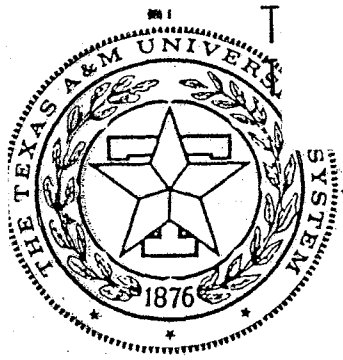

TEXAS TRANSPORTATION INSTITUTE

Guardrail and Delineator Post Accidents in the State of Texas (1984): A Study of the Validity and Reliability of Existing Data

by

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Prepared by

Texas Transportation Institute

for

The Traffic Safety Section (D-18, TS) of the

State Department of Highways & Public Transportation

DISCLAIMER

The conclusions and opinions expressed in this report are those of the author and do not necessarily represent those of the State of Texas, the State Department of Highways and Public Transportation, or any political subdivision of this state or the Federal Government.

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INTRODUCTION

As part of an on-going contract with the Texas State Department of Highways and Public Transportation (SDHPT), the Texas Transportation Institute (TTI) was asked to review a variable on the Texas Accident Report Form referred to as "object struck." Not all values of this variable were to be considered, just one: "guard post or rail."

The specific questions that this report addresses include:

(1) How do accidents involving a guard post or rail differ from other accidents?

(2) What factors are associated with guard post or rail accidents?

(3) Of all the accidents said to involve a guard post or rail, what percentage involve guard posts (delineator posts) and what percentage involve guardrails? How do these two kinds of accidents differ? What are the antecedent conditions associated with guard post (delineator post) accidents and guardrail accidents?

(4) How accurately is "object struck" being coded? Are the accidents classified as involving a guard post or rail being correctly coded?

PROCEDURE

To answer the questions shown above, a systematic, 20 percent sample of all 1984 Texas traffic accidents reported by a uniformed officer and involving a collision with a guard post or rail was selected. The sample was drawn by taking every fifth guard-post-or-rail accident case, in the Texas Department of Public Safety (DPS) files. Since the DPS files are sequenced by the order in which individual cases are processed, the sample drawn covered the entire calendar year of

1984. The first case in the sample occurred on January 1, 1984 and the last case occurred on December 31, 1984. In all, there were 1,135 accident cases in the 20 percent sample that was drawn.

It should be noted that in 1984 there were 5,798 accidents involving a guard post or rail. Some 123 of these accidents were driver reported, i.e. these accidents were not coded by a uniformed police officer. The 20 percent sample referred to in this study represents 20 percent of the 5,675 police-reported accidents involving a guard post or rail that were recorded in Texas in 1984.

For each of the 1,135 accidents selected, DPS provided the Institute with a "hard copy," i.e. a photostatic copy, of the police officer's report. Each hard copy was then read by the author and coded according to several additional variables not ordinarily recorded by DPS. These added variables were as follows:

A. Object Struck

1. Guardrail
2. Delineator Post
3. Other

B. One or More Vehicles Overturned in the Accident

1. Yes
2. No or cannot determine

C. A Vehicle Got Through, Over or Around a Rail

1. Yes
2. No
3. Not applicable

D. Location

1. Tangent
2. Curve
3. Intersection
4. Ramp
5. Gore
6. Other (e.g. dead end road)

E. Control Problem Before Accident

1. Skidding (single vehicle accident)
2. Recovering from "run off road" (SVA)
3. Avoiding another vehicle, object or animal (SVA)
4. Prior collision with another vehicle
5. No control problem, some other problem, or cannot determine

Object struck was coded to one of three values: (1) guardrail, (2) delineator post, and (3) other. Some of the objects that were coded as "other" included fence posts, retaining walls, bridge rails, concrete rails, cement walls, barricades, barrels, median cables, etc.

Overturn was coded to one of two values: (1) yes and (2) no, or unable to determine. "Overturn" is an accident-oriented variable, indicating that one or more vehicles left its wheels and struck the ground with its side and/or top. If two vehicles were involved in an accident, and only one overturned, the accident was coded as an overturn accident. If an accident involved a truck and trailer, or truck semi-trailer, and only the trailer (or semi-trailer) overturned, the accident was coded as an overturn accident.

Finally, of the 1,135 accidents in the data set, 26 involved motorcycles. All of these accidents were classified as overturn accidents.

Was a guardrail defeated, i.e. did a vehicle or vehicles get over, through or around the rail? This variable was coded: (1) yes, (2) no, or (3) not applicable. For vehicles striking delineator posts or fixed objects other than guardrails, this variable was coded (3), "not applicable." If a vehicle struck a guardrail and broke through it, or went over or around it, then this variable was coded (1), "yes." If the vehicle was restrained and/or redirected, came to rest on top of the rail--or struck the rail from the wrong side (i.e. the post side), a

situation that happens more often than might be thought, this variable was coded (2), "no."

Accident location was coded fairly simply: (1) tangent, (2) curve, (3) intersection, (4) ramp, (5) gore, and (6) other (e.g. dead end roads).

Finally, antecedents to the accident were classified as (1) skidding, (2) recovering from running off the road, (3) avoiding other vehicles, animals or movable objects, (4) prior collision with another motor vehicle, and (5) other, or cannot determine. "Other" antecedent conditions to accidents included speeding; driving while under the influence of alcohol or other drugs; police in hot pursuit; inattention due to map reading, bee stings, lightning, tuning the radio, dropping hot dogs; vehicle defects including broken or faulty brakes, steering, suspension, tires, trailer equipment, drive shafts and electrical systems; seizures; and suicides.

The hand coded data of the author were merged with the automated data in the TTI database to produce many of the findings in the next section.

RESULTS

An initial overview of how guard-post-or-rail accidents compare to all accidents is provided in Tables 1 and 2. Column one in Table 1 represents the 1,135 accidents in the guard-post-or-rail sample. The second column represents all 442,294 accidents that occurred in Texas in 1984. Guard-post-or-rail accidents when compared to all accidents, are seen to be more rural, more common on Interstate and U.S. and State highways, more frequent after dark, more severe, much more common late at night and in the early morning hours, somewhat more common in

inclement weather and on wet or slick surfaces, and somewhat more common on Saturday and Sunday, and during the winter.

Table 1

		1984 Accidents Involving Guard Post or Rail (N = 1,135)	All 1984 Accidents in DPS Files (N = 442,294)
Location (%)	Urban	72.6	84.9
	Rural	27.4	15.1
Road Type (%)	Interstate	40.3	11.4
	U.S. & State	38.5	28.5
	Farm to Market	6.5	8.4
	County Road	2.0	4.8
	City Streets	12.3	46.5
Light Conditions (%)	Daylight	43.4	68.2
	Dark	56.6	31.8
Accident Severity (%)	Fatal	2.6	0.8
	Incapacitating	10.0	4.6
	Non-incapacitating	22.8	15.0
	Possible Injury	12.3	13.3
	Property Damage	52.1	66.3
Road Condition (%)	No Defects	91.3	94.4
	Slick Surface	4.8	2.2
	Under Construction	3.7	3.0
	Other	0.2	0.4
Type of Collision (%)	Single Vehicle	86.8	27.8
	Multi Vehicle	13.2	72.2
Time (%)	Midnight - 3 am	20.3	8.0
	3 am - 6 am	9.2	2.7
	6 am - 9 am	8.0	11.1
	9 am - Noon	9.4	12.3
	Noon - 3 pm	10.3	17.0
	3 pm - 6 pm	13.6	23.6
	6 pm - 9 pm	13.5	14.7
	9 pm - Midnight	15.7	10.5
Weather (%)	Clear (Cloudy)	79.7	86.5
	Raining	17.3	12.2
	Other	3.0	1.3
Surface Condition (%)	Dry	76.0	82.4
	Wet	22.0	16.8
	Other	2.0	0.8

Table 1 (continued)

Day of the Week (%)	Sunday	16.4	11.1
	Monday	11.9	14.1
	Tuesday	12.7	13.5
	Wednesday	10.8	13.3
	Thursday	13.3	14.1
	Friday	16.0	18.1
	Saturday	18.9	15.8
Month (%)	January	8.6	7.5
	February	7.3	7.2
	March	8.5	8.4
	April	7.3	8.3
	May	8.7	8.9
	June	7.9	8.3
	July	7.1	8.1
	August	7.9	8.6
	September	7.7	8.2
	October	10.6	9.3
	November	8.4	8.3
	December	10.0	9.0

Table 2 depicts the 1,303 drivers and vehicles in the guard-post-or-rail sample (column 1) and the 766,877 drivers and vehicles involved in all accidents in Texas in 1984 (column 2). For the guard-post-or-rail sample there were 1.15 drivers/vehicles per accident; for the totality of accidents in Texas in 1984 there were 1.73 drivers/vehicles per accident. Guard-post-or-rail accidents are more often associated with tractors and semi-trailers than are all accidents taken as a whole. Vehicles involved in guard-post-or-rail accidents are three or four times more likely to be cited for a vehicle defect. Compared to all accident-involved drivers, those drivers who are involved in guard-post-or-rail accidents are more often male, nine or ten times more likely to be asleep or fatigued, three times more likely to be speeding and four times more likely to be driving while intoxicated.

Table 2

		1984 Drivers/Vehicles in Accidents Involving Guard Post or Rail (N = 1,303)	All 1984 Drivers/Vehicles in DPS Accident Files (N = 766,877)
Vehicle Type (%)	Passenger Car	63.6	67.6
	Truck	24.8	25.8
	Tractor and Semis	6.8	2.5
	Motorcycle	2.0	1.5
	Other	2.8	2.6
Vehicle Defects (%)	None	94.6	98.4
	Brakes	1.0	0.6
	Tires	2.3	0.3
	Other	2.1	0.7
Sex (%)	Male	74.5	65.1
	Female	25.5	34.9
Driver Defect (%)	Fatigue or Asleep	4.8	0.5
	Other or None	95.2	95.0
Contributing Factors (%)	Speeding	51.0	16.8
	Driving While Intoxicated (DWI)	16.4	4.4

Review of Accident "Hard Copies"

Upon reading the 1,135 hard copies in the sample; 783 (69.0 percent) were coded as involving impact with a guardrail, 250 (22.0 percent) impact with a delineator, and 102 (9.0 percent) impact with some other object, or no object at all.

Table 3

Object Struck	Frequency	Percent
Guardrail	783	69.0
Guard Post (Delineator)	250	22.0
Other	102	9.0
	1,135	100.0

It should be noted that in reading the officers' hard copies, it was usually fairly easy to determine object struck, but not always.

Sometimes a vehicle struck both a delineator post and a guardrail. These cases were coded "guardrail." On other occasions, the "guardrail" referred to by the officer was obviously a bridge rail and was coded as "other." On still other occasions the officer's use of the term "guardrail" may, in fact, have been referring to a bridge rail, but the narrative and/or diagram did not provide sufficient detail to allow the author to determine what object was really struck, i.e. a bridge rail or a guardrail. In these cases the officer's coding was retained, "guardrail."

Appendix A to this report provides excerpted narratives from some of the officer's reports that were reviewed. In some cases, the officer's words are quoted directly, in others, the author's comments are provided. This appendix is by no means a complete listing of the ambiguities found in reading the 1,135 cases in the sample, but it does serve to give the reader the flavor of the errors and contradictions associated with the coding of guard post or rail accidents.

Of the 1,135 guard-post-or-rail accidents, overturns occurred in 255 (22.5 percent) accidents. Impacts with guardrails resulted in an overturn 18.8 percent of the time; impacts with delineator posts resulted in an overturn 37.6 percent of the time.

Table 4

	Object Struck		
Overturn	Guardrail	Other	Delineator
Yes	18.8	13.7	37.6
No, or do not know	81.2	86.3	62.4
Total	100.0	100.0	100.0
N	783	102	250

The seemingly anomalous finding that delineator posts are twice as likely to be associated with overturns as guardrails requires some explanation. When a guardrail is struck by an errant motorist, there is good likelihood that a fair amount of property damage will occur, even if no one is injured. If over $250 worth of damage is done to an accident-involved vehicle or the guardrail, any officer who investigates the accident should, by law, report it to the Department of Public Safety in Austin. Thus, both property damage only (PDO) accidents and injury accidents involving guardrails routinely enter the DPS accident files.

Delineator posts are very inexpensive when compared to guardrails. And, in and of themselves, they have little wherewithal to induce major damage to a passenger car or truck. Thus, when a driver strays from the road and strikes a delineator post, he may very well recover control of his vehicle and proceed along his way without reporting the collision. On the other hand, when a vehicle operator drives through a sharp horizontal curve, knocks down a delineator post, and rolls over, the accident probably will be reported. And when the investigating officer fills out his report, object struck will be coded as "guard post or rail" in DPS files. While guard posts (delineator posts) are more often associated with overturn than are guardrails, this phenomenon is no doubt the result of the reporting bias just discussed--a bias favoring more severe accidents.

In 171 (21.8 percent) of the 783 guardrail accidents reviewed, the guardrail was defeated, i.e. a vehicle got over, around or through the guardrail.

Table 5 shows that object struck interacts with roadway geometry.

Delineator hits occur more often on curves than do guardrail hits. Delineator hits are also relatively more common at intersections.

Table 5

Location	Object Struck		
	Guardrail	Other	Delineator
Tangent	60.7	65.7	48.4
Curve	15.1	11.8	26.4
Intersection	9.1	7.8	13.6
Ramp	11.1	11.8	8.0
Gore	3.2	2.0	3.6
Other	0.9	1.0	0.0
Total	100.0	100.0	100.0
N	783	102	250

Finally, with regard to the conditions antecedent to collisions with the guard posts or rails, Table 6 shows that guardrail accidents are more often associated with prior collisions (or the attempted avoidance of a collision with another vehicle, movable object or animal) than are delineator accidents. Recovering from running off the road is more often associated with delineator accidents than with guardrail accidents.

Table 6

Antecedent Condition	Object Struck		
	Guardrail	Other	Delineator
Skidding	8.3	8.8	6.8
Recovering from running off the road	1.4	0.0	8.4
Avoiding (another vehicle, object or animal)	16.5	8.8	10.8
Prior collision with another motor vehicle	15.8	12.8	9.2
Other or cannot determine	58.0	69.6	64.8
Total	100.0	100.0	100.0
N	783	102	250

Among the "other" antecedent conditions to guard-post-or-rail accidents were drinking (driving while intoxicated) and speeding. See Appendix C, Tables 6 and 7. Sleep, fatigue, illness and other untoward problems that may befall or distract the driver (e.g. bees, lightning, dropped cigarettes, etc.) were all associated with guardrail and delineator accidents. Mechanical failures of vehicles were also noteworthy antecedents to accidents in the study sample. Finally, it should be noted that there appeared to be a large number of trailers and semi-trailers--with and without mechanical failures--in the sample. Unfortunately, separate tallies were not kept on trailers and semi-trailers.

Accident Severity

Accidents involving guard posts or rails tend to be severe. Table 7 shows the number of people killed or injured in the study sample. Since the study sample contains only 20 percent of all police-reported, guard-post-or-rail accidents, the numbers in Table 7 should be expanded by approximately five to estimate annual casualties, statewide.

Table 7

Injury Level	Object Struck			
	Guardrail	Other	Delineator	Total
Killed	28	2	8	38
Incapacitating Injuries	104	9	41	154
Non-incapacitating Injuries	245	36	69	230
Possible Injuries	149	20	52	221
Total	526	67	170	763

While accidents involving guard posts or rails are more severe than many other types of accidents, two points should be kept in mind. First, guardrails and delineator posts are usually deployed on high

speed roads--Interstate highways and U.S. and State highways--where travel speeds are higher than might be expected on city streets. Furthermore, guardrails, and to an even greater extent delineator posts, are deployed at the very location where hazards are thought to exist.

Second, the fact that a guardrail or delineator post is involved in an injury accident, does not necessarily mean that the rail or post was the proximal cause of injury. On the Texas Accident Report Form there are basically three places from which the DPS coders can determine object struck: (1) the officer's narrative, (2) the officer's diagram and (3) an open-ended question pertaining to the amount of dollar damage sustained by properties (objects) other than the crash involved vehicles. This third source of information, couched as it is in economic terms, causes trouble. Example: a driver leaves the road at 60 miles per hour, knocks down a delineator post and collides head on with a bridge pier. The driver is killed. Object struck is "guard post or rail." Dollar damage is to the delineator, not the bridge pier. Furthermore, the delineator was struck first.

While there is nothing wrong with defining object struck in economic terms, this definition prevents sound analysis of the State's data to determine which objects along the roadside are hazardous, and why. This definition prevents analysts from validly determining where serious fixed object accidents are occurring and makes more difficult the task of evaluating safety projects implemented to redress alleged deficiencies.

Analyses Based on Standard Reporting Variables

Appendix B to this report contains ten tables depicting guardrail, delineator and other accidents by a variety of crossing variables. The

specific tables (crosses) found in Appendix B are as follows:

Object Struck (Guardrail, Other, Delineator) by:

B1 Population
B2 Road Class
B3 Month
B4 Day of Week
B5 Time (Hour of Day)
B6 Light Condition
B7 Accident Severity
B8 Weather
B9 Surface Condition
B10 Vehicles Involved in Accident

Over half of all accidents involving delineator posts occur in rural areas. Conversely, almost three fourths of all accidents involving guardrails occur in urban areas. Approximately half of all guardrail accidents occur in cities with populations over 250,000 (Table B1).

Accidents involving delineator posts are most common on U.S. and State highways (50 percent). Another 23 percent occur on Interstates and 17 percent on Farm to Market roads. Guardrail accidents are most common on Interstate (45 percent) and U.S. and State highways (36 percent) (Tablet B2).

By month of year delineator post accidents and guardrail accidents show similar distributions. When compared to all accidents (Table 1) guard-post-and-rail accidents are slightly more common during the winter. This phenomenon may result from relatively more hours of darkness (a factor associated with post and rail accidents) and/or poor weather and road surface conditions during the winter (Table B3)

By day of week delineator post accidents and guardrail accidents again show similar distributions. When compared to all accidents, guard post and rail accidents are more common on weekends (Table B4).

Guardrail and delineator post accidents show similar distributions

by hour of day. Both post and rail accidents are overrepresented during late night and early morning hours when compared to all accidents (Table B5).

While guardrail and delineator post accidents share similar distributions by light condition (daylight versus dark), guardrail accidents that occur at night are more often associated with street lights due, no doubt, to the more urban nature of guardrail accidents (Table B6).

Delineator post accidents are quite similar in severity to guardrail accidents. As explained earlier, the apparent severity of delineator post accidents is at least partially artifactual, the result of a reporting bias (Table B7).

Guardrail accidents are approximately twice as likely to occur during rain and/or on wet surfaces as are delineator post accidents (Tables 8 and 9).

The average guardrail accident involves 1.26 vehicles; the average delineator post accident involves 1.19 vehicles (Table 10).

Appendix C contains 8 tables that depict vehicles/drivers involved in guardrail, delineator and other accidents. Specific tables found in Appendix C are as follows:

Object Struck (Guardrail, Other, Delineator) by:

C1 Vehicle Type
C2 Vehicle Defects
C3 Driver Sex and Race
C4 Driver Age
C5 Driver Defects
C6 Contributing Factor 1
C7 Contributing Factor 2
C8 Driver Injury

Almost two thirds of the vehicles involved in guardrail accidents are passenger cars. Approximately half of the vehicles involved in

delineator post accidents are passenger cars. Trucks--probably pickup trucks--are more common in delineator post accidents (Table C1).

Vehicle defects are found in 5.4 percent of all vehicles involved in guard post or rail accidents. For all accidents, the figure in 1.6 percent. Vehicle defects are similar for vehicles involved in delineator and guardrail accidents (Table C2).

Drivers involved in collisions with guardrails and delineators differ by race and sex. White males are most often involved in guard-post-or-rail accidents, followed by white females. Black drivers have relatively more accidents with guardrails; white drivers have relatively more accidents with delineators. This racial difference in accident type may result, at least partially, from the correlation between location (urban/rural) and object struck (guardrail/delineator) (Table C3).

The median age of drivers involved in guardrail accidents is 28.2 years; the median age of drivers involved in delineator post accidents is 28.1 years (Table C4).

Drivers striking guardrails and drivers striking delineators were both said to be fatigued or asleep in four or five percent of the cases examined (Table C5).

Drivers involved in guardrail and delineator post accidents were often said to be speeding. Little difference is seen in the probability of speeding for the two groups: 51 percent for drivers in guardrail accidents; 50 percent for drivers in delineator accidents (Table C6).

Sixteen percent of all drivers involved in guardrail accidents were said to be under the influence of alcohol. For drivers involved in delineator post accidents the figure was 19 percent (Table C7).

Drivers involved in guardrail accidents were apparently more apt to be killed than drivers involved in delineator post accidents. But the general distributions of injuries for drivers involved in both types of accidents are quite similar (Table C8).

Clinical Appraisal

After having read the hard copies of 1,135 guard-post-or-rail accidents--and considered the data in Appendices B and C--several general, perhaps over simplified statements will be made. Accidents involving guardrails and delineators typically occur on high speed facilities. They occur disproportionately at night and have a high percentage of impaired drivers (asleep, drunk, or ill) who are often speeding. Mechanical failures precipitate many of these accidents, but even more result from a previous collision, or an attempt to avoid another motor vehicle. For whatever reasons, vehicles that collide with guardrails or delineators are often out of control (skidding, swerving, spinning, stopping). It is not uncommon for these vehicles to strike a rail or delineator post sideways, backwards or while yawing clockwise or counterclockwise. It is also not uncommon for one vehicle to hit the same guardrail twice, or to hit guardrails (or bridge rails) on both sides of the road. One accident reviewed in this study involved impacts with four different guardrails.

CONCLUSION

The state has a need to determine where, when, and why accidents involving guard posts and guardrails are occurring--and to know what the consequences of those accidents are. Texas accident data, as currently recorded and coded, do not distinguish between guardrails and delineator posts. Furthermore, Texas data do not specify which vehicles in

multi-vehicle accidents actually struck a rail or post, and which, if any, overturned. And most seriously, objects that are neither guardrails or delineator posts are being coded as such.

Past analyses of guard post or rail accidents in the State of Texas for purposes of problem identification or evaluating hardware may have been misleading, if not completely erroneous. A major effort to enhance the collection and coding of guardrail/delineator data is warranted.

RECOMMENDATIONS

(1) Delineator posts and guardrails are vastly different physical structures. These two objects should have separate values under "object struck" in the Texas accident data set.

(2) It is clear from this study that objects such as concrete median barriers, bridge rails, etc. are assumed to be guardrails. To correct this problem, an educational program for use with police officers, and perhaps DPS coders, would seem prudent.

(3) In DPS files, object struck is an accident-oriented (A) variable. It should be a vehicle-oriented (B) variable. Object struck should be tied to a vehicle, not to the accident. If two cars collide and one then strikes a guardrail, it is not clear for automated Texas data which car struck the rail.

(4) One level of "object struck" is "overturn." If a car strikes a guardrail and then overturns, the officer will record that the accident involved a "guard post or rail." Having already used up his response to "object struck" the officer cannot now code "overturn." Overturn (yes or no) should be recorded for

all vehicles, in all accidents, independent of "object struck."

(5) Object struck should not be defined in economic terms, but in terms of its effect on the accident. Consideration should be given to recording impacts with multiple objects, not just the first object to sustain significant dollar damage.

APPENDIX A

Case Number	Officer's Narrative and/or Author's Comments
4068833	The object struck in this case was a "cable and post road guard."
4071814	Unit 1 was traveling north on FM 3024. Unit 2 was traveling south on same. Vehicles side swiped. Unit 2 lost control struck a bridge rail and plunged down to the ground.
4073549	Number 1 traveling eastbound on Katy Freeway lost control and struck concrete guardrail with LF. On the diagram the officer refers to the object struck as a "concrete median."
4074717	Driver of Unit 1 states he was southbound in the 1200 block of Willow when Unit 2 came up on his left forcing him off of the roadway and caused him to strike a median cable.
4081363	Vehicle 1 was traveling west on Expressway 83, crossed onto the eastbound Expressway 83 and then crossed over onto eastbound frontage striking the cable rod between east frontage and east expressway and struck the fence on the front of Rudy's Auto Sales.
4083272	Unit 1 lost control and struck the right guardrail then crossed all three traffic lanes striking center guardrail causing Units 3, 4 and 5 to stop in a traffic lane at which time Unit 1 struck all three from the rear. In the diagram the officer refers to this guardrail as a "bridge guardrail."
4083547	The narrative and diagram do not indicate that an object was struck. Number 1 was westbound on US 290. Number 1 drove off the south side of the roadway, swerved to the right to avoid striking a reflector pole and lost control of the vehicle. Number 1 rolled several times and came to rest on its roof on the north side of the roadway.
4084202	Unit 1 traveled south on 1000 Oak Hurst Scenic Drive and left the road to the right and struck a cable barrier and several poles. The driver of Unit 1 left the scene.
4089357	Driver 1 said he applied brakes while making curves and brakes did not work. No. 1 hit concrete column. There is no further information on this report form to indicate that the driver hit a guardrail or any kind of delineator post. Indeed, according to this report form the driver hit only concrete columns.
4114894	Vehicle 1 was traveling west when driver failed to control speed, ran off road and hit auto lot's guardrail.

Case Number	Officer's Narrative and/or Author's Comments
4116903	Unit southbound. Right wheels slipped off pavement on right side of road. Driver overcorrected. Unit slid into concrete rail overturning 1/2 time into creek bottom.
4117897	Driver 1 states that he was headed west on NE Loop 410 when unknown driver ahead of him stopped. Driver 1 pulled wheel to the left to avoid hitting vehicle from behind and in turn vehicle one slammed into concrete median.
4121782	Unit 1 swerved off roadway to miss oncoming vehicle and collided his right front into concrete rail.
4127118	I was north on North Freeway in the right lane. He was in the far left lane. He changed lanes and to avoid him hitting me I was forced into the concrete guardrail.
4137935	The object struck in this accident was a parking guardrail. That is to say, a guardrail used in a parking lot.
4143462	Unit 1 was traveling west on IH-20 near FM 460 when a large truck in front of it had an oil line or radiator line break throwing an oily substance over Unit 1's windshield causing poor visibility. Driver lost control hitting guardrail of bridge on right side of roadway.
4148197	Vehicle No. 1 was eastbound on West Highway 70. Vehicle lost control and spun around striking retaining wall. Vehicle 1 spun off wall and then struck it again with rear end.
4151009	No. 1 south on Gulf Freeway struck No. 2 heading south on Gulf Freeway. No. 2 FRQ struck cement barrier.
4160290	Unit 1 traveling northbound on Stimmons lost control on wet pavement, struck retaining wall and spun out onto grassy median. Operator spoke limited English and had no ID. No witnesses saw operator driving.
4183548	Vehicle 1 turned corner from Lamar to East Anderson. Vehicle started to skid and he applied brakes but vehicle jack-knifed and hit concrete wall.
4200582	Unit 1 struck rear of Unit 2. Unit 1 then forced Unit 3 into concrete wall. Unit 4 to avoid Unit 1 switched lanes and was struck by Unit 5 before Unit 1 hit Unit 2.
4222304	Driver 1 stated that he was eastbound on Ashley Road and looked down at the radio and started to tune the radio and his vehicle hit the curb and he lost control, hit a

Case Number	Officer's Narrative and/or Author's Comments
	cement rail and damaged his vehicle. No other vehicle was involved.
4223671	Unit 1 southbound in inside southbound lane failed to turn at intersection and struck highway marker and pole holding traffic lights.
4229115	Unit 1 eastbound at 500 McCright made an unsafe movement to the left. Unit 1's front left struck two wooden barrier posts located two feet north of roadway.
4229810	No. 1 vehicle was going south on Gulf Freeway service road outbound. Vehicle No. 1's front end struck the fixed object (concrete fixture).
4230698	IH 10 East is two lanes running east only. According to witness Unit 1 veered to the right for no apparent reason. Unit 1 jumped the south curb and traveled 235 feet in the dirt median. The front left then struck the wood post. Unit 1 continued southeast bound across the gateway east into a dirt lot for another 312 feet. The undercarriage struck an asphalt abutment sending Unit 1 airborne for 35 feet. The right front quarter of Unit 1 struck the back of Unit 2. Unit 2 still airborne for 15 feet. The left undercarraige struck the back of Unit 3. Unit 1 continued 23 feet and struck the second wooden post coming to rest. Item No. 1 received a small laceration to his head and complained of neck pain. Damage to Unit 1 and 2 was moderate, damage to Unit 3 was extensive. Item 1 stated he takes Tegretol to control seizures.
4234857	Unit 1 southbound around a curve with speed unsafe, lost control and collided with concrete retaining wall. Unit 1 continued on and turned over on its top.
4236467	Unit 1 traveling east on the freeway frontage road lost control on water in the roadway, drove off the road on the north side, drove through a drainage ditch, collided with two barricade posts and a street sign.
4238135	The object struck in the accident report is referred to as a bridge guardrail.
4240003	Unit No. 1 southbound on Valley Mills. Unit No. 2 westbound on I 35 access road. Unit No. 2 ran the red light and struck Unit 1's left front quarter with Unit 2's right front quarter. Both vehicles then struck the curb and cement part of the guardrail.
4242248	The object struck in this accident was said to be guardrail posts.

Case Number	Officer's Narrative and/or Author's Comments
4249473	Object struck - concrete median.
4250642	Unit No. 1 northbound in the 2300 block of north IH 35 lower level skids to avoid traffic cones, swerved and collided with center concrete lane divider.
4263032	Vehicle traveling on old state 36 southbound. Driver stated that he could not detect a large reflector barricade on the roadway used because roadway was closed down. Driver slammed on the brakes and thus locked them up, sliding through the barricade.
4264732	Unit 1 was eastbound on I 30. Driver stated he fell asleep and drove off of the roadway on the right and into the median between the eastbound and the south service road. He struck a concrete bridge and fell into approximately three feet of water.
4266858	No. 1 traveling southbound on West Loop South and lost control striking guardrail barrels. No. 1's left passenger side struck the fixed object.
4269801	Damage to property other than vehicles was said to be guardrail. The narrative reads as follows: Unit No. 1 southbound on FM 1776. Unit No. 1 left the road on the right side of the road, struck a bridge railing and traveled 110 feet coming to a stop. Subject appeared to have been intoxicated although investigation was not enough for DWI.
4272301	Damage to property other than vehicles is left blank. The narrative reads as follows: Unit 1 was southbound on Higginbothem and failed to maintain a single lane of traffic and ran off the road on Higginbothem Street. At no point on this accident report form is a struck object listed.
4276879	Unit No. 1 was traveling eastbound on Expressway 83 between Stewart and Glasscock Road. Driver failed to maintain vehicle under control thus colliding with the pole guards damaging posts at three different locations. From the diagram provided by the officer the "pole guards" seem to be located in the center of the median, not standard delineator posts.
4280632	Unit 1 traveling north on FM 1053 took eyes off road and Unit 1 veered to the right striking a concrete culvert and delineator post. Driver was unable to control Unit 1 and ran through a fence.

Case Number	Officer's Narrative and/or Author's Comments
4281189	Vehicle 1 was headed west on northeast loop 410 driving in the center lane. Vehicle 1 attempted to pass another vehicle which was on the right and lost control of his vehicle and went head on into the concrete wall.
4310240	Vehicle traveling northbound on US 285. The driver allegedly distracted himself momentarily with a two way radio and ran off the road on the right side. After traveling 74 feet he struck a concrete culvert and one reflector pole with the right front wheel and the driver lost control. He went into a broadside skid for 90 feet more before rolling over and coming to rest on his top four feet off the road facing northeast.
4335372	Vehicle No. 1 southbound US 385. Driver advised he fell asleep, ran off right side of roadway. Vehicle first struck a delineator post and then a large breakaway sign. Vehicle came to rest by fence approximately 150 feet west of roadway.
4339379	Vehicle No. 1 was traveling east on West Pizano in the inner lane. His steering column broke and he lost control of the vehicle, crossed the roadway to the south curb of North Pizano and struck the curb and a steel retaining fence for 25 feet before bouncing the vehicle to a halt.
4339626	The officer's narrative reads as follows: No. 1 vehicle lost control of his vehicle and hit guardrail and then hit Vehicle No. 2, then continued to center median. Both vehicles westbound. Comments from Driver No. 1 were as follows: I started to slow for construction, the car skidded and I crossed the freeway and hit the concrete barrier, then bounced off and hit the Toyota.
4342327	Unit 1 traveling north struck the rail guard (cement portion), lost control of vehicle and proceeded to the left lane and struck Unit 2 traveling north. Unit 2 started spinning around and struck a cyclone fence.
4342465	Unit 1 was traveling westbound on US 290. He missed the entrance ramp onto the new part of US 290 at the 1900 block. He tried to drive over the grass median to get onto the new US 290 but lost control when he hit the grass. The vehicle slid striking the cement guardrail. He then bounced back onto the roadway, spun around and struck the guardrail again. The vehicle stopped facing eastbound in the middle of the roadway.

Case Number	Officer's Narrative and/or Author's Comments
4359161	Unit 1 southbound on Park turned east into east alley of Park Street, lost control while driving down the alley striking a road barrier and coming to rest with the front end of the vehicle being in Cat Claw Creek.
4368519	Unit 1 was southbound in the outside lane of IH 35. Unit 1 had a blow out on the left back tire. Vehicle crossed the inside traffic lane, hit barrel used as a control device. Damage to vehicle left front, down left side and left back bumper dislodged.
4369848	Unit 1 was eastbound on Summit Drive at a high rate of speed. Operator of Unit 1 was unfamiliar with the roadway. Summit Drive dead-ends into Cline Drive. Unit operator failed to make the turn, struck the curb and rolled over twice before coming to rest. Operator of Unit 1 stated he was driving in excess of 70 mph at the time of the accident. NOTE: Other than the curb, no fixed object was recorded as having been struck in this accident.
4371585	Vehicle No. 1 westbound on Bertran, slid through stop sign across Aldene Westfield and struck barricades.
4375388	Vehicle No. 1 traveling north on IH 45 northbound feeder road. Driver stated the left front tire blew out and struck the cement wall with Vehicle 1 front.
4382367	Vehicle No. 1 was going west on Texas 86. The driver started putting a tape in the tape player. The vehicle steered onto the guardrail. The vehicle rode the rail across the bridge. The officer investigating this accident lists object struck as bridge rail.
4386489	This is a fatal accident that resulted in the deaths of two people riding inside of a passenger car. The narrative reads: Vehicle 1 was traveling westbound on IH 30. Vehicle 1 veered off the left side of the roadway onto guardrail. Vehicle then came off guardrail onto center median. Vehicle traveled west on median and hit overpass support where it came to rest on right side. This accident is coded as a guardrail accident.
4392653	Unit 1 was westbound on Almeda. Unit 1 unable to maneuver curve and at listed address, grazed the concrete guardrail, went out of control and flipped onto left side.

APPENDIX B

Table B1

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF POP BY SOBJECT

POP(POPULATION GROUP) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
RURAL	161 20.56	14 13.73	136 54.40	311
TOWN UNDER 2,500	20 2.55	4 3.92	11 4.40	35
2,500-5,000	18 2.30	2 1.96	1 0.40	21
5,000-10,000	17 2.17	0 0.00	10 4.00	27
10,000-25,000	50 6.39	10 9.80	22 8.80	82
25,000-50,000	23 2.94	4 3.92	8 3.20	35
50,000-100,000	40 5.11	8 7.84	16 6.40	64
100,000-250,000	72 9.20	5 4.90	17 6.80	94
OVER 250,000	382 48.79	55 53.92	29 11.60	466
TOTAL	783	102	250	1135

Table B2

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF ROAD BY SOBJECT

ROAD(ROAD CLASS) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
INTERSTATE	356 45.47	44 43.14	57 22.80	457
US & STATE HW	282 36.02	29 28.43	126 50.40	437
FARM TO MARKET	29 3.70	3 2.94	42 16.80	74
COUNTY ROAD	14 1.79	3 2.94	6 2.40	23
CITY STREET	100 12.77	22 21.57	18 7.20	140
TRNPIKE & TOLL	2 0.26	1 0.98	0 0.00	3
OTHER (ALLEY)	0 0.00	0 0.00	1 0.40	1
TOTAL	783	102	250	1135

Table B3

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF MONTH BY SOBJECT

MONTH(MONTH) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
JANUARY	71 9.07	8 7.84	19 7.60	98
FEBRUARY	55 7.02	9 8.82	19 7.60	83
MARCH	68 8.68	9 8.82	19 7.60	96
APRIL	57 7.28	4 3.92	22 8.80	83
MAY	76 9.71	6 5.88	17 6.80	99
JUNE	65 8.30	2 1.96	23 9.20	90
JULY	54 6.90	8 7.84	19 7.60	81
AUGUST	60 7.66	10 9.80	20 8.00	90
SEPTEMBER	57 7.28	6 5.88	24 9.60	87
OCTOBER	82 10.47	15 14.71	23 9.20	120
NOVEMBER	61 7.79	15 14.71	19 7.60	95
DECEMBER	77 9.83	10 9.80	26 10.40	113
TOTAL	783	102	250	1135

Table B4

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF DAY BY SOBJECT

DAY(DAY OF WEEK) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
SUNDAY	126 16.09	16 15.69	44 17.60	186
MONDAY	92 11.75	14 13.73	29 11.60	135
TUESDAY	99 12.64	17 16.67	28 11.20	144
WEDNESDAY	83 10.60	13 12.75	27 10.80	123
THURSDAY	111 14.18	12 11.76	28 11.20	151
FRIDAY	118 15.07	14 13.73	49 19.60	181
SATURDAY	154 19.67	16 15.69	45 18.00	215
TOTAL	783	102	250	1135

Table B5

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF TIME BY SOBJECT

TIME(TIME)	SOBJECT			
FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
MIDNITE-12:59 AM	49 6.26	8 7.84	20 8.00	77
1-1:59 AM	46 5.87	9 8.82	14 5.60	69
2-2:59 AM	62 7.92	6 5.88	17 6.80	85
3-3:59 AM	30 3.83	3 2.94	12 4.80	45
4-4:59 AM	21 2.68	0 0.00	3 1.20	24
5-5:59 AM	24 3.07	2 1.96	9 3.60	35
6-6:59 AM	15 1.92	5 4.90	6 2.40	26
7-7:59 AM	24 3.07	3 2.94	2 0.80	29
8-8:59 AM	28 3.58	3 2.94	5 2.00	36
9-9:59 AM	26 3.32	4 3.92	6 2.40	36
10-10:59 AM	17 2.17	3 2.94	7 2.80	27
11-11:59 AM	27 3.45	7 6.86	10 4.00	44
NOON-12:59 PM	26 3.32	0 0.00	10 4.00	36
1-1:59 PM	28 3.58	3 2.94	11 4.40	42
2-2:59 PM	24 3.07	6 5.88	9 3.60	39
3-3:59 PM	40 5.11	2 1.96	9 3.60	51
4-4:59 PM	37 4.73	3 2.94	17 6.80	57
5-5:59 PM	31 3.96	0 0.00	15 6.00	46
6-6:59 PM	38 4.85	5 4.90	11 4.40	54
7-7:59 PM	31 3.96	6 5.88	8 3.20	45
8-8:59 PM	39 4.98	6 5.88	9 3.60	54
9-9:59 PM	35 4.47	6 5.88	13 5.20	54
10-10:59 PM	44 5.62	6 5.88	11 4.40	61
11-11:59 PM	41 5.24	6 5.88	16 6.40	63
TOTAL	783	102	250	1135

Table B6

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF LIGHT BY SOBJECT

LIGHT(LIGHT CONDITION) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
DAYLIGHT	341 43.55	40 39.22	111 44.40	492
DAWN	5 0.64	3 2.94	0 0.00	8
DARK-NO LIGHTS	306 39.08	38 37.25	116 46.40	460
DARK-STREET LITE	125 15.96	20 19.61	19 7.60	164
DUSK	6 0.77	1 0.98	4 1.60	11
TOTAL	783	102	250	1135

Table B7

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF TSEV BY SOBJECT

TSEV(ACCIDENT SEVERITY) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
NON-INJURY	409 52.23	49 48.04	133 53.20	591
POSSIBLE INJURY	92 11.75	15 14.71	32 12.80	139
NONINCAPACIT	184 23.50	28 27.45	47 18.80	259
INCAPACITATING	73 9.32	9 8.82	32 12.80	114
FATAL	25 3.19	1 0.98	6 2.40	32
TOTAL	783	102	250	1135

Table B8

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF WEATHER BY SOBJECT

WEATHER(WEATHER) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
CLEAR (CLOUDY)	606 77.39	82 80.39	216 86.40	904
RAINING	151 19.28	19 18.63	26 10.40	196
SNOWING	6 0.77	0 0.00	1 0.40	7
FOG	15 1.92	1 0.98	4 1.60	20
OTHER	1 0.13	0 0.00	1 0.40	2
SLEETING	4 0.51	0 0.00	2 0.80	6
TOTAL	783	102	250	1135

Table B9

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF SURF_CON BY SOBJECT

SURF_CON(SURFACE CONDITION)
SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
DRY	574 73.31	79 77.45	210 84.00	863
WET	195 24.90	20 19.61	35 14.00	250
MUDDY	0 0.00	1 0.98	0 0.00	1
SNOWY	1 0.13	0 0.00	0 0.00	1
ICY	13 1.66	2 1.96	5 2.00	20
TOTAL	783	102	250	1135

Table B10

1984 TEXAS GUARDRAIL ACCIDENTS (NOT DRIVER REPORTED)
BY OBJECT STRUCK (SOBJECT)

TABLE OF TOTALVEH BY SOBJECT

TOTALVEH(TOTAL NUMBER OF VEHICLES INVOLVED)
SOBJECT

FREQUENCY COL PCT	G UARDRAIL	OTHER	DE LINEATOR	TOTAL
1	611 78.03	81 79.41	207 82.80	899
2	154 19.67	20 19.61	38 15.20	212
3	11 1.40	0 0.00	5 2.00	16
4	4 0.51	0 0.00	0 0.00	4
5	3 0.38	1 0.98	0 0.00	4
TOTAL	783	102	250	1135

APPENDIX C

Table C1

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF VEHTYPE BY SOBJECT

VEHTYPE(VEHICLE TYPE) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
VEH TYPE UNKNOWN	6 0.66	0 0.00	2 0.71	8
PASSENGER CAR	598 65.93	81 69.83	150 53.57	829
CAR & TRAILER	2 0.22	0 0.00	2 0.71	4
TRUCK	209 23.04	28 24.14	86 30.71	323
TRUCK & TRAILER	9 0.99	1 0.86	7 2.50	17
TRACTOR & SEMI	65 7.17	4 3.45	20 7.14	89
TRUCK & HS TRLR	0 0.00	0 0.00	1 0.36	1
OTHER TRUCK COMB	2 0.22	0 0.00	3 1.07	5
BUS	0 0.00	1 0.86	0 0.00	1
MOTORCYCLE	16 1.76	1 0.86	9 3.21	26
TOTAL	907	116	280	1303

Table C2

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF VEHDEF BY SOBJECT

VEHDEF(VEHICLE DEFECT) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
NO DEFECTS	857 94.49	111 95.69	265 94.64	1233
BRAKES	9 0.99	3 2.59	1 0.36	13
STEERING	5 0.55	0 0.00	1 0.36	6
LIGHTS	2 0.22	0 0.00	1 0.36	3
TIRES	19 2.09	2 1.72	9 3.21	30
TRAILER EQUIP	3 0.33	0 0.00	0 0.00	3
WHEEL CAME OFF	2 0.22	0 0.00	1 0.36	3
OTHER DEFECTS	10 1.10	0 0.00	2 0.71	12
TOTAL	907	116	280	1303

Table C3

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVR_SEX BY SOBJECT

DRVR_SEX(DRIVER RACE AND SEX) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
UNKNOWN	35 3.86	9 7.76	8 2.86	52
WHITE MALE	435 47.96	39 33.62	166 59.29	640
WHITE FEMALE	159 17.53	21 18.10	45 16.07	225
BLACK MALE	79 8.71	17 14.66	11 3.93	107
BLACK FEMALE	29 3.20	8 6.90	4 1.43	41
HISPANIC MALE	119 13.12	17 14.66	35 12.50	171
HISPANIC FEMALE	33 3.64	5 4.31	10 3.57	48
OTHER MALE	13 1.43	0 0.00	1 0.36	14
OTHER FEMALE	5 0.55	0 0.00	0 0.00	5
TOTAL	907	116	280	1303

Table C4

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVAGE BY SOBJECT

DRVAGE(DRIVER AGE) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
15	2 0.23	0 0.00	0 0.00	2
16	7 0.81	1 0.91	6 2.21	14
17	14 1.62	6 5.45	7 2.57	27
18	26 3.01	4 3.64	15 5.51	45
19	39 4.51	3 2.73	13 4.78	55
20	40 4.63	6 5.45	13 4.78	59
21	48 5.56	10 9.09	10 3.68	68
22	42 4.86	6 5.45	14 5.15	62
23	47 5.44	4 3.64	10 3.68	61
24	47 5.44	8 7.27	15 5.51	70
25	35 4.05	2 1.82	9 3.31	46
26	45 5.21	5 4.55	10 3.68	60
27	33 3.82	5 4.55	13 4.78	51
28	32 3.70	4 3.64	9 3.31	45
29	35 4.05	5 4.55	9 3.31	49
30	30 3.47	3 2.73	4 1.47	37
31	29 3.36	3 2.73	11 4.04	43
TOTAL	864	110	272	1246

(CONTINUED)

Table C4 (continued)

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVAGE BY SOBJECT

DRVAGE(DRIVER AGE) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
32	20 2.31	7 6.36	5 1.84	32
33	29 3.36	3 2.73	10 3.68	42
34	16 1.85	1 0.91	6 2.21	23
35	17 1.97	5 4.55	3 1.10	25
36	15 1.74	2 1.82	10 3.68	27
37	20 2.31	1 0.91	2 0.74	23
38	8 0.93	1 0.91	6 2.21	15
39	6 0.69	1 0.91	2 0.74	9
40	11 1.27	1 0.91	9 3.31	21
41	11 1.27	1 0.91	3 1.10	15
42	11 1.27	1 0.91	3 1.10	15
43	12 1.39	1 0.91	5 1.84	18
44	10 1.16	0 0.00	1 0.37	11
45	7 0.81	1 0.91	2 0.74	10
46	6 0.69	0 0.00	2 0.74	8
47	8 0.93	1 0.91	3 1.10	12
48	5 0.58	0 0.00	0 0.00	5
TOTAL	864	110	272	1246

(CONTINUED)

Table C4 (continued)

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVAGE BY SOBJECT

DRVAGE(DRIVER AGE) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
49	6 0.69	1 0.91	3 1.10	10
50	9 1.04	0 0.00	4 1.47	13
51	5 0.58	0 0.00	2 0.74	7
52	6 0.69	1 0.91	1 0.37	8
53	6 0.69	0 0.00	4 1.47	10
54	4 0.46	0 0.00	1 0.37	5
55	2 0.23	0 0.00	0 0.00	2
56	7 0.81	2 1.82	4 1.47	13
57	1 0.12	0 0.00	0 0.00	1
58	6 0.69	0 0.00	1 0.37	7
59	5 0.58	0 0.00	2 0.74	7
60	4 0.46	0 0.00	1 0.37	5
61	5 0.58	1 0.91	1 0.37	7
62	7 0.81	2 1.82	0 0.00	9
63	2 0.23	0 0.00	2 0.74	4
64	1 0.12	0 0.00	0 0.00	1
65	2 0.23	0 0.00	0 0.00	2
TOTAL	864	110	272	1246

(CONTINUED)

Table C4 (continued)

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVAGE BY SOBJECT

DRVAGE(DRIVER AGE) SOBJECT

FREQUENCY / COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
66	4 0.46	0 0.00	0 0.00	4
67	2 0.23	0 0.00	0 0.00	2
68	2 0.23	0 0.00	0 0.00	2
69	0 0.00	1 0.91	1 0.37	2
70	2 0.23	0 0.00	1 0.37	3
71	2 0.23	0 0.00	1 0.37	3
72	1 0.12	0 0.00	0 0.00	1
74	2 0.23	0 0.00	1 0.37	3
76	2 0.23	0 0.00	1 0.37	3
78	1 0.12	0 0.00	0 0.00	1
80	1 0.12	0 0.00	0 0.00	1
81	1 0.12	0 0.00	0 0.00	1
83	2 0.23	0 0.00	1 0.37	3
87	1 0.12	0 0.00	0 0.00	1
TOTAL	864	110	272	1246

FREQUENCY MISSING = 57

Table C5

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVDEF BY SOBJECT

DRVDEF(DRIVER DEFECT) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
NONE	859 94.71	111 95.69	263 93.93	1233
ILL	7 0.77	0 0.00	1 0.36	8
FATIGUE OR SLEEP	41 4.52	5 4.31	16 5.71	62
TOTAL	907	116	280	1303

Table C6

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF CONTRIB1 BY SOBJECT

CONTRIB1(CONTRIBUTING FACTOR 1) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
WRNG WAY 1-WAY	3 0.33	0 0.00	0 0.00	3
WRONG SIDE	4 0.44	0 0.00	3 1.07	7
NONE APPLIES	408 44.98	51 43.97	123 43.93	582
SPEEDING, LIMIT	102 11.25	7 6.03	35 12.50	144
SPEEDING, UNSAFE	361 39.80	55 47.41	105 37.50	521
FAIL TO YLD ROW	12 1.32	1 0.86	11 3.93	24
DISREG STOP	8 0.88	1 0.86	0 0.00	9
DISREG STOP & GO	7 0.77	1 0.86	2 0.71	10
TURN, WIDE RIGHT	2 0.22	0 0.00	0 0.00	2
TURN, WRONG LANE	0 0.00	0 0.00	1 0.36	1
TOTAL	907	116	280	1303

Table C7

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF CONTRIB2 BY SOBJECT

CONTRIB2(CONTRIBUTING FACTOR 2) SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
OTHER FACTOR	62 6.84	9 7.76	14 5.00	85
DW DRUGS	5 0.55	0 0.00	2 0.71	7
NONE APPLIES	677 74.64	86 74.14	207 73.93	970
FOLLOW TOO CLOSE	11 1.21	3 2.59	1 0.36	15
PASS, INSUF CLR	5 0.55	0 0.00	0 0.00	5
OTHER ILLEG PASS	2 0.22	0 0.00	2 0.71	4
IMPROP START PAR	0 0.00	1 0.86	1 0.36	2
IMPROPER PARKING	2 0.22	0 0.00	0 0.00	2
DWI	143 15.77	17 14.66	53 18.93	213
TOTAL	907	116	280	1303

Table C8

1984 TEXAS GUARDRAIL VEHICLE/DRIVER RECORDS
BY OBJECT STRUCK (SOBJECT)

TABLE OF DRVTINJ BY SOBJECT

DRVTINJ(DRIVER SEVERITY OF INJURY)
SOBJECT

FREQUENCY COL PCT	GUARDRAIL	OTHER	DELINEATOR	TOTAL
NON-INJURY	539 59.43	63 54.31	161 57.50	763
POSSIBLE INJURY	102 11.25	16 13.79	37 13.21	155
NONINCAPACIT	179 19.74	28 24.14	48 17.14	255
INCAPACITATING	63 6.95	8 6.90	30 10.71	101
FATAL	24 2.65	1 0.86	4 1.43	29
TOTAL	907	116	280	1303