Shoulder Use

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●THE NEW JERSEY State Highway Department has conducted a study to determine the frequency of use of shoulders along state highways. The purpose was to determine the frequency of use for leisure stops and for emergency stops.

Points of observation were selected where other reasons for stopping, such as those attracted by business establishments or residences, were at a minimum. The points of observation were also selected where one mile of highway could be observed and where the observer would have a minimum of influence on driver behavior.

Data recorded included:

Type of vehicle - truck or passenger car
State of registration
Time of stopping
Time of resuming trip
Lateral distance from edge of pavement
Number of occupants
Purpose of stop
Direction of travel
Distance from other vehicles on shoulder
Location of stop longitudinally
Special remarks

A summary of the data is given in Table 1.

Also shown on the summary sheet are the emergency stops on the Skyway, Route U.S. 1 in Newark, Kearny and Jersey City. This is an elevated structure with no shoulders on which leisure stops are not made. It is 3.25 miles long, carrying about 55,000 vehicles per average day during the year of study. Trucks are not allowed on the Skyway. The State Highway Department maintained a jeep service free of charge for about a year and a half in 1948 and 1949. Police patrolling the Skyway notified the jeep service and reports were kept for each incident. The service was maintained 16 hr per day from 6:00 a.m. to 10:00 p.m. The records of this service are used for part of this study.

From the Skyway study, there was one emergency stop for each 13,450 vehicle miles; whereas the summary of six locations shows one emergency stop per 11,800 vehicle miles of travel. This difference is accountable by the fact that trucks are not allowed on the Skyway. At the six locations, there were three emergency truck stops and five emergency passenger car stops. The trucks accounted for 37.5 percent of the emergency stops; whereas, the truck mileage is 20 percent of the total mileage.

Of the 197 leisure stops, the reasons for stopping were as follows:

Rest, including sleeping	135
Check vehicle (tires, motor, load)	31
Refer to road map	4
Slight pause	4
Change drivers	3
Writing reports	1
Eating in car	1
Inspect shrubbery	1
Empty car (cleaning inside)	1
Not determinable	16
	197

Trucks	120
Passenger Cars	77
TOTAL	197

Although there are many other items of interest that can be summarized from these data, the items pertinent to highway safety, highway capacity and service to the driving public are:

TABLE 1

SUMMARY OF OBSERVED DATA ON SHOULDER USE

Route and Time	Number of Vehicles					Vehicle Miles	Vehicle Miles per Stop				
	Leisure	Emergency	Business	Other	Total		Leisure	Emergency	Business	Other	Total
Rt. U.S. 1 - Middlesex Co.											
Tues. 8/4/53 8:00 a.m. -4:00 p.m.	8	2	2		12	5,280	660	2,640	2,640		440
Wed. 8/5/53 8:00 a.m. -4:00 p.m.	50	2	2	4	58	28,150	563	14,075	14,075	7,037	485
Thur. 9/16/54 12:00 noon -1:00 p.m.	4				4	690	172				172
Tues. 10/5/54 11:00 a.m. -3:00 p.m.	6				6	2,920	487				487
Rt. U.S. 9 - Middlesex Co.											
Thur. 7/26/56 10:00 a.m.-3:30 p.m.	8		2	1	11	4,700	690		2,350	4,700	427
Fri. 7/27/56 9:15 a.m.-3:15 p.m.	9		5	12	26	4,800	540		960	400	185
Rt. U.S. 22 - Hunterdon Co.											
Fri. 4/27/56 1:45 p.m. -3:45p.m.	2		1		3	2,210	1,105		2,210		737
Mon. 4/30/56 9:15 a.m. -4:30p.m.	14		2	3	19	6,330	450		3,165	2,110	333
Tues. 5/1/56 9:15 a.m. -4:30p.m.	19		1		20	5,400	284		5,400		270
Rt. U.S. 22 - Somerset Co.											
Wed. 7/11/56 9:30 a.m. -3:30 p.m.	16			4	20	4,600	288			1,150	230
Thur. 7/12/56 8:50 a.m. -5:00 p.m.	23	2		2	27	6,500	282	3,250		3,250	240
Wed. 7/18/56 9:00 a.m. -4:00 p.m.	8		31	1	40	5,620	703		181	5,620	140
Thur. 7/19/56 9:15 a.m. -3:30 p.m.	21	1		2	24	10,600	505	10,600		5,300	442
Rt. U.S. 130 - Mercer Co.											
Tues. 3/29/55 10:30 a.m.-2:00 p.m.	6	1	13		20	1,940	323	1,940	149		97
Rt. U.S. 206 - Somerset Co.											
Wed. 5/23/56 3:15 a.m.-4:30 p.m.				2	2	860				430	430
Tues. 7/3/56 10:30 a.m.-4:00 p.m.	3			2	5	3,670	1,235			1,835	734
Total	197	8	59	33	297	94,270	480	11,800	1,600	2,860	318

Rt. U.S. 1 - Skyway 1 year 7/1/48 to 6/30/49 6:00 a.m. -10:00 p.m.	Emergency 4,049[a]	Vehicle Miles 54,500,000	Vehicle Miles per Stop 13,450

Emergency passenger car stops occur once for every 13,450 passenger car miles.

Emergency truck stops occur once for every 5,200 truck miles.

Emergency stops occur once for every 11,800 vehicle miles with 20 percent trucks.

Leisure passenger car stops occur once for every 980 passenger car miles.

Leisure truck stops occur once for every 154 truck miles.

Leisure stops occur once for every 480 vehicle miles with traffic 20 percent trucks.

Passenger cars make leisure stops 13.7 times as frequently as they make emergency stops.

Trucks make leisure stops 33.8 times as frequently as they make emergency stops.

With 20 percent trucks there are 24.6 times as many leisure stops as there are emergency stops.

The following discussion is based on the above observations, supplemented with logical reasoning and a knowledge of relative highway problems:

Stopping on shoulders reduces the capacity of a highway and increases the accident hazard potential.

In order to stop on a shoulder a vehicle will slow down on the pavement to speeds far below the normal speed of the highway, therefore, affecting the smooth flow of traffic within the influence area. When resuming the trip after stopping, the vehicle will enter the pavement far below the normal speed of the highway, and, consequently interrupt the smooth flow of traffic. For each stop, therefore, there are two interferences with normal traffic flow, each of which reduces capacity and sets up an accident hazard potential.

Emergency stops cannot be avoided but leisure stops can be avoided. Business stops, considered parking, is not a problem of this discussion. Of the stops listed as "others" some can be avoided and others, such as police enforcement, probably cannot be avoided.

Shoulders are needed for emergency stops but, when provided, they encourage leisure stops. If shoulders are not provided, there would be no leisure stops.

A possible solution would be to provide shoulders but regulate them for emergency stops only. This has proven successful along the New Jersey Turnpike. In such case, it would be desirable to provide areas for leisure stops well off the roadway with deceleration and acceleration lanes designed to avoid slow speed movements on the roadway.

This study is not presented as conclusive evidence. It can only be accepted as an indication for the specific locations and times. No nighttime or weekend observations were recorded. It is desirable to supplement these findings with findings in other states.