

## **APPENDIX G. EFFECTS ON A SAMPLE OF INTERSTATE SECTIONS**

When this research was initiated in October 1985, the maximum speed limit on limited access highways was 55 mi/h (89 km/h). Consequently, the initial experimental design for the study did not include these special high-speed facilities.<sup>[10]</sup> In April 1987, near the end of the site-selection phase of the study, Congress permitted States to raise the speed limit on selected limited access facilities to 65 mi/h (105 km/h). After enactment of the legislation, four Interstate experimental sites where the speed limits were raised and three comparison sites and three nearby sites where the speed limits were not changed were selected for study. Available funding and time constraints did not permit the random selection of a representative sample of Interstate sites nor the intensive collection of speed and crash data that would be required to draw conclusions concerning the effects of raising speed limits on driver behavior and the effects on crashes on these facilities.

Before and after speed and crash data were collected to obtain an indication of the effects of raising the speed limit at the study sites. A summary of the effects of raising the speed limit on vehicle speeds and crashes for this limited number of sites is given in this appendix.

### **Site Characteristics**

Shown in table 45 are the general characteristics of the experimental sites. The characteristics of the comparison and nearby sites are shown in table 46. Site selection for the experimental locations was limited to States that were planning to raise speed limits on Interstate facilities, and to locations where existing inductive loops, buried in the pavement, could be used to collect before and after speed data. Four experimental sites, representing 94 mi (151 km), were selected in California, Michigan, and Virginia. Comparison sites were selected in California and Michigan. A comparison site for the Virginia experimental sites was selected in Maryland, a State that retained the 55-mi/h (89-km/h) speed limit.

The experimental four-lane sites were located in rural areas and carried 24-h traffic volumes ranging from 14,000 to 34,000 vehicles. As shown in table 45, the 65-mi/h (105-km/h) speed limits on these sections were posted between June 1987 and July 1988. The speed limit for trucks remained at 55 mi/h (89 km/h) on these sections.

### **Vehicle Speed Results**

Before and after 24-h free-flow vehicle (a vehicle with a headway of 4 s or more) speed data, as well as the differences in the speed characteristics for the experimental sites, are shown in tables 47 through 49. Speed data for the comparison and nearby sites are given in tables 50 through 52. The data were collected between April 1987 and August 1989. The volume and speed data for the Michigan sites include vehicles for both directions of travel; however, because inductive loops were only installed in one direction of travel, the data for the other Interstate sites are for one direction of travel.

**Table 45. Interstate experimental site characteristics.**

Interstate Site Number	Jurisdiction	Route	Area	Length, No.		Before	After	Date	Intersections		Driveways	
				Miles	Lanes	Speed Limit	Speed Limit	New Limit Posted	Signalized	No Signal	Comm. Per Mile	Resid.
CA08E	Colusa County	I-5 near Williams	Rural	24.76	4	55	65	06103187			Not	Applicable
MI08E	Livingston & Ingham Cos.	I-96 near Fowlerville	Rural	15.83	4	55	65	11129187			Not	Applicable
VA08E	Fauquier County	I-66 E. of Marshall	Rural	21.93	4	55	65	07/01/88			Not	Applicable
VA09E	Rockbridge County	I-81 S. of Lexington	Rural	31.73	4	55	65	07/01/88			Not	Applicable
4 Sites				94.27 Miles								

1 mi = 1.61 km  
 1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h.

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**Table 46. Interstate comparison and nearby site characteristics.**

Comparison Site Number	Jurisdiction	Route	Area	Length, No.		Posted	Intersections		Driveways	
				Miles	Lanes	Speed Limit	Signalized	No Signal	Comm. Per Mile	Resid.
CA08C	Sacramento County	99 at Grant Line Road	Rural	19.61	4	55			Not	Applicable
MI08C	Genesee County	I-69 near Flint	Urban	19.91	4	55			Not	Applicable
MD70C	Frederick & Washington Cos.	I-70 W. of Frederick	Rural	28.31	4	55			Not	Applicable
CA08P	Sacramento County	I-5 in Sacramento	Urban	21.72	8	55			Not	Applicable
MI81P	Ingham County	52 S. of I-96	Rural	13.12	2	55	0.00	2.59	0.15	11.13
MI82P	Washtenaw County	Rt. 52 S. of I-94	Rural	9.18	2	55	0.00	1.31	1.85	10.35

1 mi = 1.61 km  
 1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h.

**Table 47. Before speed data for the Interstate experimental sites.**

Experimental Site Number	Before Data				Collection Date	Mean Speed	Std. Dev. Speeds	Free-Flow Volume	Pct. Free Flow	Percentile Speeds																			1 0-mi/h Pace			
	Before Limit	After Limit	Diff. Limit	Date Posted						1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit	Pct. Pace	Skew. Index						
	CA08E	55	65	10						06/03/87	04/28/87	64.7	6.6	6,839	5,674	83.0	45	54	58	60	62	64	66	67	69	71	72	74	81	61	70	65.5
MI 08E	55	65	10	11/29/87	1 0/08/87	64.8	6.3	34,399	20,392	59.3	51	56	58	59	61	63	65	67	69	71	73	76	82	60	69	61.0	1.11					
VA08E	55	65	10	07/01/88	06/29/88	62.2	6.2	11,133	7,720	69.3	50	54	56	57	59	60	62	64	66	68	70	73	81	58	67	64.7	1.18					
VA09E	55	65	10	07/01/88	06/29/88	66.2	5.3	12,092	8,109	67.1	55	59	60	62	63	64	66	68	70	72	73	76	81	62	71	69.7	1.20					

1 mi/h = 1.61 km/h

Note: All speed limits and vehicle speeds are shown in mi/h.

**Table 48. After speed data for the Interstate experimental sites.**

Experimental Site Number	After Data				Collection Date	Mean Speed	Std. Dev. Speeds	After-Flow Volume	Pct. Free Flow	Percentile Speeds																			1 0-mi/h Pace			
	Before Limit	After Limit	Diff. Limit	Date Posted						1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit	Pct. Pace	Skew. Index						
	CA08E	55	65	10						06/03/87	06/06/88	65.2	6.8	8,662	7,132	82.3	46	54	57	59	62	64	66	68	70	72	74	76	81	62	71	58.0
MI 08E	55	65	10	11/29/87	10/1 3/88	65.9	5.9	37,365	21,676	58.0	52	56	59	61	63	65	67	69	70	72	73	76	81	62	71	63.8	0.89					
VA08E	55	65	10	07/01/88	08/02/89	64.5	5.3	11,521	8,141	70.7	51	56	58	60	62	63	65	67	68	70	71	73	79	61	70	68.9	0.93					
VA09E	55	65	10	07/01/88	08/02/89	66.4	5.2	12,197	8,703	71.4	55	58	60	62	64	65	67	69	70	72	73	75	81	62	71	70.2	0.93					

1 mi/h = 1.61 km/h

Note: All speed limits and vehicle speeds are shown in mi/h.

**Table 49. Differences in speed characteristics for the Interstate experimental sites.**

Site Number	Diff. Limit	Mean Speed	Std. Dev. Speeds	Total Volume	Free-Flow Volume	Pct. Free Flow	Percentile Speeds																			1 0-mi/h Pace			
							1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit	Pct. Pace	Skew. Index						
							CA08E	10	0.5	0.2	1,823	1,458	-0.7	1	0	-1	-1	0	0	0	1	1	2	2	0	1	1	-7.5	0.13
MI 08E	10	1.1	-0.4	2,966	1,284	-1.3	1	0	1	2	2	2	2	2	1	1	0	0	-	1	2	2	2.8	-0.22					
VA08E	10	2.3	-0.9	388	421	1.4	1	2	2	3	3	3	3	3	2	2	1	0	-	2	3	3	4.2	-0.25					
VA09E	10	0.2	-0.1	105	594	4.3	0	-1	0	0	1	1	1	1	0	0	0	-	1	0	0	0	0.5	-0.27					

1 mi/h = 1.61 km/h

Note: All speed limits and vehicle speeds are shown in ml/h.

**Table 50. Before speed data for the Interstate comparison and nearby sites.**

Comparison Site Number	Posted Speed Limit	Before Data Collection Date	Mean Speed	Std. Dev. Speeds	Free-Flow Volume	Pct. Free Flow	Percentile Speeds													10-mi/h Pace		Pet. Pace	Skew. Index	
							1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit			
CA08C	55	04/28/87	61.6	4.9	13,346	9,007	67.5	51	55	56	58	59	60	62	64	65	67	68	70	75	57	66	74.6	1.08
MI08C	55	10/08/87	65.5	6.7	39,713	24,413	61.5	51	56	58	59	62	63	66	68	70	72	74	77	84	62	71	58.1	1.05
MD70C	55	06/29/88	65.3	5.5	14,490	7,795	53.8	53	58	59	61	62	64	66	67	69	71	72	75	80	60	69	68.0	1.00
CA08P	55	04/29/87	62.5	5.7	41,214	21,040	51.1	51	55	57	58	59	61	83	65	66	69	70	73	79	58	67	66.4	1.13
MI81P	55	10/08/87	60.6	7.9	3,057	2,662	87.1	39	47	51	54	57	59	62	64	66	68	70	73	79	57	66	57.6	0.82
MI82P	55	10/08/87	56.6	6.4	4,369	3,498	80.1	41	47	50	51	53	55	57	59	61	63	65	67	73	53	62	60.2	1.00

1 milh = 1.61 kmh

Note: All speed limits and vehicle speeds are shown in milh.

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**Table 51. After speed data for the Interstate comparison and nearby sites.**

Comparison Site Number	Posted Speed Limit	After Data Collection Date	Mean Speed	Std. Dev. Speeds	After Volume	Free-Flow Volume	Pct. Free Flow	Percentile Speeds													10-mi/h Pace		Pet. Pace	Skew. Index
								1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit		
CA08C	55	06/06/88	61.3	4.8	14,717	9,943	67.6	50	54	56	57	59	60	62	63	65	66	68	70	75	57	66	74.5	1.00
MI08C	55	10/13/88	65.8	6.4	33,281	20,181	60.6	51	56	58	60	62	64	66	69	71	73	74	77	82	62	71	57.6	1.00
MD70C	55	08/02/89	65.8	5.5	15,631	8,137	52.1	54	58	60	61	63	64	66	68	70	72	73	75	81	61	70	68.0	1.13
CA08P	55	06/06/88	62.2	5.8	49,486	21,752	44.0	49	54	56	57	59	60	62	65	66	68	70	72	77	58	67	64.3	1.13
MI81P	55	10/13/88	60.2	6.8	3,392	2,994	88.3	42	49	52	54	57	59	61	63	65	67	69	71	76	57	66	58.9	0.90
MI82P	55	10/13/88	58.1	5.8	5,208	3,932	75.5	44	49	52	53	55	57	58	61	62	64	65	68	75	54	63	66.2	1.06

1 milh = 1.61 kmh

Note: All speed limits and vehicle speeds are shown in milh.

**Table 52. Differences in speed characteristics for the Interstate comparison and nearby sites.**

Comparison Site Number	Posted Speed Limit	Mean Speed	Std. Dev. Speeds	Total Volume	Free-Flow Volume	Pct. Free Flow	Percentile Speeds														1 0-mi/h Pace		Pct. Pace	Skew. Index	
							1	5	10	15	25	35	50	65	75	85	90	95	99	Lower Limit	Upper Limit				
CA08C	55	-0.3	-0.1	1,371	936	0.1	-1	-1	0	-1	0	0	0	-1	0	-1	0	0	0	0	0	0	0	-0.1	-0.08
MI08C	55	0.3	-0.3	-6,432	-4,232	-0.9	0	0	0	1	0	1	0	1	1	1	0	0	-	2	0	0	-0.5	-0.05	
MD70C	55	0.5	0.0	1,141	342	-1.7	1	0	1	0	1	0	0	1	1	1	1	0	1	1	1	1	0.0	0.13	
CA08P	55	-0.3	0.1	8,272	712	-7.1	-2	-1	-1	-1	0	-1	-1	0	0	-1	0	-1	-2	0	0	0	-2.1	0.00	
MI81 P	55	-0.4	-1.1	335	332	1.2	3	2	1	0	0	0	-1	-1	-1	-1	-1	-2	-3	0	0	0	1.3	0.08	
MI82P	55	1.5	-0.6	839	434	-4.6	3	2	2	2	2	2	1	2	1	1	0	1	2	1	1	6.0	0.06		

1 milh = 1.61 km/h

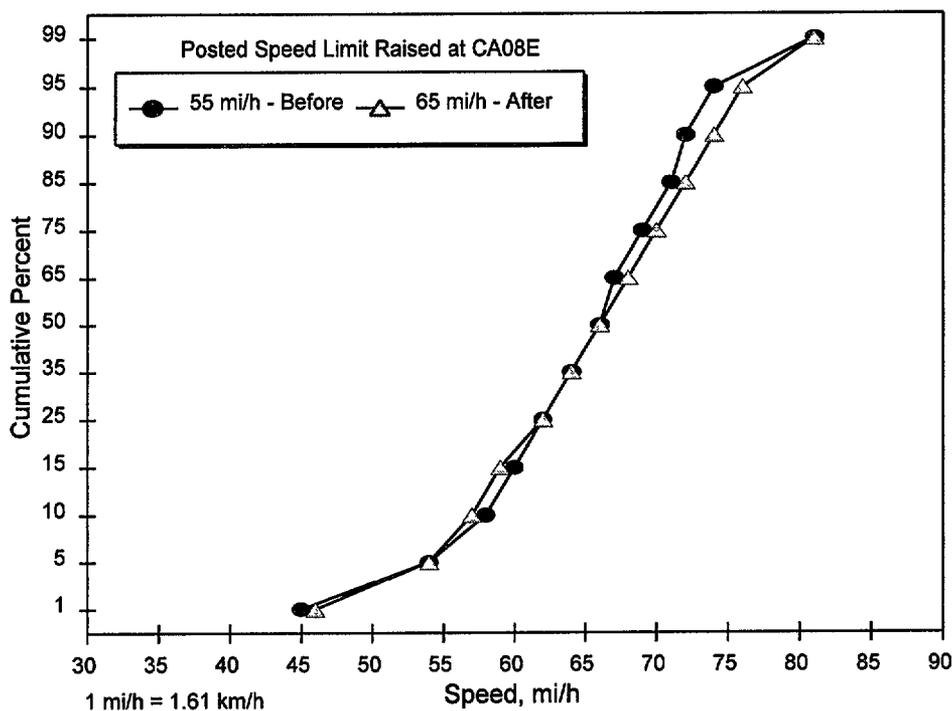
Note: All speed limits and vehicle speeds are shown in mi/h.

Shown in figure 44 are the before and after 24-h cumulative speed distributions for free-flowing vehicles measured at California experimental site CA08E. The differences in the before and after percentile speeds at this site ranged from a decrease of 1 mi/h (1.6 km/h) at the 10th and 15th percentile speeds to a 2-mi/h (3.2-km/h) increase at the 90th and 95th percentile speeds.

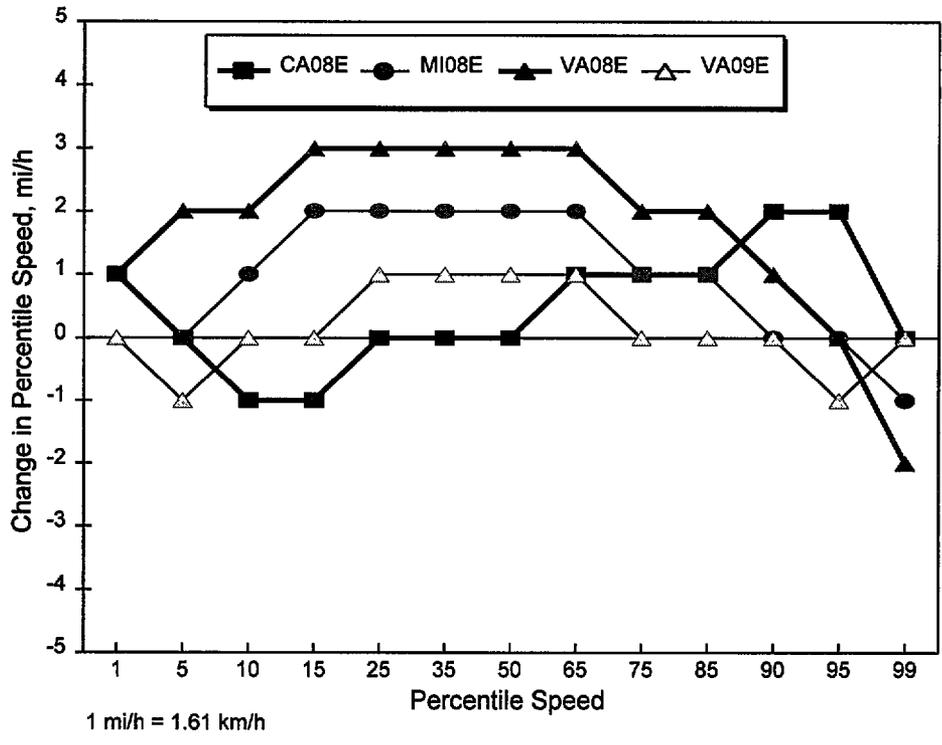
Changes in the before and after 24-h percentile speeds for free-flowing vehicles for each of the four sites where speed limits were raised to 65 mi/h (105 km/h) are shown in figure 45. Examination of figure 45 reveals that driver speeds at these sites increased between 1 and 3 mi/h (1.6 and 4.8 km/h). Figure 45 also reveals that the 99th percentile speed, which contains the highest speed drivers, either did not change or was 1 to 2 mi/h (1.6 to 3.2 km/h) lower after the speed limit was raised to 65 mi/h (105 km/h) at the experimental sites.

As shown in figure 46, changes in the before and after percentile speeds at the comparison sites, where the 55-mi/h (89-km/h) speed limit remained in effect, were generally less than 2 mi/h (3.2 km/h).

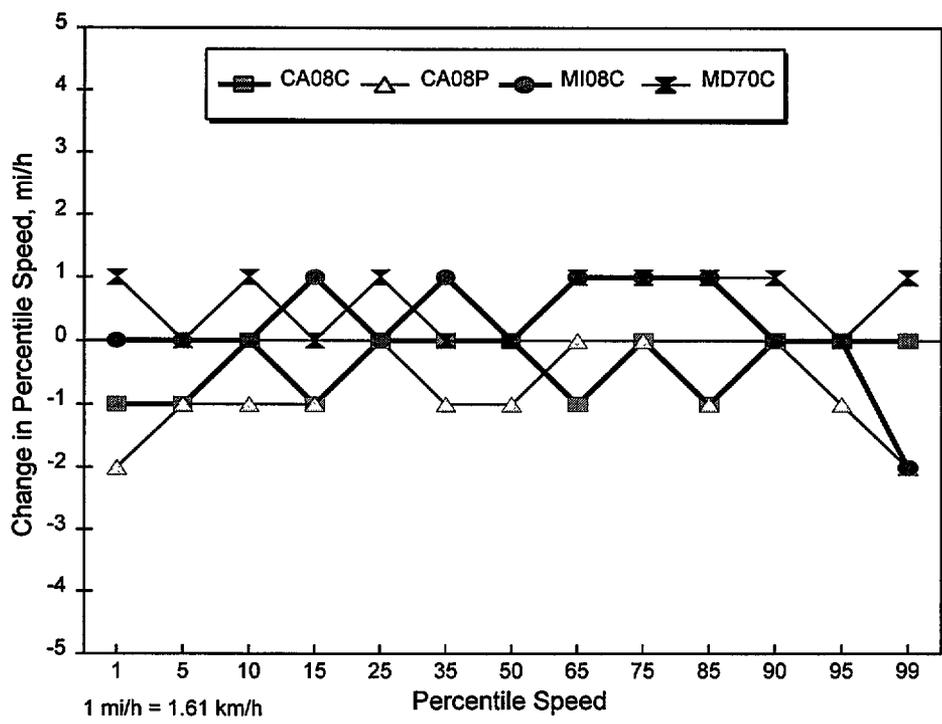
Shown in figure 47 are the changes in the 24-h mean speed and the standard deviation of speeds at each rural Interstate experimental site. While there was an increase in the mean speed, there was a reduction in the standard deviation of speeds at three of the sites. As shown in table 52, changes in the mean speed and standard deviation of speeds were less than 0.5 mi/h (0.8 km/h) at the comparison sites.



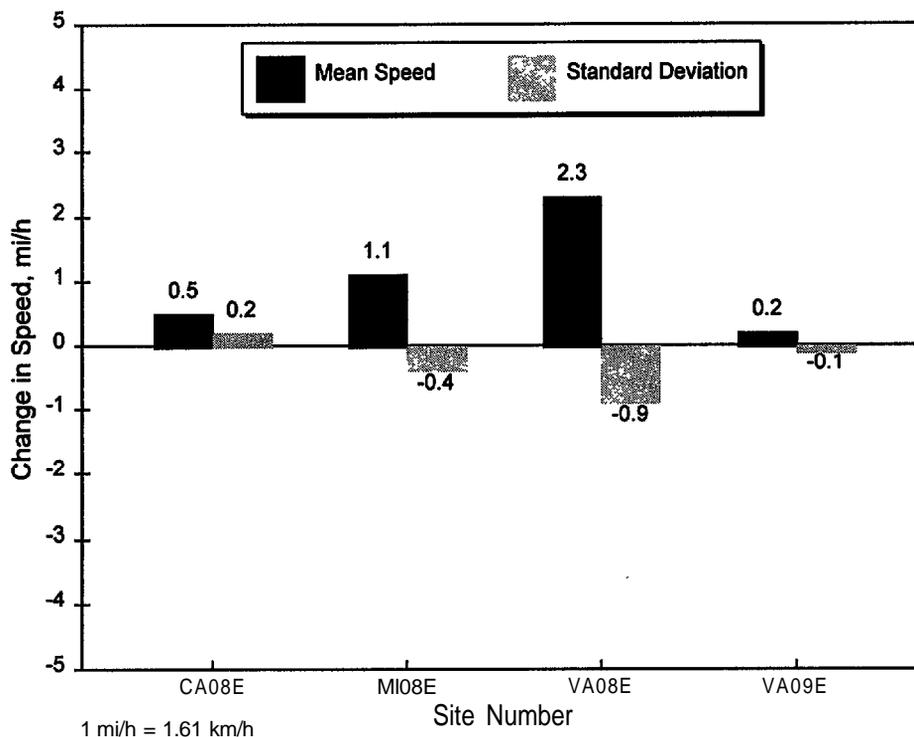
**Figure 44. Before and after cumulative speed distributions at a rural Interstate experimental site in California.**



**Figure 45. Changes in the percentile speeds for four selected rural Interstate experimental sites after the speed limit was raised.**



**Figure 46. Changes in the percentile speeds for four selected Interstate comparison sites after the speed limit was raised at the experimental sites.**



**Figure 47. Changes in the mean and standard deviation of speeds at four selected rural Interstate experimental sites.**

The percentages of drivers exceeding posted speed limits at the experimental and comparison sites are shown in tables 53 and 54, respectively.

As expected, raising the speed limit reduced the number and percentage of drivers exceeding the posted speed limit. For the four experimental sites, the average reduction in drivers exceeding the speed limit was 39 percent. In addition, there was a 41 percent reduction in drivers exceeding the speed limit by 10 mi/h (16 km/h), and a 4 percent reduction in drivers exceeding the speed limit by 20 mi/h (32 km/h). While these are average values, the findings are similar at each of the four sites, as shown in table 53.

It should be noted that these figures do not necessarily represent a change in driver behavior, but instead reflect a change in how noncompliance is measured, i.e., from the posted speed limit.

Before the speed limit **was** raised, more than 90 percent of the drivers exceeded 55 mi/h (89 km/h) at the experimental sites. After the speed limit was raised to 65 mi/h (105 km/h), more than 50 percent of the drivers exceeded the posted limit.

**Table 53. Percentage of drivers exceeding posted speed limits at the Interstate experimental sites.**

Experimental Site Number	Before Limit	After Limit	Diff. Limit	Before					After					Differences				
				Percent Exceeding Posted Speed Limit					Percent Exceeding Posted Speed Limit					Percent Exceeding Posted Speed Limit				
				0	5	10	15	20	0	5	10	15	20	0	5	10	15	20
<b>Speed Limit Raised from 55 to 65 mi/h at Experimental Sites</b>																		
CA08E	55	65	10	93.0	82.9	50.0	17.4	3.7	53.5	24.3	5.7	1.2	0.3	-39.5	-58.6	-44.3	-16.2	-3.4
MI08E	55	65	10	95.2	79.1	47.4	19.0	5.6	58.5	22.8	5.1	1.2	0.3	-36.7	-56.3	-42.3	-17.8	-5.3
VA08E	55	65	10	90.8	63.1	27.7	9.1	2.7	47.1	13.4	2.6	0.6	0.1	-43.7	-49.7	-25.1	-8.5	-2.6
VA09E	55	65	10	98.9	89.7	56.7	21.8	5.2	61.5	22.3	4.4	1.1	0.3	-37.4	-67.4	-52.3	-20.7	-4.9

1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h.

**Table 54. Percentage of drivers exceeding posted speed limits at the Interstate comparison and nearby sites.**

Comparison Site Number	Posted Limit	Before					After					Differences				
		Percent Exceeding Posted Speed Limit					Percent Exceeding Posted Speed Limit					Percent Exceeding Posted Speed Limit				
		0	5	10	15	20	0	5	10	15	20	0	5	10	15	20
<b>Speed Limit Raised from 55 to 65 mi/h at Experimental Sites</b>																
CA08C	55	93.0	63.0	21.1	4.2	0.9	92.1	60.8	19.4	3.9	0.7	-0.9	-2.2	-1.7	-0.3	-0.2
MI08C	55	95.3	80.2	51.8	23.0	7.8	95.5	81.6	56.0	25.8	7.0	0.2	1.4	4.2	2.8	-0.8
MD70C	55	97.8	85.2	50.7	17.3	3.7	98.3	88.0	53.4	20.1	4.9	0.5	2.8	2.7	2.8	1.2
CA08P	55	93.3	65.5	29.0	9.6	2.7	90.7	64.4	29.6	7.9	1.8	-2.6	-1.1	0.6	-1.7	-0.9
MI81P	55	81.3	58.6	26.7	8.8	2.4	80.8	53.0	22.8	6.3	1.1	-0.5	-5.6	-3.9	-2.5	-1.3
MI82P	55	60.1	28.3	8.1	2.1	0.7	72.1	35.8	9.9	2.6	0.7	12.0	7.5	1.8	0.5	0.0

1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h.

## **Repeated Speed Measurements**

Speed measurements were conducted before the speed limits were changed, and repeated at 3-month intervals thereafter for a 12-month period at the Virginia rural Interstate sites and the Maryland comparison site. Shown in figure 48 are changes over time in the 85th percentile speeds for these sites. The data indicate that the 85th percentile speeds increased from 1 to 3 mi/h (1.16 to 4.8 km/h) during the measurement periods at these locations.

## **Effects on a Contiguous section**

Data were collected to provide an indication of whether raising the speed limit on a rural interstate site increased vehicle speeds on a contiguous urban Interstate section. Before and after 24-h free-flow speed data were collected on a section of rural Interstate (California site CA08E) where the speed limit was raised, on a contiguous urban Interstate (CA08P), and on a rural limited access highway (CA08C) where the posted speed limit remained at 55 mi/h (89 km/h).

Before and after data showing the effects of raising the speed limit on the 85th percentile speeds at these sites are given in figure 49. Although the number of sections sampled is too small to draw conclusions, it does not appear that the 85th percentile speeds increased on both of the 55-mi/h (89-km/h) sections after the speed limit was raised at the experimental site.

## **Spillover Effects on Nearby Rural Two-Lane Highways**

One concern often expressed about raising rural Interstate speed limits is the spillover effect, which suggests that speeds may increase on nearby rural two-lane highways. To examine this effect, a rural two-lane site located 1 mi (1.6 km) from an interchange in Michigan was selected for speed measurement. In addition, data were collected 3 mi (4.8 km) from another rural interchange, also located in Michigan. The speed limit on the Interstate section was raised to 65 mi/h (105 km/h), while the speed limit on the rural two-lane highways remained at 55 mi/h (89 km/h).

The mean speeds for the Interstate sections, as well as the two-lane sections, are presented in figure 50. While the mean speed on the rural Interstate increased by 2 mi/h (3.2 km/h) 1 yr after the 65-mi/h (105-km/h) speed limit was posted, there was a 0.4-mi/h (0.6-km/h) decrease in the mean speed at the site located within 1 mi (1.6 km) from the interchange. The mean speed at the site located 3 mi (4.8 km) from the interchange fluctuated over the year. At the end of the 1-yr after period, the mean speed at this site was 1.5 mi/h (2.4 km/h) higher than it was prior to the speed limit change on the Interstate section.

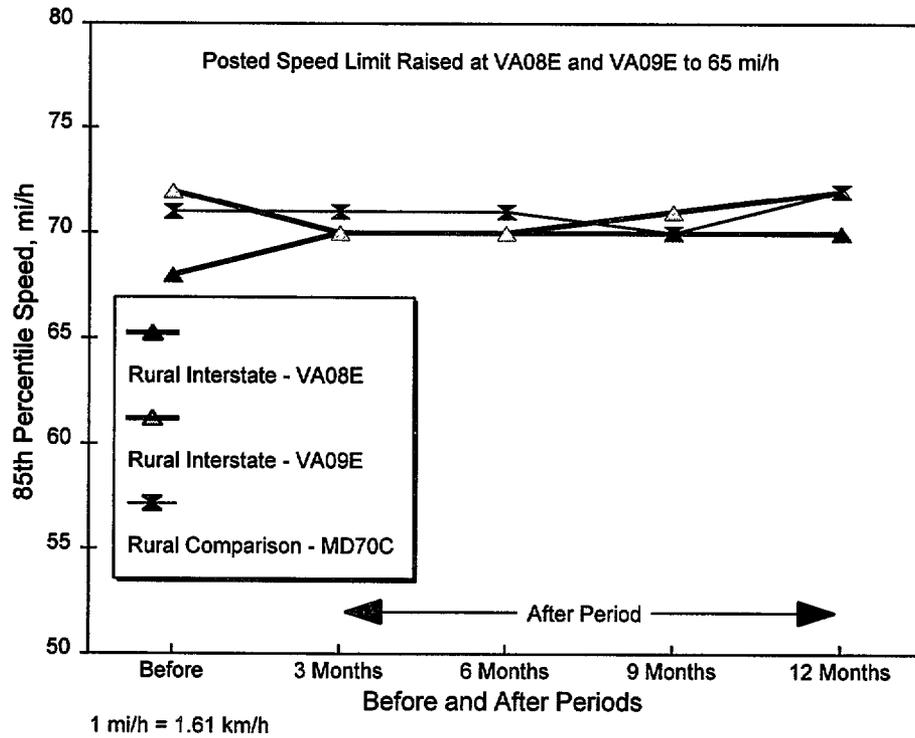


Figure 48. Before and after 85th percentile speeds at rural Interstate sites.

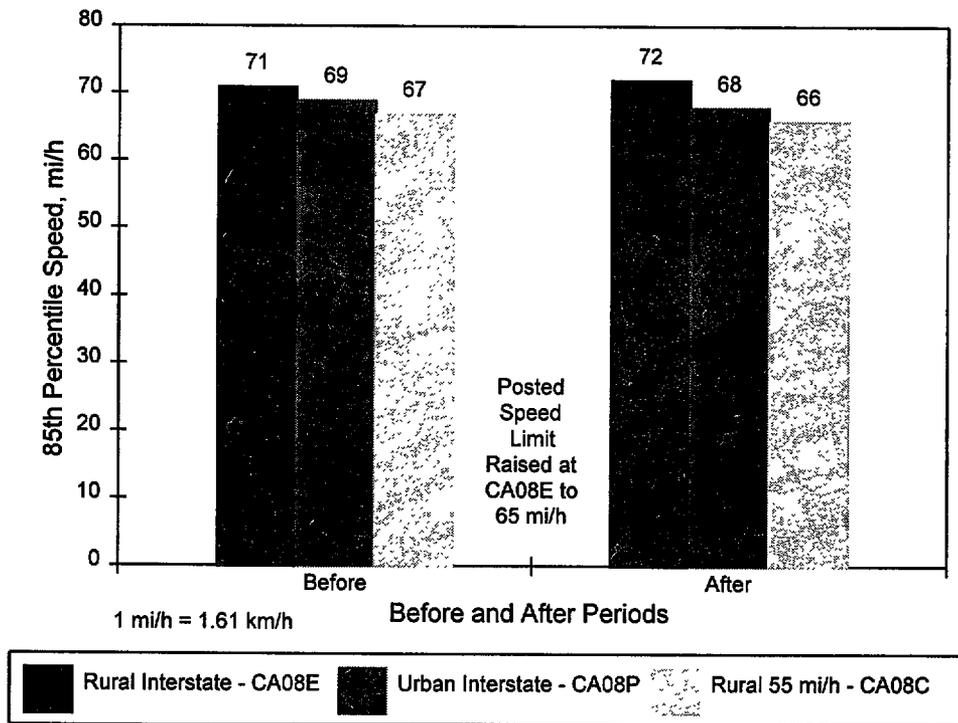
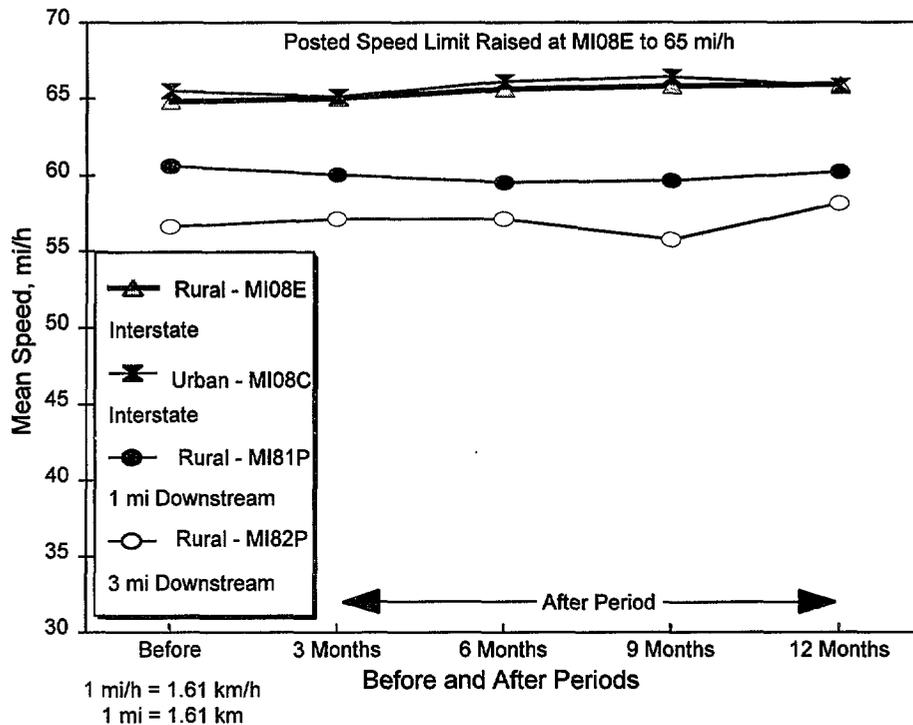


Figure 49. Before and after 85th percentile speeds at three California limited access sites.



**Figure 50. Before and after mean speeds at a rural Interstate site, an urban Interstate site, and two nearby rural two-lane highway locations.**

### Crash Results

As mentioned in the introduction to this appendix, before and after crash data were collected for four Interstate sites where speed limits were raised to 65 mi/h (105 km/h), and for three comparison sites and three nearby sites where speed limits were not changed. Due to funding and time constraints, data collection was limited to these sites, which were not randomly selected. Furthermore, only 1 year of crash data for the after period was available. Crash data for this limited number of sites were collected to obtain general information and the results apply only to these locations.

Before and after police-reported total crash and fatal and injury crash data were collected for the Interstate experimental, comparison, and nearby locations. As shown in tables 55 through 57, reported total crashes and injury crashes were obtained for a 3-yr before period and a 1-yr after period at each site, except for the California sites, where a 21-month period of after data was available.

**Table 55. Crash data for the Interstate experimental sites.**

Experimental					Third Before Period			Second Before Period			First Before Period			Total Before			First After Period			Second After Period			Total After		
Site	Diff. Limit	Length, Miles	Before Volume	After Volume	B3	B3	B3	B2	B2	B2	B1	B1	B1	B	B	B	AI	AI	AI	A2	A2	A2	A	A	A
Number					Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month					
<b>Speed Limit Raised from 55 to 65 mi/h at Experimental Sites</b>																									
CA08E	10	24.78	13,676	17,324	74	23	12	71	29	12	64	20	12	229	72	36	92	30	12	56	25	9	150	55	21
MI08E	10	15.63	34,399	37,365	145	32	12	157	36	12	136	31	12	436	99	36	219	44	12				219	44	12
VA08E	10	21.93	22,266	23,042	50	22	12	50	16	12	57	15	12	157	53	36	66	42	12				66	42	12
VA09E	10	31.73	24,184	24,394	109	47	12	152	63	12	130	59	12	391	169	36	169	66	12				169	66	12
4 Sites		94.27			376	124		430	144		407	125		1,215	393		566	184		56	25		624	209	

1 mi= 1.61 km  
 1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h. Blanks indicate that crash data were not available for the period.

**Table 56. Crash data for the Interstate comparison sites.**

Comparison					Third Before Period			Second Before Period			First Before Period			Total Before			First After Period			Second After Period			Total After		
Site	Posted Limit	Length, Miles	Before Volume	After Volume	B3	B3	B3	B2	B2	B2	BI	BI	BI	B	B	B	AI	AI	AI	A2	A2	A2	A	A	A
Number					Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month					
<b>Speed Limit Raised from 55 to 66 mi/h at Experimental Sites</b>																									
CA08C	55	19.61	26,492	29,434	166	60	12	197	82	12	210	67	12	573	249	36	235	112	12	151	71	9	366	183	21
MI08C	55	19.91	39,713	33,261	435	122	12	458	129	12	390	107	12	1,263	356	36	432	133	12				432	133	12
MD70C	55	26.31	34,555	42,631	160	77	12	156	61	12	205	91	12	523	249	36	211	106	12				211	106	12
3 Sites		67.83			761	279		613	292		605	285		2,379	656		876	353		151	71		1,029	424	

1 mi= 1.61 km  
 1 mi/h = 1.61 km/h  
 Note: All speed limits are shown in mi/h. Blanks indicate that crash data were not available for the period.

**Table 57. Crash data for the Interstate nearby sites.**

Nearby Site Number	Posted Limit	Length, Miles	Before Volume	After Volume	Third Before Period			Second Before Period			First Before Period			Total Before			First After Period			Second After Period			Total After		
					B3	B3	B3	B2	B2	B2	BI	BI	BI	B	B	B	AI	AI	AI	A2	A2	A2	A	A	A
					Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month			Total Injury Month					
<b>Speed Limit Raised from 55 to 65 mi/h at Experimental Sites</b>																									
CA08P	55	21.72	82,428	98,972	200	111	12	252	109	12	285	132	12	737	352	36	334	143	12	277	129	9	611	272	21
MI81P	55	13.12	3,057	3,392	26	6	12	43	7	12	46	7	12	115	20	36	54	9	12				54	9	12
MI82P	55	9.18	4,369	5,208	47	18	12	42	17	12	35	13	12	124	48	36	62	20	12				62	20	12
<b>3 Sites</b>		<b>44.02</b>			<b>273</b>	<b>135</b>		<b>337</b>	<b>133</b>		<b>366</b>	<b>152</b>		<b>976</b>	<b>420</b>		<b>450</b>	<b>172</b>		<b>277</b>	<b>129</b>		<b>727</b>	<b>301</b>	

1 mi=1.61 km

1 mi/h = 1.61 km/h

Note: All speed limits are shown in milh. Blanks indicate that crash data were not available for the period.

## **Overall Crash Effects**

The crash data were analyzed using the paired comparison ratio and the before and after analysis methods as discussed in appendix F. The first step in the analysis was to examine the comparability of the before crash data at the comparison sites to the before crash data at the experimental sites. The crash histories of the comparison and experimental sites were not comparable in the before periods, i.e.,  $G = 11.14$ , with three degrees of freedom, which is significant at  $\alpha = 0.05$ . Accordingly, only the before-and-after method is appropriate to estimate the overall safety effects of raising speed limits for this group of experimental sites.

The before-and-after analysis utilized comparison ratios to account for differences in before and after traffic volumes and unequal before and after time periods. The analysis indicated that total crashes at the study sites increased by 25 percent,  $Z = 4.51$ . Injury crashes, defined as a crash where one or more persons were killed or injured, appeared to have increased by 30 percent, based on the before-and-after analysis,  $Z = 3.07$ .

These results are statistically significant; however, the findings must be viewed with caution due to the limitations of the before-and-after method, i.e., no control for extraneous factors, regression-to-the-mean, etc. In addition, the nonrandom method of site selection, the small sample of sites, and the short after time period (1 year) prevent the drawing of inferences from these data and applying them to other similar freeway facilities. No general statements are appropriate from this analysis.

## **Site-by-Site Analysis**

On an individual site basis, the G-test revealed that the crash histories at the comparison sites were comparable with the crash changes at the experimental sites for three of the four locations. The Virginia site, VA09E, was not comparable to the Maryland comparison site. Accordingly, the paired comparison ratio method was used to estimate the safety effects at sites CA08E, MI08E, and VA08E. The before-and-after method was used at the VA09E site. The comparison ratios used to estimate these effects utilized before and after crash counts, traffic volumes, and unequal time periods.

A summary of the results for total crashes at each site is shown in table 58. There were no significant differences ( $\alpha = 0.05$ ) in total crashes at the California or Michigan sites; however, there was a significant increase in total crashes at the two Virginia sites.

The summary of the findings for injury crashes is given in table 59. Based on an analysis of injury crashes, the only statistically significant difference occurred at Virginia site VA08E, where injury crashes increased by 118 percent. It should be noted that the number of injury crashes at this site was small (53 in the 3-yr before period and 42 in the 1-yr after period).

**Table 58. Interstate total crash results.**

Site Number	Number of Reported Total Crashes				Percent Change	Z-Value	prob.
	Experimental		Comparison				
	3-yr Before	1-yr After	3-yr Before	1-yr After			
CA08E	229	150	573	386	-20.7	-1.86	0.07
MI08E	438	219	1,283	432	14.6	1.36	0.18
VA08E	157	86	523	211	61.9	3.06	0.004
VA09E	391	169	Data Not Available		28.6	2.72	0.008

Note: 21 months of after data were used at site CA08E and the comparison site.

**Table 59. Interstate injury crash results.**

Site Number	Number of Reported Injury Crashes				Percent Change	Z-Value	prob.
	Experimental		Comparison				
	3-yr Before	1-yr After	3-yr Before	1-yr After			
CA08E	72	55	249	183	-15.2	-0.81	0.42
MI08E	99	44	358	133	-7.7	-0.39	0.70
VA08E	53	42	249	108	117.8	3.29	0.001
VA09E	169	68	Data Not Available		19.7	1.25	0.21

Note: 21 months of after data were used at site CA08E and the comparison site.

### Summary of Interstate Results

Before and after speed and crash data were collected at four Interstate sites to obtain general information on the effects of raising the speed limit from 55 to 65 mi/h (89 to 105 km/h) at these sites. Data collection costs and time constraints limited data collection to four nonrandomly selected sites. Due to the small sample of sites and nonrandom method of site selection, the results apply only to the sites examined.

Based on speed data collected at four sites, it appears that the mean and 85th percentile speeds increased 1 to 2 mi/h (1.6 to 3.2 km/h) after the speed limits were raised to 65 mi/h (105 km/h). Based on the limited data collected in this study, there does not appear to be an increase in the 99th percentile speed, which contains the highest speed drivers.

A before-and-after analysis of police-reported crashes at four sites indicates that total crashes increased by 25 percent and injury crashes increased by 30 percent.

While the results only apply to the sites studied, the findings are similar to the results reported by other researchers who have conducted studies on these high-speed limited access facilities.<sup>[43-4,5]</sup>