

Freeway Fatal Accidents: 1961 and 1962

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Accident and fatality rates for 1961 and 1962 for freeways are compared to those of conventional highways and streets in California. In 1962 there were 426 fewer people killed in California traffic accidents than there would have been if all travel had taken place on conventional highways and streets. For a given amount of travel, there are a little over one-half as many people killed on freeways as on other roads and streets.

The freeway fatal accident rate rose from 2.29 in 1961 to 2.71 in 1962, and the fatality rate rose from 2.70 to 3.35. Ten county routes, amounting to 175 mi, accounted for 90 percent of the statewide increase in fatal accidents, but the accident rate, including nonfatal and property damage accidents on these sections, rose only slightly.

•IF ALL THE TRAVEL on California freeways since Jan. 1, 1949, had been obliged to use conventional roads and streets, there would have been over 2,000 more deaths than there were during that period (Fig. 1). Because of the lower accident rate on freeways, 406 lives were saved in 1961 and 426 in 1962. Calculations showing the effect of the lower accident rates in terms of lives saved are given in Table 1. During this 2-yr period, there were 37,384 accidents on freeways and 26,112 million vehicle-miles (MVM) traveled on freeways. The accident rate was 1.43/MVM. Non-freeways had an accident rate of 4.21.

For 1961 and 1962, there were a total of 660 fatal accidents on California freeways resulting in death to 802 persons and injury to 823 others. There were 3.07 fatalities per 100 MVM for the 2-yr period. Non-freeways had 5.77 fatalities per 100 MVM. Freeways carry approximately 16 percent of all the traffic in the state, but have only 8 percent of the fatalities with a fatality rate on freeways of about one-half that on conventional roads and streets.

TYPES OF FATAL ACCIDENTS

The number and percentage of each type of freeway fatal accident are given in Table 2. The percentages of each of the four major classifications remain relatively constant from year to year. The installation of median barriers (begun in 1959) has lowered the percentage of cross-median fatal accidents from 19 percent in 1958 to 10.9 percent in 1960. The percentage for 1961 and 1962 combined was 10.3 percent, but in 1962 alone it decreased to 8.7 percent. However, although the percentage of cross-median accidents has gone down, the fatality rate, including all types of accidents, has increased. All California freeways with a volume of 60,000 veh/day or more now have median barriers installed or under construction. A study of median barriers is currently under way to determine the effect of this installation on all types of accidents.

Fixed Object Accidents

Single vehicles which hit fixed objects account for 31 percent of freeway fatal accidents, which is more than any other single classification. Fixed objects are found on

TABLE 1
CALCULATION OF LIVES SAVED BY FREEWAYS

Type of Facility	Year	Freeway			Conventional Highways or Street, Fatalities/100 MVM	Estimated Fatalities if Travel Took Place on Non-Freeways	Lives Saved
		100 MVM	Fatalities	Fatalities/100 MVM			
Rural	1961	36.51	142	3.89	9.24 ^a	337 ^b	195 ^c
	1962	45.66	223	4.88	9.10 ^a	415	192
Urban	1961	80.69	174	2.16	4.77	385	211
	1962	95.92	259	2.70	5.15	493	234
Total	1961	—	—	—	—	—	406
	1962	—	—	—	—	—	426

^aRural state highways other than freeways.

^bProduct of the freeway travel (in 100 MVM) and the conventional fatality rate per 100 MVM.

^cEstimated fatalities on non-freeways minus actual number of fatalities on freeways.

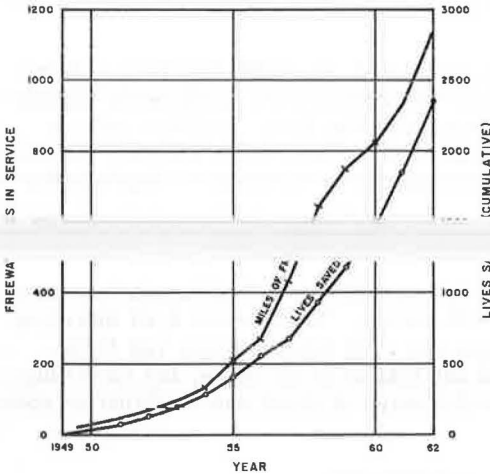


Figure 1. Estimated number of lives saved by California freeways in operation since Jan. 1, 1949.

all highways, but some are more characteristic of freeways than conventional roads. For example, there are rarely any abutments or piers at the edges of conventional roads. These objects are portions of overcrossing structures which are designed to separate cross traffic from main line traffic. Similarly, if the crossroad goes

ture is an object which would not normally be found on a highway with grade intersections.

The number of freeway fatal accidents associated with fixed objects characteristic of freeways and of all roads is indicated in Table 3.

A study of all freeway accidents (fatal and non-fatal) revealed that approximately 25 percent involved fixed objects which indicates that fixed-object accidents have a much higher fatality incidence than other accidents.

The Division of Highways Bridge Department has recently been able to eliminate columns from the right-hand side of the traveled way on most open abutment bridges with a very nominal increase in cost. The elimination of some curbs, dikes, light wells and side opening drop inlets has been accomplished. These changes cannot be easily made on existing freeways; therefore, the real effect of such changes will not be apparent for several years. It is felt that there is a need for further study and improvement in the reduction and placement of freeway fixed objects.

Rear-End Accidents

Rear-end accidents account for approximately 60 percent of all freeway accidents but only 18 percent of freeway fatal accidents. Of the 123 rear-end fatal accidents, 61 (50 percent) involved trucks, even though trucks account for only 6 to 8 percent of the vehicle-miles on freeways (Table 4).

TABLE 2
NUMBER AND TYPE OF FATAL ACCIDENTS
ON CALIFORNIA FREEWAYS

Type of Accident	Fatalities per Fatal Accident (1961 and 1962)	No. (1961 and 1962)	Percent (1961 and 1962)	Percent (1960)
Single vehicle:		333	50.5	52.3
Hit fixed object	1.21	204	30.9	31.0
Did not hit fixed object	1.07	129	19.6	21.3
Pedestrian:		84	12.7	14.4
Walkers	1.02	57	8.6	10.5
Dismounted vehicle occupants	1.04	27	4.1	3.9
Head-on collision:		104	15.8	16.7
Driving on wrong side of median	1.54	36	5.5	5.8
Crossed median	1.68	68	10.3	10.9
Overtaking and sideswipe:		139	21.0	16.6
Rear-end	1.36	123	18.6	
Sideswipe	1.14	16	2.4	
Total	1.25	660	100.0	100.0

TABLE 3
FREEWAY FATAL ACCIDENTS ASSOCIATED
WITH FIXED OBJECTS

Fixed Object	No. of Fatal Accidents Involved	Fatal Fixed Object Accidents (%)	All Freeway Fatal Accidents (%)
(a) Freeways			
Undercrossing rails	38	19	5.9
Overcrossing columns	35	17	5.2
Abutments	35	17	5.2
Ramp noses	18	9	2.8
Light poles	18	9	2.8
Sign poles	12	6	1.9
Median barriers	9	5	1.5
Total	165	82	25.3
(b) All Roads			
Guardrails	11	6	1.9
Bridge rails (water crossings)	9	5	1.5
Culvert headwalls	8	4	1.3
Trees	3	2	0.6
Walls	2	1	0.3
Total	33	18	5.6

Ten percent of the rear-end fatal accidents occur under congested conditions, even though freeways are congested much less than 10 percent of the time. However, the major problem is not congestion but slow-moving and stopped vehicles.

The speed limit for trucks on freeways is 50 mph as compared to 65 mph for cars and buses. There were 37 fatal accidents in which a car ran into the back of a truck. In 29 of these, the truck was traveling considerably below the speed limit. Raising this limit would have had no effect on the speed of the truck. In the other 8 fatal accidents, the severity might have been lessened had the truck been traveling faster. There were 22 fatal accidents in which a truck ran into the back of a car. Raising the truck speed limit would only tend to increase this type of fatal accident. Therefore, it appears that raising the truck speed limit would not be desirable from the standpoint of freeway fatal accidents.

Rear-end accidents are the only type which are equally prevalent (for a given amount of travel) on freeways and on conventional rural roads between intersections. One might expect to find more rear-end accidents on freeways because the volumes are generally higher, cars drive with less headway, and occasionally freeways reach capacity and experience "stop and go" situations.

TABLE 4
FATAL REAR-END ACCIDENTS

Conditions	No. of Accidents				Total
	Involving Trucks			Not Involving Trucks	
	Car Ran Into Truck	Truck Ran Into Car	Truck Ran Into Truck		
Freeway congested (stop and go)	1	1	0	10	12
Stopped vehicle (no congestion)	9	10	1	15	35
Slow vehicle (no congestion)	19	7	1	13	40
Other (sleep, speeding, etc.)	<u>8</u>	<u>4</u>	<u>0</u>	<u>23</u>	<u>35</u>
Total	37	22	2	61	122

TABLE 5
FATAL PEDESTRIAN ACCIDENTS

Location of Pedestrians When Struck	No. of Pedestrian Accidents	Percent
Through lanes	84	76
Ramp	6	7
Ramp shoulder	1	1
Unknown	<u>1</u>	<u>1</u>
Total	84	100

Pedestrian Accidents

There were 84 fatal pedestrian accidents on California freeways in 1961 and 1962. This was 13 percent of all freeway fatal accidents. In about two-thirds (57) of these accidents, pedestrians walked onto the freeway, although this is prohibited by law and most ramps are posted to in-

remaining one-third of the pedestrians were dismounted vehicle occupants. One of the reasons for fencing freeways is to keep pedestrians out. However, this also makes it difficult for dismounted vehicle occupants to get off the freeway. Table 5 shows where the pedestrians were when struck.

A study of all freeway pedestrian accidents has been undertaken to determine what measures the Division of Highways can take to reduce these accidents.

Ramp Accidents

Eleven and one-half percent of freeway fatal accidents and 18 percent of non-fatal freeway accidents occurred on a ramp or involved a ramp maneuver. The reason for the relatively low fatal ratio is probably that speeds are lower on ramps than on the freeway through lanes. The ratio of off-ramp fatal accidents to on-ramp fatal accidents was 1.7 to 1, approximately the same as for non-fatal ramp accidents.

Maneuvers in the vicinity of ramps are often thought to be a prime contribution to ramp accidents. The fact is that 75 percent of all fatal accidents involving a ramp maneuver or which occur on a ramp are single-vehicle accidents. There are less pedestrian, rear-end and sideswipe accidents proportionately on ramps than on the freeway through lanes.

Alignment standards (vertical and horizontal) generally are somewhat lower on ramps and quite often are very low. Ramps have many fixed objects (sign poles, light standards, curbs, dikes, and guardrails) which contribute significantly to ramp fatalities. In 50 percent of the off-ramp fatal accidents, a fixed object was hit.

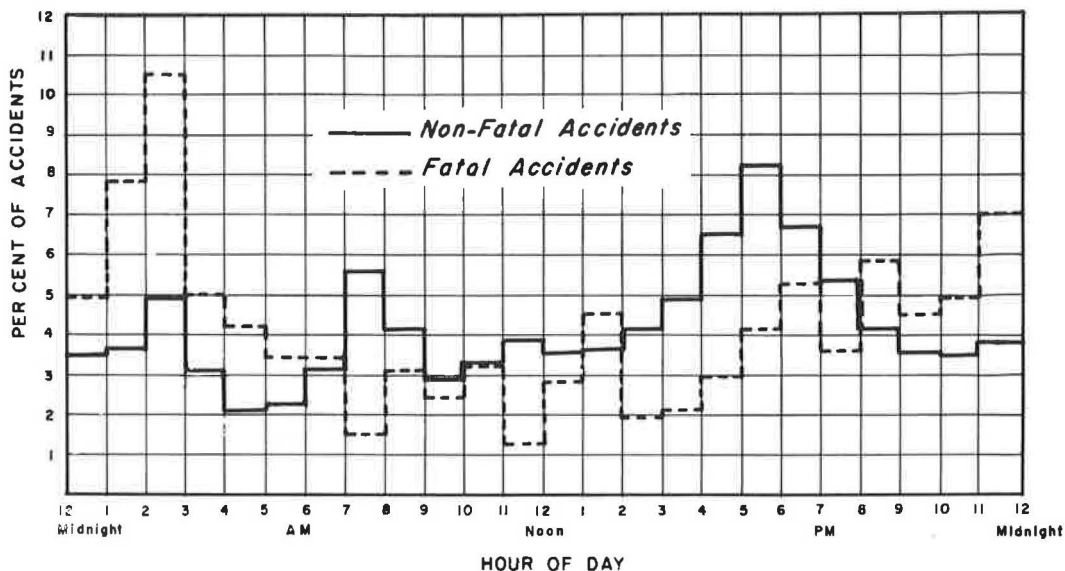


Figure 2. Hour of occurrence, fatal and non-fatal accidents, California freeways, 1961 and 1962.

TABLE 6
LIGHTING CONDITION AT TIME
OF ACCIDENT

Condition	Total Accidents (%)	
	Fatal	Non-fatal
Daylight	34.9	52.2
Dusk or dawn	2.5	2.5
Dark:	62.6	45.3
Without highway illumination	35.0	25.4
With highway illumination	27.6	19.9
Total	100.0	100.0

A freeway ramp accident study is currently under way.

ENVIRONMENTAL FACTORS ASSOCIATED WITH FREEWAY ACCIDENTS

Hour of the Day

The distribution of freeway fatal accidents by hour of day does not change much from year to year. Thirty percent of the fatal accidents occur between 11 PM and 3 AM; approximately 5 percent of the travel occurs during these hours. Of all freeway accidents, only 16 percent occur between 11 PM and 3 AM.

Previous studies have indicated that 35 to 40 percent of the freeway fatal accidents occur between midnight and 5 AM. This has decreased to 32 percent in 1961 and

1962. The percentage of accidents by hour of day, as shown in Figure 2, indicates that the severity of accidents is considerably higher during hours of darkness.

Lighting

Table 6 presents light conditions for fatal and non-fatal accidents on freeways. Sixty-five of the fatal accidents occurred during hours of darkness (including dusk and dawn), whereas 48 percent of non-fatal accidents occurred during the same hours. Since the ratio of fatal accidents to total accidents varies during hours of darkness, it seems that darkness alone does not account for the increased severity at night.

Considering fatal nighttime accidents only, 27.6/62.6 or 44 percent occurred in areas where there is highway illumination. Since only portions of the freeways are

TABLE 7
WEATHER CONDITION AT TIME
OF ACCIDENT

Weather	Total Freeway Accidents (%)	
	Fatal	Non-fatal
Clear or cloudy	90.0	90.4
Raining	3.5	6.5
Snowing	0.7	0.3
Fog	5.8	2.8

TABLE 8
AGE OF FREEWAY DRIVERS

Age	Fatal Accidents (%)	Total Accidents (%)	Licensed Drivers (%)
14	0.0	0.1	0.0
14-18	5.5	6.8	4.4
19-23	19.8	10.6	7.9
24-28	15.1	15.3	11.3
29-33	8.9	14.1	12.7
34-38	11.4	13.3	13.5
49-58	12.2	12.1	15.1
59-68	5.2	5.7	8.6
69	2.9	1.7	3.9

lighted, the value of illumination could be questioned. However, illumination is placed at points of potential conflict and places which have greater numbers of fixed objects, such as interchanges. Therefore, no conclusions can be drawn concerning the effect of illumination on freeway fatal accidents. It is also pertinent, but inconclusive, that 2.8 percent of all freeway fatal accidents involve light poles.

Weather

Nine out of every ten freeway fatal accidents occur during good weather. The remaining 10 percent occur during rain, snow or fog conditions, with fog accounting for over one-half of the remainder (Table 7).

An analysis of 1961 fog accidents indicated that the severity of fog accidents was practically the same as that of non-fog accidents for all state highways. Two and one-half percent of the fog accidents were fatalities, whereas 2.7 percent of the total accidents were fatalities. Analysis of freeway accidents revealed that 2.9 percent of the fog accidents were fatalities and only 1.6 percent of the total accidents were fatalities.

Age of Driver

In making this study, only the age of the driver deemed to have caused the accident was recorded. In all single vehicle accidents, the driver caused the accident. In two or more vehicle accidents it is al-

most always clear which driver caused the accident from the data on the accident report.

Drivers between 19 and 23 yr of age contribute disproportionately to both fatal accidents and total accidents (Table 8). Drivers in this age group caused 20 percent of the freeway fatal accidents, although they constitute only 8 percent of all licensed drivers.

It is generally believed that older drivers (69 and over) drive less than younger drivers. They also have fewer accidents and fewer fatal accidents on freeways.

Condition of Driver

From reports on 660 freeway fatal accidents, it is apparent that driver errors and physical shortcomings play an important role in such accidents. Drivers get behind the wheel when they are physically incapable of operating a motor vehicle safely. They make irrational errors and they use vehicles which should not be on the road. Fatal accidents involve actions which are irrational to an extent not observed in ordinary accidents. Two or three examples of this type of behavior are included in the Appendix, in which several fatal accidents are abstracted.

Of the drivers who caused freeway fatal accidents, 36 percent had been drinking, 17 percent had a physical shortcoming (sleep, fatigue, ill, poor eyesight, etc.), and 7 percent were driving defective vehicles. (Four percent of the drivers had more than one shortcoming; therefore, the total is 56 percent rather than 60 percent.) In addition, some drivers are emotionally upset; even though the degree of emotional disturbance is

TABLE 9
VEHICLES INVOLVED IN FATAL ACCIDENTS

Model Year	Total No. of Veh. Involved	Veh. Involved (%)	Registered Veh. ^a (%)	Veh. From Which One or More Persons Were Ejected	
				No.	Percent
1949 & Before	45	5.0	4.6	15	33
1950	33	3.7	3.5	9	27
1951	28	3.1	3.7	8	29
1952	30	3.3	3.3	9	30
1953	52	5.8	6.5	18	35
1954	38	4.2	6.2	11	29
1955	96	10.7	10.0	34	35
1956	70	7.8	9.3	21	30
1957	81	9.0	9.6	23	28
1958	62	6.9	7.1	14	23
1959	106	11.9	9.5	31	29
1960	105	11.8	10.1	26	25
1961	99	11.0	9.1	36	36
1962	<u>52</u>	<u>5.8</u>	<u>7.5</u>	<u>15</u>	<u>29</u>
Total	897	100.0	100.0	270	30

^aData derived from Automotive News, Almanac Issue, p. 42, 1963.

not readily measurable, it is considered a factor in fatal accidents. An emotionally upset driver probably will take chances and make errors he would otherwise not make.

When all freeway accidents (fatal and non-fatal) were analyzed it was found that of the drivers who caused these accidents, 14 percent had been drinking, 7 percent had a physical shortcoming and 10 percent were driving a defective vehicle, for a total of 31 percent. Drunkenness and other driver shortcomings are a major cause of, or contributing factor to, freeway fatal accidents. In the counties of Marin, San Francisco and San Mateo, 56 percent of the drivers at fault in freeway fatal accidents had been drinking.

The Vehicle

There were 897 vehicles (excluding motorcycles) studied and one or more persons were ejected from 270 of these (Table 9). All motorcycle drivers were ejected.

The percentage of vehicles from which one or more persons were ejected is not related to the year model of the vehicle. The proportion of occupants ejected from new cars was the same as from cars 10 or more years old, although it would seem that the chances of being ejected from a 10-year-old car should be greater than a brand new one because of safety features such as door latches and seat belts.

Of all persons killed in the freeway fatal accidents, 42 percent were ejected. Of all persons injured, 20 percent were ejected.

The 1959 through 1961 model vehicles were involved in slightly more fatal accidents than would be expected after looking at the percent of registered vehicles. This is not surprising since it is known that newer cars are driven more miles per year than older cars and probably faster. Exactly how much more they are driven, particularly on freeways, is not known.

The 1950 and earlier model vehicles were also involved in more fatal accidents than would be expected. This is significant because these vehicles are driven fewer miles

per year on the average than newer vehicles. These older vehicles may be involved in more than their share of the freeway fatal accidents because they are in poor mechanical condition or the drivers of these older vehicles may differ from other freeway drivers in some way that would involve them in more fatal accidents.

The figures for the 1962 model vehicles are not significant because during part of the study period, there were no 1962 model vehicles.

INCREASE IN FATAL ACCIDENTS FROM 1961 TO 1962

In 1962 there was an increase over 1961 of 121 fatal accidents (269 vs 390) and an increase of 158 fatalities (322 vs 480). The fatal accident rate per hundred MVM rose from 2.29 to 2.71. As indicated in Table 10, 44 of the fatal accidents occurred on new freeways opened to traffic during 1961 and 1962, and were offset by increases in vehicle-miles of travel. On the 811 mi of freeway open to traffic during all of both years, there was an increase in 1962 over 1961 of 77 fatal accidents. In an attempt to explain this increase, an analysis was made by locations, and it was found that 10 sections of freeway totaling 175 mi accounted for 90 percent of the increase; i. e., if it were not for the fact that in 1962 70 more fatal accidents occurred than in 1961 on these ten sections, there would have been no increase in the statewide rate. Data for these sections are tabulated in Table 11. The rate of all accidents including non-fatal and property damage rose from 1.18 to 1.36 on these ten sections. In spite of this rise, the rate on these 10 sections was below the rate for the statewide freeway system in both 1961 and 1962.

It will be noted that the rate of fatal accidents on the remainder of the freeway system decreased from 2.45/100 MVM in 1961 to 2.36/100 MVM in 1962.

Analysis of the Ten Sections

Table 11 also indicates that 4 of the ten sections (Mrn-1, SD-2, SD-12 and

statewide average in 1961 and approximately equal to the statewide average in 1962. The increases in these sections

TABLE 10
INCREASE IN FATAL ACCIDENTS

Year	No. of Fatal Accidents on Freeways Opened to Traffic		Total	
	Before	After	1961	1962
1961	264	5	269	322
1962	341	49	390	480
Increase	77	44	121	158

TABLE 11
FREEWAY SECTIONS SHOWING LARGE INCREASE IN FATAL ACCIDENTS, 1962 OVER 1961

County Route ^a	Fatal Accidents		Increase		Length (mi)	MVM		Fatal Accidents per 100 MVM		Total Accidents		Accidents/MVM	
	1961	1962	No.	Percent		1961	1962	1961	1962	1961	1962	1961	1962
Mrn-1	5	9	4	80	12.3	230	235	2.2	3.8	373	436	1.62	1.85
SD-2	2	8	6	300	23.1	239	235	0.8	3.4	413	394	1.73	1.68
SB-2	1	10	9	900	16.9	92	112	1.1	8.9	62	59	0.67	0.53
Fre-4	3	8	5	167	12.3	88	87	3.4	9.2	132	123	1.50	1.41
Ker-4	3	0	6	200	13.4	73	69	4.1	13.1	114	110	1.56	1.59
Mad-4	1	5	4	400	10.7	50	54	2.0	9.3	37	56	0.74	1.04
SJ-4	3	8	5	167	23.7	115	121	2.6	6.6	91	122	0.79	1.01
SD-12	1	8	7	700	11.5	224	239	0.4	3.3	223	259	1.00	1.08
SBd-26	6	22	16	267	24.6	328	344	1.8	6.4	387	537	1.18	1.56
SM-68	12	20	8	67	26.1	627	864	1.5	2.3	844	1,135	1.02	1.28
Total, 10 sections	37	107	70	189	174.6	2,266	2,380	1.63	4.49	2,676	3,231	1.18	1.36
Statewide total	269	390	121	45	1,148.0	11,720	14,392	2.29	2.71	16,563	20,821	1.41	1.45
Total remainder	232	283	51	22	973.4	9,454	12,012	2.45	2.36	13,887	17,590	1.47	1.46

^aNo other county route increased by more than three fatal accidents.

TABLE 12
COMPARISON OF FATAL AND TOTAL ACCIDENTS

Section	MVM Travel		Total Accidents		Total/100 MVM		Fatal Accidents		Fatal/100 MVM		Fatal/Total Ratio	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
US 99, Kern, Fresno, Madera, & San Joaquin Co.	326	331	374	411	151	124	10	30	3.1	9.1	0.027	0.073
S. B. Freeway, S. B. Co.	328	344	387	537	118	156	6	22	1.8	6.4	0.015	0.041
US 101, S. B. Co.	92	112	62	59	67	53	1	10	1.1	8.9	0.016	0.168
Total	746	787	823	1,007	110	128	17	62	2.28	7.88	0.021	0.062
Statewide total	11,720	14,392	16,563	20,821	141	145	270	390	2.29	2.71	0.016	0.019

TABLE 13
TYPES OF FATAL ACCIDENTS ON FREEWAY SECTIONS SHOWING LARGE INCREASE IN FATAL ACCIDENTS, 1962 OVER 1961

Type of Accident	No. of Fatal Accidents									
	Statewide Total		US 99, Kern, Fresno, Madera & San Joaquin Co.		S. B. Freeway, S. B. Co.		US 101, S. B. Co.		Total (3 sections)	
	No.	%	1961	1962	1961	1962	1961	1962	1961	1962
Single vehicle:										
Hit fixed object	204	30.9	2	7	2	7	0	0	4	14
Did not hit fixed object	129	19.6	3	2	2	3	0	4	5	9
Pedestrian:										
Walkers	57	8.6	1	6	0	1	1	3	2	10
Dismounted vehicle occupants	27	4.1	1	1	0	0	0	1	1	2
Head-on collision										
Wrong-way	36	5.5	0	2	1	2	0	2	1	6
Crossed median	68	10.3	1	1	0	4	0	0	1	5
Overtaking:										
Rear-end	123	18.6	2	11	1	4	0	0	3	15
Sideswipe	16	2.4	0	0	0	1	0	0	0	1
Total	660	100.0	10	30	6	22	1	10	17	62

can be considered as "coming up to the average" through chance, rather than as an alarming increase.

Of the remaining six sections, four were US 99 in the San Joaquin Valley (Fre-4, Ker-4, Mad-4, SJ-4). Although individually these four sections show small numerical increases (5, 6, 4 and 5, respectively), when combined the total increase is significant.

The ratio of fatal to non-fatal freeway accidents for US 99 in the San Joaquin Valley and the two remaining sections (San Bernardino Freeway in San Bernardino County and US 101 in Santa Barbara County) is given in Table 12. It will be noted that the overall accident rate on these roads increased only 16 percent (from 1.10 to 1.28/MVM), whereas the fatal accident rate increased 246 percent (from 2.28 to 7.88/100 MVM).

The ratio of fatal to total accidents increased tremendously in 1962 in all three sections even though the statewide ratio did not increase very much. There is a very fine dividing line between a serious injury accident and a fatal accident. Since the total accident rates did not change nearly as much as the fatal accident rates in the three sections, it appears that these sections were "extremely unlucky" in 1962. Several other attempts were made to explain the increase in fatal accidents in the three sections, and even though they were unsuccessful, the data are presented in Tables 13 and 14.

In short, there was an increase of 121 fatal accidents between 1961 and 1962 causing the rate to rise from 2.29 to 2.71/100 MVM. This is accounted for as follows:

TABLE 14
FACTORS AFFECTING ACCIDENTS ON FREEWAY SECTIONS SHOWING
LARGE INCREASE IN FATAL ACCIDENTS, 1962 OVER 1961

Factor	Statewide Total		No. of Fatal Accidents							
			US 99, Kern, Fresno, Madera & San Joaquin Co.		S. B. Freeway, S. B. Co.		US 101, S. B. Co.		Total (3 sections)	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
Sobriety										
Had been drinking	68	129	2	3	2	6	0	4	4	13
Had not been drinking	146	200	7	24	3	15	1	5	11	44
Other & unknown	56	61	1	3	1	1	0	1	2	5
Total	270	390	10	30	6	22	1	10	17	62
Lighting:										
Daylight	90	138	6	12	2	5	0	1	8	18
Dusk or dawn	4	12	0	1	0	0	0	0	0	1
Dark—no lights	90	139	3	12	2	10	0	8	5	30
Dark—lights	83	94	1	5	2	7	1	1	4	13
Unknown	3	7	-	-	-	-	-	-	-	-
Total	270	390	10	30	6	22	1	10	17	62
Weather										
Clear or cloudy	243	334	8	21	5	18	1	7	14	46
Raining	5	18	1	1	0	3	0	1	1	5
Snowing	1	3	0	0	0	0	0	0	0	0
Fog	14	24	1	8	0	1	0	1	1	10
Other or unknown	7	11	0	0	1	0	0	1	1	1
Total	270	390	10	30	6	22	1	10	17	62

1. Forty-four owing to travel on new freeways (Table 10);
2. Twenty-five owing to sections in which the fatal accident rates were unusually

3. Forty-five owing to an increase in ratio of fatal accidents to non-fatal accidents on portions of three routes, comprising 102 mi of freeway, apparently due primarily to sheer chance (Table 12); and

4. Seven owing to increased travel on existing freeways.

Appendix

FULL FREEWAY FATAL ACCIDENT SUMMARY SHEETS (Cross-Reference)

Sheet 1

Number of Lanes 8

Time of Day 1050 (Daylight) _____ (Dark or Dusk)

Total No.

Type of Vehicle: #1 Car #2 _____ #3 _____ 1

No. of People Killed In: 1 _____ _____ 1

No. of People Injured In: 0 _____ _____ 0

Number of Pedestrians Killed: _____

Primary Vehicle: Vehicle #1

Primary Type of Accident: Solo-Fixed object bridge railings on both sides of the overcrossing

Primary Driver Condition or Error: Drunk (blood alcohol 0.20)

Description: Driving at a very high rate of speed, approximately 80 miles per hour according to two witnesses. Vehicle #1 went up the off-ramp which is a diamond with a hook at the upper end. The vehicle was going about 65 miles per hour after it passed the 25 mph off-ramp speed sign. Approximately 150 feet before it got to the terminal of the off-ramp, the driver applied the brakes, skidded 60 feet, and struck the curb on the left. It then scraped along the curb for a distance of 84 feet, rolled over the eastbound half of the Overcrossing, struck the curb median, and then slid upside down for 66 feet on the other side of the median where it landed upside down against the bridge rail. The driver was ejected from the car. The car went about 150 feet upside down after it turned over. It turned over when it hit the end of the curb nose where the ramp joins the cross street.

Sheet 2

Number of Lanes 8 lanesTime of Day _____ (Daylight) 2030 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 <u>Truck</u>	#3 _____	<u>2</u>
No. of People Killed In:	<u>2</u>	<u>0</u>	_____	<u>2</u>
No. of People Injured In:	<u>1</u>	<u>0</u>	_____	<u>1</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Solo-Fixed Object (truck parked on shoulder)</u>			
Primary Driver Condition or Error:	<u>Drunk</u>			

Description: Aiming for an off-ramp, the driver went onto the shoulder before getting to the ramp and hit a truck parked there. (This is a lighted freeway according to the Police report.) The driver climbed out of the car and began running around yelling "shoot me, shoot me" and tried to pull an officer into #4 traffic lane. The driver had to be handcuffed and physically restrained. Two passengers killed, including child having same address as driver but different name.

Number of Lanes 4Time of Day _____ (Daylight) 0515 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>1</u>	_____	_____	<u>1</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>1</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Solo - Lamp Standard</u>			
Primary Driver Condition or Error:	<u>Driving very fast in rain.</u>			

Description: The driver was very tired, according to statement. Vehicle #1 was being driven about 80 MPH in the rain. The driver lost control and cannot explain why. The vehicle ran off the road and struck the light standard on the right hand side after going under an Overcrossing. The car then fishtailed for 400' before coming to a stop. A passenger in the rear seat was killed.

Sheet 4

Number of Lanes 4

Time of Day 1345 (Daylight) _____ (Dark or Dusk)

Total No.

Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>2</u>	_____	_____	<u>2</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>0</u>
Number of Pedestrians Killed:	_____	_____	_____	<u>0</u>

Primary Vehicle: Vehicle #1

Primary Type of Accident: Solo Bridge Abutment

Primary Driver Condition or Error: Possibly Asleep

Description: In moderate to heavy traffic in the afternoon the car suddenly began driving erratically, speeding up and slowing down in front of other vehicles. The vehicle went off the roadway and went off the shoulder then back onto the roadway. Then it went off onto the shoulder again as if to stop but instead of stopping it went ahead and hit the bridge abutment on the right without attempting to stop.

Sheet 5

Number of Lanes 6 lanes

Time of Day 0855 (Daylight) _____ (Dark or Dusk)

Total No.

Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>1</u>	_____	_____	<u>1</u>
No. of People Injured In:	<u>4</u>	_____	_____	<u>4</u>
Number of Pedestrians Killed:	_____	_____	_____	<u>0</u>

Primary Vehicle: Vehicle #1

Primary Type of Accident: Solo, fixed object, light pole

Primary Driver Condition or Error: Front end of car not in very good shape.

Description: Vehicle #1 on the freeway just before reaching the on-ramp, lost control due to the front end bouncing on an out-of-balance tire. The driver applied the brakes on wet pavement and skidded into the curb which threw the car out of control, and spun it around. This curb was on the right hand side of the freeway. After the car skidded 150' along the shoulder, it struck a pole in the gore of the on-ramp. The driver was killed.

Sheet 6

Number of Lanes 4

Time of Day 0550 (Daylight) _____ (Dark or Dusk)

Total No.

Type of Vehicle:	#1	<u>2 passenger</u> Car	#2	Car	#3	_____	<u>2</u>
No. of People Killed In:	<u>1</u>		<u>0</u>				<u>1</u>
No. of People Injured In:	<u>3</u>		<u>0</u>				<u>3</u>
Number of Pedestrians Killed:	_____						_____
Primary Vehicle:	<u>Vehicle #1</u>						
Primary Type of Accident:	<u>Solo - bridge rail</u>						
Primary Driver Condition or Error:	<u>Had been drinking</u>						

Description: The vehicle #1 (2 passenger) loaded with four passengers, one of them sitting on the floor, caught up with a slower vehicle and lost control going into the median. The vehicle traveled 225' out of control in the median, then went into a 200' sideways skid across both lanes into the guardrail approaching the OP and then skidded along the guardrail for 110' and into the end post of the bridge; there is where the fatality occurred. All four passengers in the vehicle were thrown out of the car. The car that was being passed also went into a skid when the driver saw that the vehicle was about to be hit and drove into the guardrail approach on the left side of the highway. However, nobody in this vehicle was injured.

Sheet 7

Number of Lanes 4

Time of Day _____ (Daylight) 0115 (Dark or Dusk)

Total No.

Type of Vehicle:	#1	Car	#2	_____	#3	_____	<u>1</u>
No. of People Killed In:	<u>1</u>						<u>1</u>
No. of People Injured In:	<u>0</u>						<u>0</u>
Number of Pedestrians Killed:	_____						<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>						
Primary Type of Accident:	<u>Solo - Off Road</u>						
Primary Driver Condition or Error:	<u>Extreme high speed</u>						

Description: Vehicle #1 and another car were apparently racing as stated by three witnesses who they had passed going approximately 85 to 90 MPH. When they got to the curve in the main roadway, which curves to the left, vehicle #1 did not make it. It went off the road on the left first, which was the inside of the curve. It then skidded along the left hand shoulder 120', across the turning roadway and then the car finally wound up over 300' from where it left the turning roadway down on the off-ramp. In the middle of the trip 300' off the roadway the driver was ejected and killed.

Sheet 8

Number of Lanes 4Time of Day _____ (Daylight) 0035 (Dark or Dusk)

				Total No.	
Type of Vehicle:	#1	Car	#2	#3	<u>1</u>
No. of People Killed In:	<u>1</u>				<u>1</u>
No. of People Injured In:	<u>0</u>				<u>0</u>
Number of Pedestrians Killed:					<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>				
Primary Type of Accident:	<u>Solo-Off road on right side</u>				
Primary Driver Condition or Error:	<u>Asleep</u>				

Description: Just prior to the accident vehicle #1 had been observed with the driver leaning against the window of the vehicle and the car was weaving all over the road. It ran into the earth median, first knocking down several sight posts, then turned sharply to the right across the freeway and struck the roadside shoulder and went on over the fill and also the off-ramp. Vehicle #1 turned over in the off-ramp and finally wound up in a drainage canal outside of the right of way.
 Note: This was not an off-ramp accident.

Sheet 9

Number of Lanes 4-DividedTime of Day _____ (Daylight) 1855 (Dark or Dusk)

				Total No.	
Type of Vehicle:	#1	Car	#2	#3	<u>1</u>
No. of People Killed In:	<u>0</u>				<u>0</u>
No. of People Injured In:	<u>0</u>				<u>0</u>
Number of Pedestrians Killed:					<u>1</u>
Primary Vehicle:	<u>Vehicle #1</u>				
Primary Type of Accident:	<u>Pedestrian</u>				
Primary Driver Condition or Error:	<u>None</u>				

Description: The pedestrian was walking across the freeway on a rainy night dressed in dark clothing and having a very strong alcoholic odor, in fact the pedestrian had a blood alcohol content of 0.16. The driver of the car saw the pedestrian about 60 feet before impact. The driver applied the brakes and went into a skid on the wet pavement.

Sheet 10

Number of Lanes 6

Time of Day _____ (Daylight) 0415 (Dark or Dusk)

			Total No.	
Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>1</u>	_____	_____	<u>1</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>0</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			

Primary Type of Accident: Solo - Off Road

Primary Driver Condition or Error: Extreme wild driving and drunk. BA : 0.23

Description: Vehicle #1 traveling in the vicinity of an undercrossing at about 80 miles per hour passed another vehicle and then fishtailed and skidded all over the road. The car went over the right hand edge of the shoulder and was airborne for 35 feet before landing on the ramp below. It then continued across the ramp and into the dirt where it wound up 210 feet from the place where it first left the road. The car rolled when it first left the freeway, ejecting the driver who was killed.

Sheet 11

Number of Lanes 6

Time of Day _____ (Daylight) 1740 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>0</u>	_____	_____	<u>0</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>0</u>
Number of Pedestrians Killed:				<u>1</u>
Primary Vehicle:	<u>Vehicle #1</u>			

Primary Type of Accident: Pedestrian

Primary Driver Condition or Error: None

Description: Pedestrian, who lived in neighborhood, was crawling on hands and knees across the freeway in the dark. The driver of Vehicle #1 saw the pedestrian just before impact.

Sheet 12

Number of Lanes 6Time of Day _____ (Daylight) 0145 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>1</u>	_____	_____	<u>1</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>0</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Solo - Off Road</u>			
Primary Driver Condition or Error:	<u>Excessive Speed</u>			

Description: Vehicle #1 going about 100 (?) MPH (witness guess) in fog, failed to negotiate a main line curve (2,500' radius) flew off of freeway and landed on a private parking lot behind an apartment house.

Sheet 13

Number of Lanes 4Time of Day _____ (Daylight) 1710 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 <u>Car</u>	#3 <u>Car</u>	<u>3</u>
No. of People Killed In:	<u>0</u>	<u>0</u>	<u>3</u>	<u>3</u>
No. of People Injured In:	<u>2</u>	<u>2</u>	<u>1</u>	<u>5</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Head-on X median</u>			
Primary Driver Condition or Error:	<u>Drunk, 80 MPH</u>			

Description: Vehicle #1 was traveling at approximately 80 MPH (judged by witness going approximately 65) struck a barricade in the median then went into broadside skid. It slid 70 feet on traveled way, then 80 feet in median, then across both opposing lanes where it was struck by Vehicle #3 in far right lane. Then it was struck by vehicle #2 in near (median) opposing lane. Fatalities were all in vehicle #3. Vehicle #1 was probably stolen; it was full of shady type individuals, some of whom had "done time" together, and who had been drinking beer and wine all day.

Sheet 14

Number of Lanes 6
Time of Day _____ (Daylight) 0148 _____ (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 _____	#3 _____	<u>1</u>
No. of People Killed In:	<u>0</u>	_____	_____	<u>0</u>
No. of People Injured In:	<u>0</u>	_____	_____	<u>1</u>
Number of Pedestrians Killed:				<u>1</u>
Primary Vehicle:	<u>Pedestrian (directing traffic at the scene of a prior accident)</u>			
Primary Type of Accident:	<u>Pedestrian</u>			
Primary Driver Condition or Error:	<u>Had Been Drinking</u>			

Description: Driver of Vehicle #1 failed to notice a string of flares and flashing lights and etc., at a prior accident. Also failed to notice the pedestrian standing in the road directing travel. Vehicle #1 went into a skid and struck the pedestrian. Vehicle #1 then went clear off of the freeway to the right over the outer separation and onto the on-ramp which enters the freeway near this location and continued on fleeing the scene of the accident. Drive of Vehicle #1 is believed to have been drinking as well as being inattentive and fleeing the scene of the accident. The pedestrian was killed.

Sheet 15

Number of Lanes 6
Time of Day 10:09 _____ (Daylight) _____ (Dark or Dusk)

					Total No.
Type of Vehicle:	#1 <u>Car</u>	#2 <u>Car</u>	#3 <u>Car</u>		<u>3</u>
No. of People Killed In:	<u>0</u>	<u>2</u>	<u>0</u>		<u>2</u>
No. of People Injured In:	<u>0</u>	<u>0</u>	<u>0</u>		<u>2</u>
Number of Pedestrians Killed:					<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>				
Primary Type of Accident:	<u>Head-on X median</u>				
Primary Driver Condition or Error:	<u>speed</u>				

Description: Vehicle #1 which was fixed up like a hot-rod, jumped the median and struck vehicle #2 and Vehicle 3. The two occupants of vehicle #2 were ejected and killed. The driver of the hot-rod that jumped the median was young, had been chased by another patrolman but had slowed down before being arrested.

Sheet 16

Number of Lanes 4
 Time of Day _____ (Daylight) 2330 (Dark or Dusk)

Total No.

Type of Vehicle: #1 Car #2 Car #3 _____ 2
 No. of People Killed In: 1 0 _____ 1
 No. of People Injured In: 0 0 _____ 0
 Number of Pedestrians Killed: _____
 Primary Vehicle: Vehicle #2

Primary Type of Accident: Head-on, wrong-way driver
 Primary Driver Condition or Error: Strong odor of alcohol, driving without headlights and on wrong side of freeway

Description: Vehicle #2 came onto the freeway from an undetermined location and drove the wrong way with the headlights off. The driver then suddenly turned the lights on when approximately 100 feet from car going the right way and they crashed (note: this driver must have been insane or very seriously troubled in some way and this would be a good case for an investigating team to investigate the driver's background). Vehicle #1 driver was killed.

Sheet 17

Number of Lanes 4
 Time of Day 1610 (Daylight) _____ (Dark or Dusk)

Total No.

Type of Vehicle: #1 Car #2 Truck & Trailer #3 _____ 2
 No. of People Killed In: 2 0 _____ 2
 No. of People Injured In: 2 0 _____ 2
 Number of Pedestrians Killed: _____ 0
 Primary Vehicle: Vehicle #2

Primary Type of Accident: Rear-end
 Primary Driver Condition or Error: Driver was afraid to put on brakes for fear of spilling logs.

Description: Vehicle #1 traveling about 60 MPH had a flat tire in the rear and lost control and was wobbling on the pavement. Vehicle #2 which was a few hundred feet behind Vehicle #1 was afraid to put on the brakes because it would spill the load. Two people in Vehicle #1 were killed.

Number of Lanes 8

Time of Day 1320 (Daylight) (Dark or Dusk)

			Total No.	
Type of Vehicle:	^{2 passenger} #1 <u>car</u>	#2 <u>car</u>	#3 <u> </u>	<u>2</u>
No. of People Killed In:	<u>1</u>	<u>0</u>	<u> </u>	<u>1</u>
No. of People Injured In:	<u>1</u>	<u>0</u>	<u> </u>	<u>1</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Rear-end followed by off-road</u>			
Primary Driver Condition or Error:	<u>Extreme speed</u>			

Description: Vehicle #1 was driving in what the police call lane 4, the lane next to the shoulder, and changed lanes into lane 3 where it struck the left rear corner of vehicle #2. Vehicle #1 apparently was on its way towards the median lane. After striking the vehicle #2, vehicle #1 went into a broadside skid, skidding for 269 feet in a gradual arc and finally leaving the roadway on the righthand side and rolling down the bank. A passenger in vehicle #1 was killed. The officers using a coefficient of 80% computed the speed of vehicle #1 when it started to skid as 82 MPH.

Number of Lanes 4

Time of Day (Daylight) 2300 (Dark or Dusk)

				Total No.
Type of Vehicle:	#1 <u>car</u>	#2 <u>car</u>	#3 <u> </u>	<u>2</u>
No. of People Killed In:	<u>0</u>	<u>1</u>	<u> </u>	<u>1</u>
No. of People Injured In:	<u>1</u>	<u>0</u>	<u> </u>	<u>1</u>
Number of Pedestrians Killed:				<u>0</u>
Primary Vehicle:	<u>Vehicle #1</u>			
Primary Type of Accident:	<u>Rear-end</u>			
Primary Driver Condition or Error:	<u>Extremely belligerent driving</u>			

Description: Vehicle #1 was traveling on the freeway at slower than average speed. When vehicle #1 noticed somebody overtaking the driver would straddle the lane line and would jockey with the other drivers apparently trying to race. This was reported by two independent witnesses not involved in the accident. Finally vehicle #2 passed vehicle #1 and pulled back into the right lane. Vehicle #1 then accelerated and clipped vehicle #2 in the left rear, causing vehicle #2 to over turn killing the driver of vehicle #2.

Sheet 20

Number of Lanes 4Time of Day _____ (Daylight) 0225 (Dark or Dusk)

Total No.

Type of Vehicle: #1 Car #2 Car #3 _____ 2No. of People Killed In: 1 0 _____ 1No. of People Injured In: 0 1 _____ 1Number of Pedestrians Killed: _____ 0Primary Vehicle: Vehicle #2Primary Type of Accident: Rear-endPrimary Driver Condition or Error: Inexperience

Description: Driver of Vehicle #2 came upon a scene consisting of a car on fire and a row of flares which had been set out and vehicle #1 which was slowing down with its orange stop lights on because of the flares and so forth. Vehicle #2 plowed right into the rear-end of vehicle #1 without slowing down. A witness behind the vehicle #2 also saw the flares, etc., and slowed down and saw the whole thing happen. The only driver who didn't slow down was the driver of vehicle #2.

Sheet 21

Number of Lanes 4Time of Day _____ (Daylight) 2300 (Dark or Dusk)

Total No.

Type of Vehicle: #1 Car #2 Car #3 Truck 3No. of People Killed In: 2 0 0 2No. of People Injured In: 0 0 0 2Number of Pedestrians Killed: _____ 0Primary Vehicle: Vehicle #1Primary Type of Accident: Rear-endPrimary Driver Condition or Error: Stopped in traveled way

Description: The driver of vehicle #1 missed the turn-off in the very dense fog and stopped in the middle of the south-bound lanes, straddling the lane line. The car was then struck by vehicle #2 and vehicle #3. Driver and passenger of vehicle #1 were killed.