	25	38	+14 (+58.3)
Fatalities	28	27	43	+15 (+53.6)
Wisconsin				
Fatal crashes	15	13	24	+9 (+60.0)
Fatalities	16	18	27	+11 (+68.8)
Wyoming				
Fatal crashes	27	27	32	+5 (+18.5)
Fatalities	31	37	42	+11 (+35.5)
Vermont				
Fatal crashes	2	8	16	+14 (+700.0)
Fatalities	2	9	18	+16 (+800.0)

[1]Not summarized in text.

1742

APPENDIX D

Fatal Crashes and Fatalities on Urban Interstate Highways

1744

APPENDIX D

Fatal Crashes And Fatalities On Urban Interstate Highways

State	1886	1987	1988	86-88 Change (%)
States with a 55 mph Rural Interstate Speed Limit				
Alaska[1]				
Fatal crashes	31	18	26	-5 (-16.1)
Fatalities	33	19	30	-3 (-9.1)
Connecticut				
Fatal crashes	46	52	44	-2 (-4.3)
Fatalities	50	57	49	-1 (-2.0)
Delaware				
Fatal crashes	5	5	19	+14 (+280.0)
Fatalities	6	5	22	+16 (+266.7)
Hawaii				
Fatal crashes	2	8	11	+9 (+450.0)
Fatalities	2	8	11	+9 (+450.0)
Maryland				
Fatal crashes	42	33	39	-3 (-7.1)
Fatalities	37	30	36	-1 (-2.7)
Massachusetts				
Fatal crashes	47	58	54	+7 (+14.9)
Fatalities	50	61	60	+10 (+20.0)
New Jersey				
Fatal crashes	49	44	73	+24 (+49.0)
Fatalities	58	49	79	+21 (+36.2)
New York				
Fatal crashes	99	150	102	+3 (+ 3.0)
Fatalities	104	162	116	+12 (+11.5)
Pennsylvania				
Fatal crashes	39	50	74	+35 (+89.7)
Fatalities	45	57	79	+34 (+75.6)
Rhode Island				
Fatal crashes	11	11	12	+1 (+9.1)
Fatalities	13	11	13	0 (0.0)

continues

Appendix D (Continued)

State	1986	1987	1988	86-88 Change (%)
States with a 65 mph Rural Interstate Speed Limit				
Alabama				
Fatal crashes	24	29	35	+11 (+45.8)
Fatalities	24	30	37	+13 (+54.2)
Arizona				
Fatal crashes	23	27	20	-3 (-13.0)
Fatalities	27	28	23	-4 (-14.8)
Arkansas				
Fatal crashes	8	12	17	+9 (+112.5)
Fatalities	9	14	19	+10 (+111.1)
California				
Fatal crashes	259	333	363	+104 (+40.2)
Fatalities	289	364	398	+109 (+37.7)
Colorado				
Fatal crashes	36	32	32	-4 (-11.1)
Fatalities	40	33	35	-5 (-12.5)
Florida				
Fatal crashes	74	82	73	-1 (-1.4)
Fatalities	85	84	86	+1 (+1.2)
Georgia[1]				
Fatal crashes	37	36	28	-9 (-24.3)
Fatalities	39	37	28	-11 (-28.2)
Idaho				
Fatal crashes	11	5	3	-8 (-72.7)
Fatalities	11	10	5	-6 (-54.5)
Illinois				
Fatal crashes	92	89	102	+10 (+10.9)
Fatalities	107	96	116	+9 (+ 8.4)
Indiana				
Fatal crashes	24	15	15	-9 (-37.5)
Fatalities	26	58	19	-7 (-26.9)
Iowa				
Fatal crashes	8	8	13	+5 (+62.5)
Fatalities	8	8	14	+6 (+75.0)

continues

Appendix D (Continued)

State	1986	1987	1988	86-88 Change (%)
Kansas				
Fatal crashes	16	12	10	-6 (-37.5)
Fatalities	17	12	14	-3 (-17.6)
Kentucky				
Fatal crashes	24	17	18	-6 (-25.0)
Fatalities	32	18	19	-13 (-40.6)
Louisiana				
Fatal crashes	24	15	32	+8 (+33.3)
Fatalities	28	16	38	+10 (+35.7)
Maine				
Fatal crashes	7	3	4	-3 (-42.9)
Fatalities	8	3	4	-4 (-50.0)
Michigan				
Fatal crashes	47	43	66	+19 (+ 40.4)
Fatalities	32	46	72	+40 (+125.0)
Minnesota				
Fatal crashes	24	17	22	-2 (-8.3)
Fatalities	25	18	23	-2 (-8.0)
Mississippi				
Fatal crashes	10	17	16	+6 (+60.0)
Fatalities	10	18	18	+8 (+80.0)
Missouri				
Fatal crashes	55	81	73	+18 (+32.7)
Fatalities	59	86	77	+18 (+30.5)
Montana				
Fatal crashes	1	2	5	+4 (+400.0)
Fatalities	1	2	5	+4 (+400.0)
Nebraska				
Fatal crashes	6	7	5	-1 (-16.7)
Fatalities	8	7	6	-2 (-25.0)
Nevada[1]				
Fatal crashes	8	9	--	--
Fatalities	10	10	14	+4 (+40.0)

continues

Appendix D (Continued)

State	1986	1987	1988	86-88 Change (%)
New Hampshire				
Fatal crashes	8	2	1	-7 (-87.5)
Fatalities	8	2	1	-7 (-87.5)
New Mexico				
Fatal crashes	18	13	15	-3 (-16.7)
Fatalities	19	15	16	-3 (-15.8)
North Carolina				
Fatal crashes	35	28	22	-13 (-37.1)
Fatalities	45	33	22	-23 (-51.1)
North Dakota				
Fatal crashes	2	1	2	0 (0.0)
Fatalities	2	1	2	0 (0.0)
Ohio				
Fatal crashes	77	69	60	-17 (-22.1)
Fatalities	85	75	66	-19 (-22.4)
Oklahoma				
Fatal crashes	28	26	24	-4 (-14.3)
Fatalities	37	26	27	-10 (-27.0)
Oregon				
Fatal crashes	10	6	6	-4 (-40.0)
Fatalities	15	6	6	-9 (-60.0)
South Carolina				
Fatal crashes	23	9	9	-14 (-60.9)
Fatalities	28	9	9	-19 (-67.9)
South Dakota				
Fatal crashes	0	0	2	+2 (+)
Fatalities	0	0	2	+2 (+)
Tennessee				
Fatal crashes	55	52	58	+3 (+ 5.5)
Fatalities	60	56	75	+15 (+25.0)
Texas				
Fatal crashes	293	245	252	-41 (-14.0)
Fatalities	341	281	276	-65 (-19.1)

continues

Appendix D (Continued)

State	1986	1987	1988	86-88 Change (%)
Utah				
Fatal crashes	15	14	15	0 (0.0)
Fatalities	18	15	15	-3 (-16.7)
Washington				
Fatal crashes	29	30	48	+19 (+65.5)
Fatalities	29	32	50	+21 (+72.4)
West Virginia				
Fatal crashes	4	4	1	-3 (-75.0)
Fatalities	4	4	1	-3 (-75.0)
Wisconsin				
Fatal crashes	2	8	10	+8 (+400.0)
Fatalities	2	9	11	+9 (+450.0)
Wyoming				
Fatal crashes	9	1	4	-5 (-55.6)
Fatalities	9	2	4	-5 (-55.6)
Vermont				
Fatal crashes	0	0	0	0 (0.0)
Fatalities	0	0	0	0 (0.0)

[1]Not summarized in text.

1750

APPENDIX E

Raw Data and Projections for Regression of Speed and VMT on Virginia's Rural Interstate Highway Fatalities

1752

APPENDIX E

Raw Data and Projections for Regression of Speed
And VMT On Virginia's Rural Interstate Highway Fatalities

Year	Avg. Speed	Actual Fatalities	Expected Fatalities	VMT (millions)
1966	60.3	82	76	2,337
1967	62.3	91	83	2,523
1968	62.5	74	82	2,815
1969	63.8	92	84	3,187
1970	64.5	67	85	3,488
1971	63.9	92	86	2,984
1972	64.9	78	88	3,300
1973	66.2	107	91	3,557
1974	58.7	56	63	3,393
1975	60.4	43	68	3,626
1976	59.0	65	61	3,825
1977	59.8	65	62	4,073
1978	58.9	54	57	4,304
1979	58.2	52	55	4,311
1980	57.9	53	54	4,272
1981	56.7	58	48	4,404
1982	58.7	53	54	4,688
1983	58.8	57	55	4,558
1984	58.8	55	53	4,896
1985	59.7	59	55	5,153
1986	57.9	44	45	5,522
1987	59.0	44	47	5,866
1988	63.0[1]	78	58	6,518
1989	63.5[2]	63	56	7,082[3]

[1]Average speed after 65 mph speed limit implemented.

[2]Average speed in spring quarter.

[3]Estimated VMT.

1754