SCHOOL OF 1354
CIVIL ENGINEERING

INDIANA
DEPARTMENT OF HIGHWAYS

JOINT HIGHWAY RESEARCH PROJECT

JHRP-83-13

TRAFFIC SPEED REPORT NO. 117

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PURDUE UNIVERSITY

JOINT HIGHWAY RESEARCH PROJECT

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To: H. L. Michael, Director
Joint Highway Research Project

October 12, 1983

File: 8 - 3 - 3

From: R. M. Shanteau, Research Associate
Joint Highway Research Project

Project: C - 36 - 10C

The attached Progress Report No. 117 is the report of the June-August 1983 study of free flow automobile and truck speeds on tangent, level and dry sections of rural interstate, urban interstate, and 4-lane and 2-lane highways in Indiana. This report has been prepared by Mr. P. B. Satterly, Graduate Research Assistant. The data were collected by Mr. G. K. Stafford and Mr. P. B. Satterly. All phases of the study were directed by Professor R. M. Shanteau, Research Associate, Purdue University.

The overall results show an average free flow speed of 57.5 mph, up by 0.7 mph from 1982. Speeds have not changed much since the implementation of the 55 mph speed limit in 1974.

This report includes a chart, Figure 2 on page 8, that graphically summarizes the results of summer free flow speed monitoring since 1973. This chart shows that speeds of all classes of vehicles on all types of highways have not changed much since 1974. The 55 mph speed limit caused the 85th percentile passenger car speeds to drop by about 7 mph, while the 15th percentile speeds remained unchanged.

Copies of this report will be sent to the Indiana DOH. Copies of this report are requested for release to the Indiana State Police and other highway safety agencies, which is normal procedure for these reports.

Respectfully submitted,

RM Shanteau

R. M. Shanteau
Research Associate

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Interim Report

TRAFFIC SPEED REPORT NO. 117

by

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Project No.: C - 36 - 10C

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Prepared as Part of an Investigation Conducted by Joint Highway Research Project Engineering Experiment Station, Purdue University, in Cooperation with the Indiana Department of Highways

Purdue University

West Lafayette, Indiana

October 12, 1983

TRAFFIC SPEED REPORT NO. 117

This report is an analysis of spot speed observations made during the 1983 summer months of June, July and August. All observations were made of free-flowing vehicles on level, tangent sections of rural and urban highways under favorable conditions. All observations were made during daylight.

This is the third report with exclusively summer observations since 1975. From 1976 until 1980 (Traffic Speed Reports Nos. 95 through 114) 14 primary and secondary stations as well as another 14 randomly selected stations were monitored every quarter in conjunction with the speed certification performed for the Federal Highway Administration. Since 1981 the state and federal studies have been conducted separately.

Fourteen speed monitoring stations were used for the 1983 Traffic Speed Report calculations. These stations are divided into four categories which include: four rural interstate locations, four rural four-lane locations, four rural two-lane locations and two urban interstate locations. These 14 stations are the same as the primary and secondary control stations monitored since 1975 in Indiana. Prior to 1975 only the 12 rural stations were monitored. The locations of the 12 rural stations are essentially the same since 1970 except for stations 4L-32 (formerly number 6 on US 52) and 2L-54 (formerly number 11 on US 31), which changed in 1975.

The speed limit at all the stations is 55 mph. The site locations are given in Table 1 and shown in Figure 1.

The vehicles were classified as Indiana or Non-Indiana Passenger Cars and light (less than 5000 lbs. gross weight) or heavy (equal to or more than 5000 lbs. gross weight) trucks. Computer analysis was performed for each vehicle classification and for combined passenger cars and combined trucks.

1. Sample Size

At each station a minimum of 200 vehicles in each direction were recorded using the free flow technique at each station. At least 25 of these vehicles were required to be heavy trucks (in each direction).

2. Equipment and Field Procedure

The observations for this study were obtained by use of a Kustom Signals Model HR-8 K-Band radar gun. The burst method using the on/off switch was used to record speeds. This method was used to avoid early detection by radar detectors. Speeds were taken from within a van or sedan parked on the right shoulder of the road or parked in an access driveway to the road. The observers were equipped with a CB radio to monitor possible radio notification

Table 1: Monitoring Locations

Rural Interstate Highways		
RI-6	I-65	7.5 Miles North of State Road 160
RI-21	I-69	1.6 Miles South of State Road 18
RI-12	I-74	0.1 Miles West of 109 Mile Marker
RI-34	I-65	2.0 Miles South of State Road 39
4-Lane Highways		
4L-17	US 52	150 Feet East of CR 475W (Tippecanoe Co.)
4L-32	US 30	2.9 Miles West of Wanatah City Limit Sign
4L-20	US 41	1.1 Miles North of State Road 2
4L-21	US 31	1.1 Miles South of State Road 38
2-Lane Highways		
2L-18	US 35	2.5 Miles East of I-69
2L-54	US 231	1.1 Miles South of State Road 234
2L-79	SR 25	0.7 Miles South of Americus
2L-91	SR 43	2.0 Miles South of Chalmers
Urban Interstate Highways		
UI-6	I-65	Just East of White River
UI-1	I-80	First Bridge East of Burr St. Interchange

of speed measurement and of police vehicles in the area. When radar speed recording was detected and subsequently broadcast on the CB radio, speeds were not taken for at least 5 minutes. This problem primarily occurred on interstate highways.

The accuracy of the meter was checked at the beginning of each data recording session, every time the sampling technique was changed, and at other times when deemed necessary.

3. Results of Analysis

The free flow data collected were analyzed and are summarized for each station in Tables A1 through A14 in the Appendix. Tables A15 through A18 summarize the free flow data by highway classification. Table A19 is the summary for all highways.

The results of the free flow data categorized by highway classification and vehicle type are shown in Tables 2 through 5.

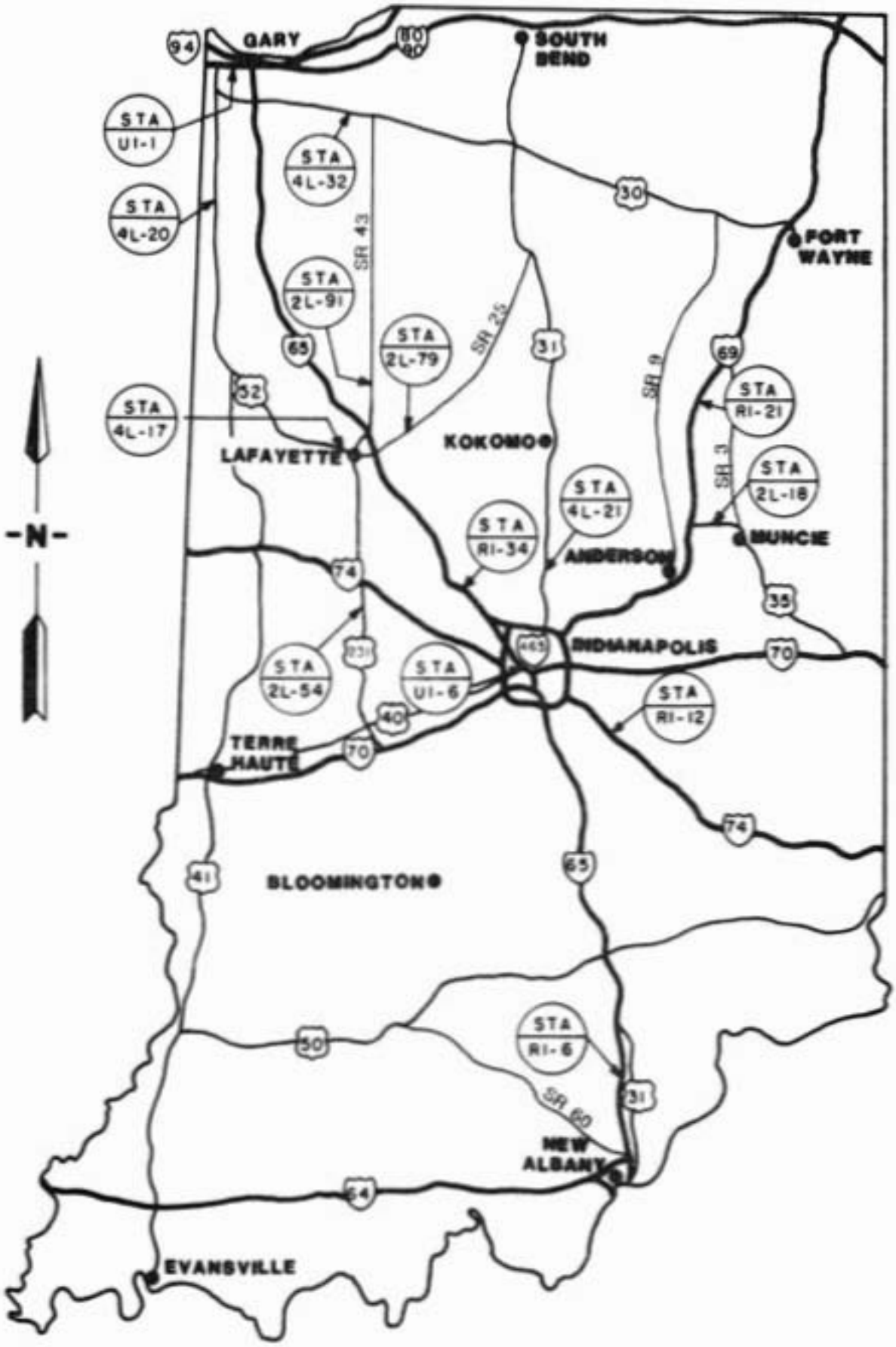

FIGURE 1. LOCATION OF SPEED-STUDY STATIONS

Table 2: Average Speed MPH

	Interstate		Other Rural		All
	Urban	Rural	4-Lane	2-Lane	
Passenger Cars:					
Indiana	58.7	59.2	57.4	56.3	57.6
Non-Indiana	58.2	60.0	58.0	56.0	58.9
All Passenger Cars	58.6	59.5	57.5	56.2	57.9
85 Percentile (all)	61.9	63.1	61.7	60.7	62.1
Trucks:					
Less than 5000 lbs.	57.8	58.5	56.4	55.0	56.6
5000 lbs. or more	57.2	58.7	56.4	54.6	56.8
All Vehicles:					
Average	58.2	59.2	57.1	55.7	57.4
85 Percentile	61.6	62.8	61.4	60.2	61.7

Table 3: Percent of Vehicles Exceeding 55 MPH

	Interstate		Other Rural		All
	Urban	Rural	4-Lane	2-Lane	
Passenger Cars:					
Indiana	81.9	84.3	67.1	54.5	68.9
Non-Indiana	77.0	89.8	72.1	50.0	79.8
All Passenger Cars	80.7	86.4	68.1	54.2	71.2
Trucks:					
Less than 5000 lbs.	74.4	78.4	60.8	43.1	60.7
5000 lbs or more	70.6	76.9	60.1	40.5	62.2
All Vehicles:	77.6	83.2	65.3	49.6	67.6

Table 4: Percent of Vehicles Exceeding 60 MPH

	Interstate		Other Rural		All
	Urban	Rural	4-Lane	2-Lane	
Passenger Cars:					
Indiana	32.0	35.1	22.7	18.1	25.3
Non-Indiana	22.1	43.5	28.9	20.0	34.4
All Passenger Cars	29.7	38.2	23.9	18.2	27.2
Trucks:					
Less than 5000 lbs.	21.5	30.6	20.4	13.3	20.6
5000 lbs. or more	20.0	33.3	20.6	9.3	21.7
All Vehicles:	26.4	36.0	22.6	15.7	25.0

Table 5: Percent of Vehicles Exceeding 65 MPH

	Interstate		Other Rural		All
	Urban	Rural	4-Lane	2-Lane	
Passenger Cars:					
Indiana	4.1	6.1	4.9	4.2	4.8
Non-Indiana	2.5	7.4	5.0	4.3	5.7
All Passenger Cars	3.7	6.6	4.9	4.2	5.0
Trucks:					
Less than 5000 lbs.	2.5	3.9	3.8	2.8	3.3
5000 lbs. or more	0.0	5.3	3.4	1.1	2.9
All Vehicles:	2.8	5.9	4.4	3.4	4.3

The results of this study and similar studies conducted since 1972 are tabulated in Table 6. The speeds given in the table up to 1974 were obtained from Traffic Speed Report No. 92. The speed values for 1975 to 1978 were calculated from the tables given in the respective appendicies of the reports (nos. 94, 98, 102, 106) for the 14 Locations used in this study. The 15th and 85th percentile speed values for 1979 through 1983 were calculated by interpolation over 1 mph speed intervals from the raw data.

Table 6. Summary of Spot Speed Observations on Indiana Highways (Free-Moving Vehicles on Level, Tangent Sections)

	Passenger Cars				Trucks		
	Indiana Mean	Non-Indiana Mean	All Mean	All 85%	Light Mean	Heavy Mean	All Mean
2-Lane:							
1972	62.0	62.4	62.0	68.7	53.3	55.6	56.7
1973	62.1	61.4	62.1	68.7	58.7	56.4	57.3
1974	56.8	55.9	56.7	61.8	55.3	54.5	54.8
1975	57.2	57.4	57.8	62.9	57.5	56.2	56.9
1976	56.0	57.3	56.1	61.5	54.9	55.0	54.9
1977	56.7	56.2	56.7	62.3	56.3	54.7	55.4
1978	56.8	57.1	56.8	61.9	55.4	55.9	55.7
1979	56.4	56.0	56.4	60.5	55.1	55.6	55.4
1980	55.2	58.4	55.3	59.7	55.1	54.9	55.0
1981	55.7	56.2	55.8	60.2	55.0	54.7	54.8
1982	55.8	57.2	56.0	60.2	54.8	54.9	54.9
1983	56.3	55.8	56.2	60.7	55.0	54.6	55.7
4-Lane:							
1972	64.3	64.3	64.3	70.9	59.4	55.2	57.1
1973	64.0	63.7	63.9	70.9	60.8	57.8	59.1
1974	58.0	57.9	58.0	63.1	56.8	54.4	55.3
1975	57.6	58.1	57.7	62.8	56.4	55.9	56.1
1976	57.0	57.2	57.1	62.3	55.5	56.6	54.7
1977	57.7	58.7	57.9	62.9	56.0	57.3	56.9
1978	57.5	57.8	57.5	62.5	56.0	57.7	56.9
1979	56.3	57.0	56.5	61.1	55.7	56.4	56.1
1980	55.9	57.4	56.2	60.5	55.3	56.4	55.9
1981	56.5	58.0	56.8	61.1	56.3	56.1	56.2
1982	56.6	57.6	56.8	61.1	55.1	55.7	55.4
1983	57.4	58.0	57.5	61.7	56.4	56.4	57.1
Rural Interstate:							
1972	69.1	69.6	69.3	74.4	63.7	60.9	61.8
1973	69.3	70.1	69.6	74.8	64.1	61.6	62.3
1974	58.3	59.3	58.7	62.6	56.7	56.4	56.5
1975	59.7	60.2	59.9	64.2	58.2	59.3	58.9
1976	59.0	60.3	59.4	63.0	58.5	58.9	58.3
1977	60.4	60.5	60.4	65.4	58.4	59.7	59.3
1978	59.2	60.3	59.7	63.7	58.9	59.8	59.5
1979	58.4	58.9	58.6	62.4	57.6	59.3	58.7
1980	58.4	59.7	58.8	62.3	57.6	57.2	58.3
1981	57.9	59.6	58.6	62.3	57.4	58.8	58.4
1982	58.9	59.5	58.9	62.2	58.0	58.2	58.1
1983	59.2	60.0	59.5	63.1	58.5	58.7	59.2
Urban Interstate:							
1981	57.7	58.5	57.9	62.2	57.2	56.5	57.5
1982	57.7	57.8	57.7	61.9	56.8	55.7	57.0
1983	58.7	58.2	58.6	61.9	57.8	57.2	58.2

Figure 2 represents a graphical presentation of the results from this and similar studies since 1973. The speed values plotted in Figure 2 were obtained in the same way as those in Table 6, except for the values from 1973 and 1974 which were obtained from a similar graph in the Traffic Speed Report No. 92. This was done to be consistent with the annual traffic speed reports up to 1974. Only data collected at the 12 rural stations were used to calculate the values given in Figure 2.

Table 7 shows the average speeds for all passenger cars, trucks of more than 5000 lbs. and trucks less than 5000 lbs. with and without the two urban interstate stations. The urban interstates were first monitored in 1975.

Table 7. Average Speeds (mph)

	Passenger Cars		Trucks Less Than 5000 lbs.		Trucks 5000 lbs. or More	
Year	12 Rural Stations	All 14 Stations	12 Rural Stations	All 14 Stations	12 Rural Stations	All 14 Stations
1975	58.5	58.7	57.2	57.4	57.8	57.5
1976	57.5	57.6	56.3	56.4	56.4	56.6
1977	58.2	58.2	57.7	57.8	57.0	57.1
1978	58.2	58.2	57.9	57.8	56.6	56.6
1979	57.1	61.8	57.2	57.0	56.0	56.1
1980	56.7	56.8	56.8	56.6	56.0	56.1
1981	57.0	57.1	56.7	56.3	56.1	56.6
1982	57.2	57.3	55.8	55.9	56.4	56.3
1983	57.8	57.9	56.5	56.6	56.7	56.8

4. SUMMARY

The average speed of passenger cars on all types of highways in 1983 increased 0.6 mph from 1982. The largest increases were on urban interstates and 4-lane highways with increases of 0.9 and 0.7 mph respectively.

The average speed of light trucks (trucks less than 5000 lbs.) increased by 0.7 mph. The largest increase occurred in the 4-lane highways and urban interstates with a increase of average speed of 1.3 mph and 1.0 mph respectively. There was an increase of 0.5 mph in the mean speed of light trucks on rural interstates.

The average speed for heavy trucks (5000 lbs. or more) increased slightly, by 0.5 mph from 1982. The largest increase, 1.5 mph, occurred on the urban interstates and the only decrease, 0.3 mph, on 2-lane highways.

The speed changes are illustrated by Figure 2. The mean speeds of cars, light and heavy trucks on rural highways have remained virtually the same since 1979. The mean speeds dropped sharply from the summer of 1973 to the summer of 1974. They increased a little in 1975 and have remained fairly

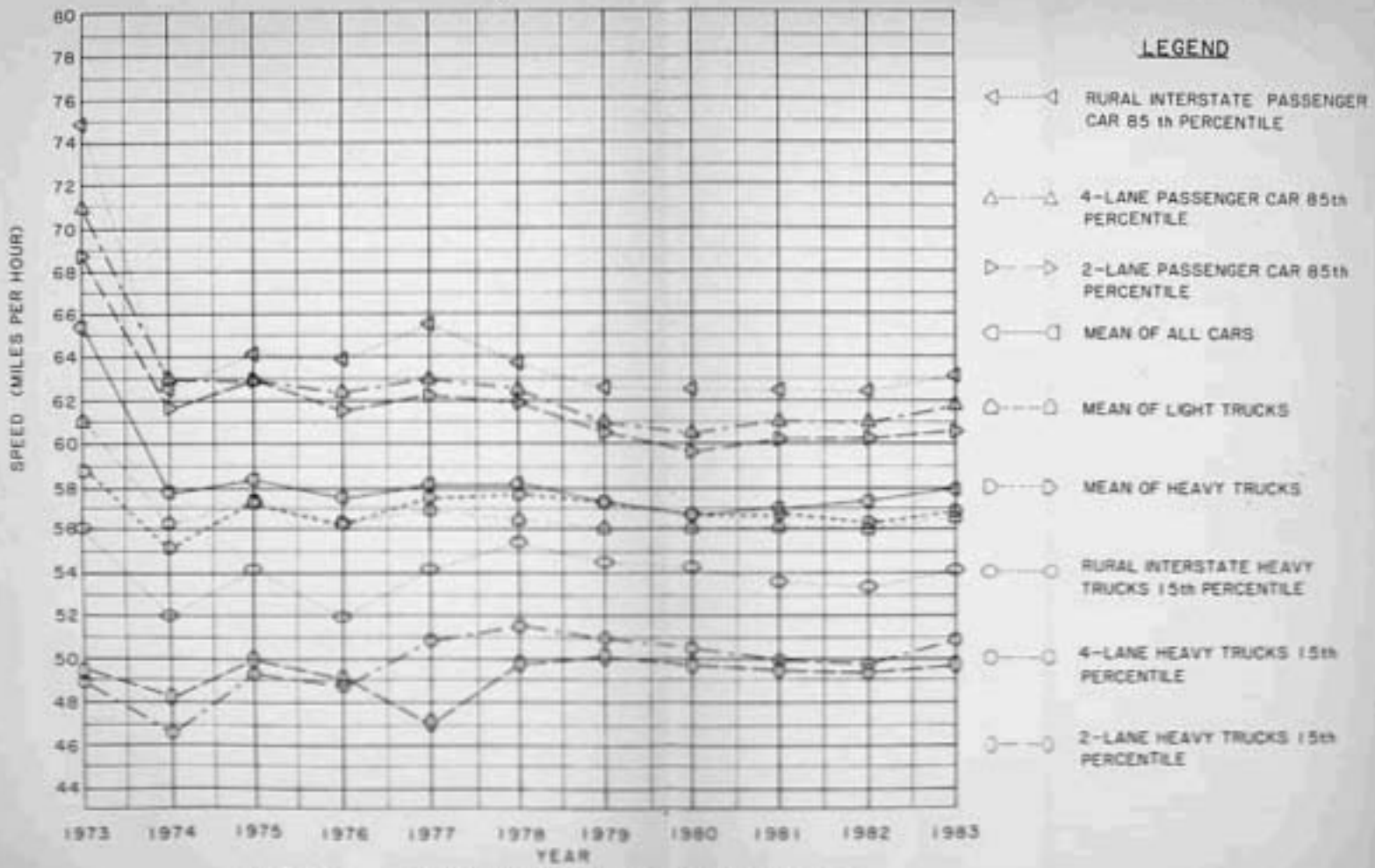

FIG. 2: INDIANA RURAL SPEED TRENDS

constant up to 1978, except for a slight drop in 1976. A slight reduction in mean speeds occurred in 1979 and they have remained almost constant since then. All speed categories in Figure 2 showed an increase for 1983.

Since the mean speeds are almost the same for the 12 rural stations (Table 7) as for the 14 urban and rural stations, there is no reason to expect that the results in Figure 2 would change if the urban interstate stations were included in the analysis.

The 85th percentile speeds of cars on rural highways decreased sharply between 1973 and 1974, due to the implementation of the 55 mph speed limit. They increased a little in 1975, but remained fairly constant until 1978, except for an increase of 1.5 mph in the 85th percentile speed of cars on rural interstates in 1977. The 85th percentile speed has remained essentially the same on the rural interstates from 1979 to 1983. For the other rural highways it showed a slight reduction in 1980 and a slight increase towards 1983 (Figure 2).

The 15th percentile speeds of heavy trucks on rural highways have shown no marked change since 1974. The 15th percentile speed of heavy trucks on rural interstates is basically the same as in 1973, but the 15th percentile speed of heavy trucks on the other rural highways increased a little. There seems to be a slight downward trend in the 15th percentile speed of heavy trucks on rural highways from 1978 to 1982, although in 1983 there was an increase back to the 1980 15th percentile speed levels (Figure 2).

The difference between the 85th percentile speeds of passenger cars and the 15th percentile of heavy trucks on all rural highways was reduced sharply from 1973 to 1974. Since then it has remained fairly constant up to 1983, with the smallest and most constant differences from 1978 to 1983.