

Speeds Associated with 55-mph and 65-mph Speed Limits in Northeastern States

BY MARK FREEDMAN AND ALLAN F. WILLIAMS

In 1987 Congress enacted legislation allowing states to increase speed limits on rural interstate highways from 55 miles per hour to 65 mph (P.L. 100-17; P.L. 100-202). By the end of that year, 38 states had raised speed limits on most sections of their rural interstate highways; two more states did so in 1988. Of the remaining 10 states, the following eight rural interstate highways were eligible for the higher limits but retained 55 mph speed limits: Connecticut, Hawaii, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island.

Surveys have shown that raising the speed limit from 55 mph to 65 mph produces higher average speeds and a larger percentage of vehicles traveling at very high speeds.^{1,2,3} About three times as many vehicles travel in excess of 70 mph after speed limits were raised to 65 mph than they did before the higher limit. Speeds typically increase immediately upon posting of 65-mph speed limit signs and continue to increase into the second year of the higher limit.¹

As a consequence of the 65-mph speed limit and the even higher driving speeds that result, fatalities on rural interstates have increased 20-30 percent as indicated by three national studies.^{3,4,5} In the eight states that have retained 55-mph limits on rural interstates, there has been no significant increase in fatalities on these highways. There has been concern, however, that higher speeds in states that adopted 65-mph speed limits would spill over into the states that re-

tained 55. Existing evidence indicates that any spillover to date has not been large. Surveys in the neighboring states of Maryland and Virginia before and after the speed limit was raised to 65 mph for all vehicles except heavy trucks in Virginia indicated that the proportions of traffic exceeding 65 mph and 70 mph have substantially increased in Virginia but have remained about the same on similar roads in Maryland.¹ Similar results were reported in Georgia and South Carolina. Speeds increased and the proportion of vehicles exceeding 70 mph doubled in South Carolina after a 65-mph speed limit was enacted in 1987. They remained stable in Georgia until 1988, when Georgia also raised the speed limit to 65, whereupon speeds in Georgia increased.²

Information on speeds in more states was obtained by measuring vehicle speeds on rural interstate highways in six states that have retained 55-mph limits and in five adjacent states with 65-mph limits.

Methods

Data collection and analysis procedures are summarized below; they are described in greater detail in a previous report.¹ Speeds on rural interstate highways were measured at each of 34 sites in six 55-mph states and at 20 sites in five nearby 65-mph states. The number of miles of interstate highway eligible for the 65-mph limit is given in Table 1, and the survey site locations are given in Ta-

ble 2. Figure 1 illustrates the geographic locations of the sites in each state. Sites were located on straight and level roadway sections.

Speeds of cars and tractor-semitrailers were measured during the three-month period from mid-October until mid-January 1989. The study was limited to these two classes of vehicles because passenger cars represent the largest group of four-wheel vehicles, and tractor-semitrailers represent the largest

Table 1. Interstate Highway Miles Eligible for 65-mph Speed Limit in Northeastern States Studied

State	Miles Eligible ^a	Miles Posted ^a
<i>55-mph Speed Limit</i>		
Connecticut	112	-
Maryland	166	-
Massachusetts	186	-
New Jersey	131	-
New York	922	-
Pennsylvania	1,184	-
<i>65-mph Speed Limit</i>		
New Hampshire	197	174
Ohio ^b	904	832
Vermont	313	300
Virginia ^b	794	782
West Virginia	458	458

^aIncludes all rural and small urban areas, which under the Surface Transportation and Uniform Relocation Assistance Act of 1987 (P.L. 100-17) are also eligible for 65-mph speed limits. Their population limit of 5,000 to 50,000 lies between the FHWA's definitions of rural and urban.

^bHeavy trucks limited to 55 mph.

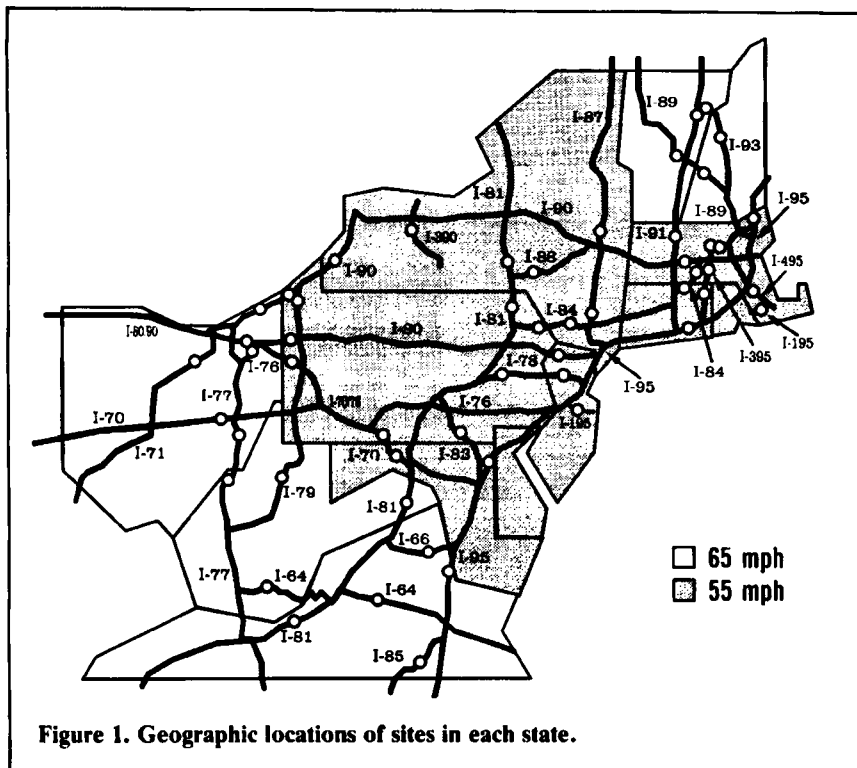


Figure 1. Geographic locations of sites in each state.

group of heavy trucks. Passenger cars were defined according to Highway Loss Data Institute criteria as regular two-door models, regular four-door models, station wagons, and sports or specialty models (all two-seater cars, all convertibles, all midsize and large cars with two or fewer rear seating positions, and all luxury cars).⁶ Tractor-semi-trailer trucks were defined as combination trucks with a tractor and one trailer.

At each location, the speed of free-flowing vehicles (separated from the preceding vehicle in its lane by at least 5 seconds) was measured by a stationary observer, or data collector, using specially designed (K-band) radar, which was tuned by its manufacturer to a frequency not detectable by radar detectors.⁷ Observers were in unmarked passenger vans positioned off the roadway shoulder behind the guardrail or in the clear zone in all states except West Virginia, where overpasses were used. Measurements were taken at each site for one day between 9 a.m. and 4 p.m. on Tuesday through Thursday. Speeds were not measured during inclement weather. Only traffic moving in one direction was observed, as indicated in Table 2. Data collectors maintained a log of when police and other emergency vehicles passed

a site and when other traffic or roadside disturbances occurred near a site. Speeds of vehicles that were measured within 2 minutes of such events were not included.

Measured speeds were corrected for the angle of observation and for the transmission frequency of the nondetectable radar. Raw speeds were adjusted by dividing by the cosine of the angle between the direction of traffic and the aim of the radar beam. Raw speeds were also adjusted by dividing by 1.0145, a factor that accounts for the difference between the standard K band frequency and the special frequency of the nondetectable radar.

Results

A summary of free-flowing vehicle speeds for passenger cars and tractor-semi-trailers and the percentage of vehicles exceeding 65, 70, and 75 mph on the studied rural interstate highways in each state is shown in Table 3. In each state with 65-mph speed limits, car and truck drivers were more likely to be traveling at higher speeds than in any of the nearby states with 55-mph limits. For cars, mean speeds were about 2–5 mph higher and 85th percentile speeds 1–6 mph higher in the states with 65-mph

speed limits. Tractor-semi-trailer mean and 85th percentile speeds were 3–7 mph higher in states with 65-mph speed limits (Ohio and Virginia limit heavy trucks to 55 mph, while other vehicles are permitted 65 mph).

Standard deviations of the speeds of vehicles measured in this study ranged from 4.9 to 6.4 mph for passenger cars and from 4.2 to 6.3 mph for tractor-semi-trailers. There was no apparent systematic relationship between standard deviation and speed limit for either type of vehicle. It must be noted that because the measured sample was limited to free-flowing vehicles (at least 5-second headways) traveling during the day at off-peak hours, the standard deviation of the sampled speeds is not the speed variance of traffic at the measurement location.

The proportions of vehicles exceeding various speed thresholds demonstrated a greater difference than mean and 85th percentile speeds in 65-mph states compared to 55-mph states. Table 4 shows a summary of speeds aggregated by speed limit. The mean speed of observed (free-flowing) passenger cars on rural interstates in 55-mph states was 63 mph, exceeding the speed limit by 8 mph. For passenger cars on rural interstates in 65-mph states, mean speeds were 67–68 mph, exceeding that speed limit by 2–3 mph. Differences between 85th percentile speeds and the speed limits were also greater in 55-mph states than in 65-mph states.

About twice as many passenger cars exceeded 65 mph in the five 65-mph states: 56–75 percent of cars traveled in excess of 65 mph in those five states compared to 31–37 percent in states with 55-mph speed limits. Up to four times as many cars exceeded 70 mph, and up to six times as many exceeded 75 mph in the states with 65-mph speed limits compared with cars on rural interstates in the 55-mph states. As many as 33 percent exceeded 70 mph in Virginia, and nearly 10 percent of free-flowing cars on the rural interstate sites studied in New Hampshire exceeded 75 mph. (Virginia and New Hampshire have 65-mph limits.) Although the proportions of vehicles exceeding posted 65-mph speed limits in those states were smaller than in 55-mph states (with concomitantly higher compliance), proportions exceeding high speeds were much greater in the 65-mph states.

Table 2. Speed Survey Site Locations and Characteristics

State	Interstate Route No.	Milepost/ Location	Lanes	Traffic Direction
Connecticut (55 mph)	I-395	36.2	2	North
	I-95	1.2 mi N. exit 70	2	North
	I-84	2 mi E. exit 73	3	West
Maryland (55 mph)	I-70	5.5	2	East
	I-95	38.7	3	South
Massachusetts (55 mph)	I-91	1.7 mi S. exit 26	2	North
	I-84	2 mi N. exit 74	3	West
	I-395	1 mi S. exit 4E	2	North
	I-290	2 mi W. exit 25	3	East
	I-95	2 mi S. exit 55	4	South
	I-495	1.3 mi N. exit 10	3	South
	I-195	20.5	2	East
	I-190	3.4 mi S. exit 5	2	North
	I-90	70	2	West
New York (55 mph)	I-90	493	2	East
	I-90	192	2	East
	I-390	46	2	South
	I-81	1.3 mi N. exit 9	2	North
	I-88	25.9	2	East
	I-87	22	3	North
	I-87	64.2	2	South
	I-84	13	2	West
	I-80	14	3	West
New Jersey (55 mph)	I-78	23	3	West
	I-195	14	2	East
	I-80	16.5	2	East
Pennsylvania (55 mph)	I-79	175.4	2	North
	I-81	220	2	North
	I-84	1 mi W. exit 11	2	East
	I-76	27	2	East
	I-70	163.7	2	West
	I-78	32.1	2	West
	I-83	4.9	2	North
	I-90	4.3	2	West
	I-89	46.5	2	South
	I-93	92	2	North
Ohio (65 mph)	I-71	190.6	2	North
	I-76	56	2	East
	I-70	171.7	2	West
New Hampshire (65 mph)	I-77	31	2	South
	I-80	205.6	2	East
	I-90	234	2	East
	I-93	4.7	2	North
	I-91	127	2	South
Vermont (65 mph)	I-89	6	2	North
	I-64	132.2	2	West
	I-66	41.6	2	West
Virginia (65 mph)	I-81	163.7	2	North
	I-85	39.6	2	North
	I-95	124	3	South
	I-77	170°	2	North
West Virginia (65 mph)	I-81	3°	2	South
	I-77	170°	2	North
	I-79	125°	2	North
	I-64	150°	2	East

*Traffic observed from overpass

Among tractor-semitrailers, two to six times as many vehicles exceeded 65 mph, and far more exceeded 70 and 75 mph at study sites in states with 65-mph heavy-

truck speed limits compared to states with 55-mph heavy-truck speed limits. From nearly half to two-thirds of the tractor-semitrailers went faster than 65

mph, and as many as one-quarter exceeded 70 mph in the 65-mph states, while fewer than one-fourth exceeded 65 mph and very few exceeded 70 mph in the 55-mph states. Of the 65-mph states, Vermont and New Hampshire had the greatest proportions of tractor-semitrailers traveling at very high speeds; 55-mph states showed less disparity in the proportions of those vehicles traveling at high speeds.

In Virginia and Ohio, which limit heavy trucks to 55 mph but permit cars to travel 65 mph on rural interstates, tractor-semitrailer speeds were similar to the speeds of trucks in states with 55-mph limits for all vehicles; they were 3–6 mph lower than in the states with 65-mph speed limits for both heavy trucks and cars. Tractor-semitrailers in Ohio and Virginia exceeding 65, 70, and 75 mph were proportionally half or less than in the states with uniform 65-mph speed limits.

Continuous Routes

A separate analysis was performed to examine speeds on rural interstate routes that pass through a state with a 55-mph speed limit and an adjacent state with a 65-mph speed limit. Four such groupings were possible. Information from this analysis is presented in Table 5. Passenger car speeds were 2–5 mph faster on routes in states with 65-mph speed limits than on the same highways in adjacent states that limit speeds to 55 mph. The proportion of cars exceeding 65 mph on the routes in the 65-mph states was about twice as large as that in the 55-mph states; cars were two to four or more times more likely to exceed 70 and 75 mph on the continuous routes in the 65-mph states.

For tractor-semitrailers, only one route (I-91) in one pair of states (Massachusetts and Vermont) provided an opportunity to compare speed-limit differences. Truck speeds on I-91 in Vermont (65-mph limit) were considerably higher than in Massachusetts (55-mph limit); for example, 44 percent of the trucks were traveling faster than 65 mph in Vermont compared to 14 percent in Massachusetts.

Discussion

This study provides clear evidence that the proportions of vehicles traveling at

Table 3. Free-Flowing Vehicle Speeds for Passenger Cars and Tractor-Semitrailers on Rural Interstate Highways for States with 55-mph and 65-mph Speed Limits

State	Sample Size	Mean Speed (mph)	Std. Dev. (mph)	85th Percentile (mph)	Percent > 55 mph	Percent > 65 mph	Percent > 70 mph	Percent > 75 mph
Passenger Cars								
55-mph Speed Limit								
Connecticut	1,192	64.0	5.7	69.7	96.1	37.1	13.5	3.5
Massachusetts	2,915	63.0	6.2	69.2	91.7	34.5	12.6	3.6
New York	2,518	62.9	5.3	67.3	94.8	33.6	8.7	2.5
New Jersey	394	62.5	5.6	67.3	92.4	30.7	7.6	2.8
Pennsylvania	2,519	62.8	5.7	68.2	92.6	32.7	9.6	2.4
Maryland	658	63.0	5.2	68.3	95.3	34.3	8.0	1.5
65-mph Speed Limit								
New Hampshire	958	67.9	5.8	73.1	98.7	70.5	32.4	9.5
Vermont	815	65.7	6.4	72.2	95.6	56.2	23.3	7.7
Ohio	2,072	67.5	5.3	72.2	99.0	69.0	27.3	7.0
Virginia	1,918	67.8	4.9	72.2	99.1	75.4	33.4	7.8
West Virginia	1,031	66.4	5.0	71.0	98.4	60.7	19.3	4.2
Tractor-Semitrailers								
55-mph Speed Limit								
Connecticut	459	59.6	4.5	64.3	85.2	11.1	1.1	0.0
Massachusetts	1,083	61.2	4.9	65.7	91.6	19.7	4.4	0.7
New York	1,411	61.1	5.0	66.2	91.3	22.5	3.4	0.2
New Jersey	319	59.8	4.9	65.3	85.3	15.7	0.6	0.0
Pennsylvania	2,008	58.9	6.3	65.2	75.0	15.1	4.1	0.9
Maryland	749	61.3	4.3	65.3	92.3	20.7	2.4	0.0
65-mph Speed Limit								
New Hampshire	168	65.4	5.1	70.0	97.0	51.8	14.9	2.4
Vermont	201	66.3	5.1	71.7	97.5	65.7	25.4	3.5
Ohio*	1,209	60.9	5.1	66.3	89.5	20.6	3.9	0.6
Virginia*	1,588	62.0	4.6	66.3	94.7	25.2	5.2	0.8
West Virginia	592	64.5	4.7	68.8	98.5	43.7	10.1	1.7

*Heavy trucks limited to 55 mph.

high speeds are substantially lower in states with 55-mph speed limits than in states with 65-mph limits. In all six states with 55-mph limits, speeds were lower than in all five states allowing 65 mph. Data from this and other studies support the conclusion that the difference in speed limits is the reason for the large differences in travel speeds.¹ Speeds on the same roads near the borders of states where the speed limit was 55 mph in one state and 65 mph in the other were very different; before-after studies of neighboring state pairs have shown that when a state raises its speed limit to 65 mph, speeds go up immediately, whereas speeds remain about the same in the state retaining 55-mph limits.¹

There is no evidence that travel speeds in states with 65-mph limits have had an upward influence on speeds on rural interstates in adjacent states. Fifty-five

mph speed limits hold down speeds, and there is strong evidence from this and other studies that when states raise the speed limit to 65 mph for cars but retain 55 mph for heavy trucks, truck speeds are held down.

Although compliance with 65-mph rural interstate speed limits is higher than for 55-mph speed limits, there are still large proportions of vehicles (60–70 percent) exceeding the 65-mph speed limit. Two to three times as many drivers exceed 65, 70, and 75 mph in states with 65-mph speed limits than they do in states with 55-mph limits. If a crash were to occur, it would be more severe at the higher speeds, based on the principle of physics that crash energy increases with the square of velocity.

A key feature of 55-mph speed limits is that they reduce the number of drivers who would otherwise drive faster than

70 mph. This is important because 70 mph is the design speed of most of the rural sections of the interstate highway system in the United States. According to the American Association of State Highway and Transportation Officials, "The design speed is the maximum safe speed that can be maintained over a specified section of highway when conditions are so favorable that the design features of the highway govern."² In other words, it is the maximum speed at which drivers can maintain a safe level of control of the vehicle on a particular section of highway under the conditions for which the highway was designed. On rural interstates with 65-mph speed limits, 70 mph was exceeded by as many as one-third of the observed free-flowing cars, while far fewer vehicles exceeded that speed on the 55-mph rural interstates.

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Psychology from Harvard University. Dr. Williams has published more than 100 scientific papers in a wide variety of research areas.

Table 4. Speeds for Cars and Tractor-Semitrailers According to Speed Limit

Speed Limit (mph)	Sample Size	Mean		85th Percentile	
		mph	Amount over speed limit	mph	Amount over speed limit
Passenger Cars					
55	10,196	63.0	8.0	68.7	13.7
Cars 65/ Trucks 55	3,990	67.7	2.7	72.2	7.2
65	2,804	66.7	1.7	72.2	7.2
Tractor-Semitrailers					
55	6,029	60.2	5.2	65.3	10.3
Cars 65/ Trucks 55	2,797	61.6	6.6	66.3	11.3
65	961	65.0	0.0	69.8	4.8

Table 5. Passenger Car and Tractor-Semitrailer Speeds on Routes Passing Through 55-mph and 65-mph States

Adjacent State Groups	Speed Limit (mph)	Interstate Route	Sample Size	Mean Speed (mph)	Std. Dev. (mph)	85th Percentile (mph)	Percent > 65 mph	Percent > 70 mph	Percent > 75 mph
Passenger Cars									
Massachusetts	55	I-91	393	61.5	5.7	66.2	21.9	5.9	2.3
Vermont	65	I-91	206	63.1	6.4	69.2	35.9	12.1	3.4
New York	55	I-90	155	62.5	4.9	67.8	34.8	5.8	0.6
Pennsylvania	55	I-90	104	63.9	6.0	69.0	27.9	11.5	4.8
Ohio	65	I-90	282	66.9	5.5	72.2	67.0	28.0	7.4
Pennsylvania	55	I-76	180	62.0	5.5	67.2	32.2	7.2	1.1
Pennsylvania	55	I-80	319	63.5	5.5	69.2	39.2	11.3	2.8
Ohio	65	I-80	333	67.1	4.7	72.2	68.8	25.5	5.4
Maryland	55	I-95	227	64.2	4.6	68.3	42.7	7.9	1.8
Virginia	65	I-95	422	67.0	5.1	71.2	69.9	28.9	6.2
Tractor-Semitrailers									
Massachusetts	55	I-91	63	60.9	4.5	65.1	14.3	6.3	0.0
Vermont	65	I-91	45	63.4	4.4	67.2	44.4	6.7	0.0

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