

INVESTIGATION OF ACCIDENTS  
WITHIN CONSTRUCTION ZONES  
IN LOUISIANA

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## ABSTRACT

This investigation is to analyze construction and maintenance work zone accidents by reviewing accident data to determine if deficiencies exist and recommend possible corrective measures for future traffic control applications. To accomplish this, a review of accident statistics for Calendar Year 1979 was initiated to establish parameters. Of the 169,069 legally reported accidents involving death, bodily injury or property damage (in excess of \$100.00 or more) between Jan. 1 - Dec. 31, 1979; only 1,811 (or 1.1%) occurred within construction or maintenance work zones.

Characteristics of these work zone accidents were examined to determine primary and secondary contributing factors, roadway types and conditions, environmental factors, types of collisions, driver and vehicle conditions, etc. These were compared to all other types of accidents within Louisiana to establish if any significant detrimental practices could be identified as potential candidates for further investigation.

Analysis of 1979 accident data failed to identify any significant problems associated with construction or maintenance work zones. However, statistical data indicated that driver violations were a primary contributing factor in 79.4% of the work zone accidents. Additionally, the condition of the driver contributed to another 10.8% of these accidents.

It was found that accidents of all types and severity consistently displayed a 75% - 25% urban versus rural frequency of occurrence, whereas work zone accidents repeatedly reflected a 50% - 50% split. Researchers speculated that this might be due to the ability to detour or divert traffic within urban work zone situations, a resource not readily available in rural areas hampered with narrower roads, shoulders, reduced visibility, etc. It might also be speculated that rural travellers might have been exposed to much more construction or maintenance activities during 1979 than did their travelling

counterparts in the urbanized areas. Assuming this to be the case, it would infer that accidents occur in work zones more frequently than in non-work zones. However, considering the fact that in 1979, a total of only 1811 accidents occurred within the work zones, this might indicate that Louisiana may not have a severe accident problem within its construction and maintenance zones.

Construction and maintenance work zones and related activities can provide a distraction and create a potentially hazardous situation to the motoring public. Therefore, it is recommended that project engineers be made aware of the consequences and pay particular attention to minimum traffic control requirements, augmented with sound engineering judgment and frequent inspections, to insure minimal hazard exposure to the motoring public. In addition, due to the inherent ambiguities within the standard Uniform Accident Report Form (that provided the source of information for the evaluation), a Departmental Work Zone Accident Reporting System might be in order. This would provide the Department with more accurate, reliable accident information than can be obtained from the present uniform report. This would be beneficial in defending the Department against the increasing number of law suits being filed by the motoring public.

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## PURPOSE

This investigation was initiated to comply with a 1979 Federal-Aid Highway Program Manual directive which states, in part:

"Construction zone accidents and accident data shall be analyzed and used to continually correct deficiencies..."

At the request of the Louisiana DOTD Traffic and Programs Engineer, the Research and Development Section investigated accident data to establish if Louisiana has any significant increases in accidents that could be attributed to its construction zone safety practices.

## SCOPE

For this investigation only the most recent statistical accident data available, calendar year 1979, were used to evaluate accidents that occurred within construction or maintenance work zones in the state of Louisiana. This study was undertaken to determine characteristics unique to accidents occurring within work zones as opposed to all other accidents and situations. It was felt that this limited investigation would provide insight and establish the need for or provide the justification for a more comprehensive evaluation.



## METHODOLOGY

For this investigation, researchers randomly selected sixteen (16) major, primary and secondary routes (from various geographic or populace areas) from within Louisiana for evaluation purposes. Developing various SAS and EASYTRIEVE programs, 1,469 accident statistics were acquired for evaluation. These statistics represented 81% of all accidents that occurred within construction work zones during calendar year 1979. Using this information, over 900 Uniform Accident Report Forms were reproduced from microfilm files maintained by the Department's Traffic and Programs Section. It was felt that these reproductions would provide the researchers with narrative descriptions and diagrammatic sketches of the accident and give them some insight into the particulars surrounding the incident. These reports, prepared by the law enforcement officers at the scene of the accident, provide the Department of Public Safety with the information necessary to compile accident statistics for distribution to various state agencies.

After poring over the first few hundred reports, it became increasingly evident that the typical law enforcement officer at the scene of an accident located within a work zone was not realistically depicting the true situation. With exception of the fact that he coded Construction-Repair or Construction-No Warning (Roadway Condition Category), there was little or nothing to attribute the accident to a work zone. This made it extremely difficult to ascertain the nature or scope of the "work zone" since the narrative description or graphic reconstruction failed to substantiate the coded response. This condition was prevalent in approximately 95% of the reports screened and reviewed in attempt to isolate particulars in regards to potentially unsafe procedures within work zones. After extensive manual review, researchers concluded that they were only rewriting the composite already tabulated on the computer printout and could shed no light on the probable cause of accidents unique to work zones.

The DOTD printout, compiled by the Traffic and Programs Section, was

in a tabular, coded format and proved as unwieldly as manual inspection of the actual reports. Considering the 1,469 accidents retrieved each with 17 categories and a potential for 5 to 24 single or multiple response codes and you can imagine the problem in isolating contributory factors. After struggling to derive any meaningful, significant characteristics using existing Departmental resources, the researchers were at an impasse.

It was at this point that the Louisiana Highway Safety Commission was approached to provide possible insight into the problem area. They produced copies of their All Severity Accident General Information Report for calendar year 1979. Unlike the DOTD printout, theirs is categorically broken down with all tabulations spelled out and further defined with urban and rural breakdown. After some investigation, it was found that the Highway Safety Commission could extract and isolate those accidents which occurred only within work zones. Using these printouts exclusively, the researchers decided to perform a categorical comparison of all accidents vs. work zone accidents to satisfy the original intent of the study. The following is a brief summary of the results obtained.

## ANALYSIS OF DATA

To establish the parameters for this evaluation, Table 1 presents the total accidents of all severity that occurred during calendar year 1979 in the state of Louisiana. For comparison, Table 1 also isolates those accidents that were attributed to have occurred only within construction or maintenance work zones.

### ACCIDENT SEVERITY

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Fatality	1,034	310	724	23	7	16
Injury	21,825	12,432	9,393	287	92	195
PDO <sup>1</sup>	<u>146,210</u>	<u>111,162</u>	<u>35,048</u>	<u>1,501</u>	<u>804</u>	<u>697</u>
Totals	169,069	123,904	45,165	1,811	903	908

<sup>1</sup>Property Damage Only - \$100 or more

### PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Fatality	0.6%	0.2%	0.4%	1.3%	0.4%	0.9%
Injury	13.0%	7.4%	5.6%	15.8%	5.1%	10.7%
PDO <sup>1</sup>	<u>86.4%</u>	<u>65.7%</u>	<u>20.7%</u>	<u>82.9%</u>	<u>44.4%</u>	<u>38.5%</u>
Totals	100.0%	73.3%	26.7%	100.0%	49.9%	50.1%

<sup>1</sup>Property Damage Only - \$100 or more

TABLE 1

It can be noted that the rate of fatal accidents in work zones is twice the fatal rate for all accidents. Tedious inspection of work zone fatal accident reports failed to indicate particulars, specifics or conditions related to a true work zone. This led researchers to

question the validity of the coded response on the Uniform Accident Form, in which the law enforcement officers at the scene of the accident coded Construction-Repair or Construction-No Warning (Roadway Condition Category). These two categories provided the source of computer recall, isolating out all other variables. One significant trend that will become increasingly evident throughout this report is the approximate 75%-25% urban versus rural frequency of occurrence when evaluating accidents of all types as opposed to a 50%-50% split when considering work zone statistics. Researchers speculated that this may be due to the ability to detour or divert traffic within urban work zones, a resource not readily available in rural areas hampered with narrower roads, shoulders, reduced visibility, etc. It might also be speculated that rural travellers might have been exposed to much more construction or maintenance activities during 1979 than did their travelling counterparts in the urbanized areas. Assuming this to be the case, it would infer that accidents occur in work zones more frequently than in non-work zones. However, considering the fact that in 1979, a total of only 1811 accidents occurred within the work zones, this might indicate that Louisiana may not have a severe accident problem within its construction and maintenance zones.

Work zone accidents evaluated on a Day of the Week (Table 2) basis showed very little overall change in frequency from all other accidents. In all categories, Friday was the predominant day of the week with respect to accidents, Sunday the least significant and all others somewhat equal overall.

FREQUENCY OF OCCURRENCE - DAY OF THE WEEK

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Monday	23,496	17,753	5,743	270	157	113
Tuesday	23,163	17,494	5,669	284	154	130
Wednesday	22,437	16,774	5,663	273	141	132
Thursday	23,641	17,443	6,198	258	131	127
Friday	31,575	23,589	7,986	337	149	188
Saturday	27,291	19,148	8,143	231	112	119
Sunday	17,466	11,703	5,763	158	59	99
Totals	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Monday	13.9%	10.5%	3.4%	14.9%	8.7%	6.2%
Tuesday	13.7%	10.3%	3.4%	15.7%	8.5%	7.2%
Wednesday	13.3%	10.0%	3.3%	15.1%	7.8%	7.3%
Thursday	14.0%	10.3%	3.7%	14.2%	7.2%	7.0%
Friday	18.7%	14.0%	4.7%	18.6%	8.2%	10.4%
Saturday	16.1%	11.3%	4.8%	12.8%	6.2%	6.6%
Sunday	10.3%	6.9%	3.4%	8.7%	3.3%	5.4%
Totals	100.0%	73.3%	26.7%	100.0%	49.9%	50.1%

TABLE 2

Increases in work zone accidents due to weather conditions (Table 3) were difficult to evaluate. Lacking the scope or extent of the work zone activities, researchers could only surmise that rather than inclement weather being a major factor in work zone accidents, it would appear that accidents are more a result of the presence of the work taking place on or near the roadway.

WEATHER CONDITIONS DURING THE ACCIDENT

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Clear	102,401	74,954	27,447	1,152	562	590
Cloudy	36,281	26,878	9,403	430	228	202
Rain	28,494	21,173	7,321	209	108	101
Fog	1,508	644	864	17	4	13
Other	385	255	130	3	1	2
Totals	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Clear	60.6%	44.3%	16.3%	63.6%	31.0%	32.6%
Cloudy	21.5%	15.9%	5.6%	23.7%	12.6%	11.1%
Rain	16.8%	12.5%	4.3%	11.6%	6.0%	5.6%
Fog	0.9%	0.4%	0.5%	0.9%	0.2%	0.7%
Other	0.2%	0.2%	0.0%	0.2%	0.1%	0.1%
Totals	100.0%	73.3%	26.7%	100.0%	49.9%	50.1%

TABLE 3

Analysis of Roadway Surface Types (Table 4) reflected similar patterns. While concrete comprises more major, primary or interstate routes, asphalt can generally be ascribed to major secondary US or state routes. These generally exhibit narrower shoulders (sand-shell or light-weight aggregate) that are definitely more hazardous when wet. Review of the accident reports indicated a noticeable increase in incidents of running off the roadway, on improved (?) shoulders or within a work (?) zone or combinations thereof. Lack of specifics in regard to magnitude or extent of the work zones left researchers with only speculation as to contributory factors.

ROAD SURFACE TYPE

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Concrete	54,825	46,991	7,834	513	334	179
Blacktop	111,006	74,990	36,016	1,191	517	674
Other	3,238	1,923	1,315	107	52	55
Totals	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Concrete	32.4%	27.8%	4.6%	28.3%	18.4%	9.9%
Blacktop	65.7%	44.4%	21.3%	65.8%	28.6%	37.2%
Other	1.9%	1.1%	0.8%	5.9%	2.9%	3.0%
Totals	100.0%	73.3%	26.7%	100.0%	49.9%	50.1%

TABLE 4

Accidents due to Roadway Alignment (Table 5) were somewhat increased within work zones when curves, grades, or both were involved.

ROADWAY ALIGNMENT

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Straight - Level	143,149	110,103	33,046	1,327	698	629
Curved - Level	12,257	5,617	6,640	184	48	136
On Grade - Straight	6,659	4,184	2,475	142	72	70
On Grade- Curved	2,755	988	1,767	47	12	35
All Others	4,249	3,012	1,237	111	73	38
Totals	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Straight - Level	84.7%	65.1%	19.6%	73.3%	38.6%	34.7%
Curved - Level	7.2%	3.3%	3.9%	10.2%	2.7%	7.5%
On Grade - Level	4.0%	2.5%	1.5%	7.8%	3.9%	3.9%
On Grade - Curved	1.6%	0.6%	1.0%	2.6%	0.6%	2.0%
All Others	2.5%	1.8%	0.7%	6.1%	4.0%	2.1%
Totals	100.0%	73.3%	26.7%	100.0%	49.8%	50.2%

TABLE 5



Table 6A, Type of Accident and Table 6B, Type of Collision, should be studied collectively to ascertain any significant discrepancies associated with work zones accidents. As shown on the following tables, accident rate involving collision with fixed objects located within the work zones was 7.7% compared to 3.8% for all other locations. In contrast, collision rate with parked cars was found to be only 4.2% for work zones compared to 9.4% for all other zones.

TYPE OF ACCIDENT

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Collision w/Another Auto	120,441	93,222	27,219	1,187	657	530
Running Off Roadway	19,318	7,567	11,751	245	35	210
Collision w/Parked Car	16,024	14,260	1,764	75	50	25
Collision w/Fixed Object	6,382	4,661	1,721	140	69	71
All Others	6,904	4,194	2,710	164	92	72
Totals	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Collision w/Another Auto	71.2%	55.1%	16.1%	65.6%	36.3%	29.3%
Running Off Roadway	11.5%	4.5%	7.0%	13.5%	1.9%	11.6%
Collision w/Parked Car	9.4%	8.4%	1.0%	4.2%	2.8%	1.4%
Collision w/Fixed Object	3.8%	2.8%	1.0%	7.7%	3.8%	3.9%
All Others	4.1%	2.5%	1.6%	9.0%	5.1%	3.9%
Totals	100.0%	73.3%	26.7%	100.0%	49.9%	50.1%

TABLE 6A

TYPE OF COLLISION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Head-On	5,355	3,430	1,925	82	34	48
Rear End	35,055	26,845	8,210	423	216	207
Right Angle	45,674	37,336	8,338	325	208	117
Sideswipe Same Direction	22,030	17,307	4,723	225	144	81
Sideswipe Opp. Direction	12,509	8,377	4,132	138	56	82
Non-Collision	19,318	7,572	11,746	244	36	208
Other	29,128	23,037	6,091	374	209	165
Total	169,069	123,904	45,165	1,811	903	908

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Head-On	3.2%	2.0%	1.2%	4.5%	1.9%	2.6%
Rear End	20.8%	15.9%	4.9%	23.4%	11.9%	11.5%
Right Angle	27.0%	22.1%	4.9%	17.9%	11.5%	6.4%
Sideswipe Same Direction	13.0%	10.2%	2.8%	12.4%	8.0%	4.4%
Sideswipe Opp. Direction	7.4%	5.0%	2.4%	7.6%	3.1%	4.5%
Non-Collision	11.4%	4.5%	6.9%	13.5%	2.0%	11.5%
Other	17.2%	13.6%	3.6%	20.7%	11.6%	9.1%
Total	100.0%	73.3%	26.7%	100.0%	50.0%	50.0%

TABLE 6B

The age (Table 7A) and condition of drivers (Table 7B) are ambiguous in the sense that the exact age of the drivers and the severity of the accidents caused by drivers in a specific condition were not recorded. However, the data does indicate the relationship between accidents, age of drivers and condition of drivers as shown on the following tables.

DISTRIBUTION ACCORDING TO AGE OF DRIVER

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Not Stated on Report	38,255	33,700	4,555	164	107	57
1-14 years (14 years)	1,106	773	333	8	3	5
15-20 years (6 years)	62,749	44,618	18,131	595	288	307
21-26 years (6 years)	64,577	47,913	16,664	701	350	351
27-32 years (6 years)	45,488	34,287	11,201	528	285	243
33-38 years (6 years)	28,040	20,926	7,114	334	164	170
39-99 years (60 years)	<u>83,989</u>	<u>63,650</u>	<u>20,339</u>	<u>897</u>	<u>488</u>	<u>409</u>
Totals	324,204	245,867	78,337	3,227	1,685	1,542

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Not Stated on Report	11.8%	10.4%	1.4%	5.1%	3.3%	1.8%
1-14 years (14 years)	0.3%	0.2%	0.1%	0.3%	0.1%	0.2%
15-20 years (6 years)	19.4%	13.8%	5.6%	18.4%	8.9%	9.5%
21-26 years (6 years)	19.9%	14.8%	5.1%	21.7%	10.8%	10.9%
27-32 years (6 years)	14.1%	10.6%	3.5%	16.3%	8.8%	7.5%
33-38 years (6 years)	8.6%	6.4%	2.2%	10.4%	5.1%	5.3%
39-99 years (60 years)	<u>25.9%</u>	<u>19.6%</u>	<u>6.3%</u>	<u>27.8%</u>	<u>15.1%</u>	<u>12.7%</u>
Totals	100.0%	75.8%	24.2%	100.0%	52.1%	47.9%

TABLE 7A

CONDITION OF THE DRIVER

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Normal	208,323	163,886	44,437	2,067	1,172	895
Distracted	59,523	40,844	18,679	694	316	378
Unknown	37,364	31,076	6,288	219	130	89
Drinking	16,450	8,903	7,547	212	60	152
Other	2,544	1,158	1,386	35	7	28
Totals	324,204	245,867	78,337	3,227	1,685	1,542

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Normal	64.3%	50.6%	13.7%	64.0%	36.3%	27.7%
Distracted	18.4%	12.6%	5.8%	21.5%	9.8%	11.7%
Unknown	11.5%	9.6%	1.9%	6.8%	4.0%	2.8%
Drinking	5.0%	2.7%	2.3%	6.6%	1.9%	4.7%
Other	0.8%	0.4%	0.4%	1.1%	0.2%	0.9%
Totals	100.0%	75.9%	24.1%	100.0%	52.2%	47.8%

TABLE 7B

Primary Contributing Factors, Table 8A, and Secondary Contributing Factors, Table 8B, show that driver violations are responsible for the overwhelming majority of accidents. Statistical data for 1979 indicated that driver violations were a primary contributing factor in 79.4% of the work zone accidents and in 86.7% of all other accidents. It should also be noted that condition of drivers contributed to another 10.8% of the work zone accidents and 8.8% of the accidents of all types. Roadway conditions contributed to 4.1% of the work zone accidents as compared to only 0.7% of all other accidents.

PRIMARY CONTRIBUTING FACTORS

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Due to Driver Violations	146,675	111,782	34,893	1,437	753	684
Movement Prior to Acc.	3,385	1,516	1,869	55	29	26
Condition of Driver	14,975	8,152	6,823	195	55	140
Roadway Conditions <sup>1</sup>	1,109	585	524	75	48	27
Pedestrian Actions	1,298	1,038	260	19	5	14
All Other Categories	1,627	831	796	30	13	17
Totals	169,069	123,904	45,165	1,811	903	908

<sup>1</sup>Surface condition, lighting, alignment, weather, etc.

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Due to Driver Violations	86.7%	66.1%	20.6%	79.4%	41.6%	37.8%
Movement Prior to Acc.	2.0%	0.9%	1.1%	3.0%	1.6%	1.4%
Condition of Driver	8.8%	4.8%	4.0%	10.8%	3.0%	7.8%
Roadway Conditions <sup>1</sup>	0.7%	0.4%	0.3%	4.1%	2.6%	1.5%
Pedestrian Actions	0.8%	0.6%	0.2%	1.0%	0.3%	0.7%
All Other Categories	1.0%	0.5%	0.5%	1.7%	0.7%	1.0%
Totals	100.0%	73.3%	26.7%	100.0%	49.8%	50.2%

<sup>1</sup>Surface condition, lighting, alignment, weather, etc.

TABLE 8A

SECONDARY CONTRIBUTING FACTORS

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Not Stated on Report	45,006	38,956	6,050	255	171	84
Due to Driver Violations	16,026	8,828	7,198	227	73	154
Movement Prior to Acc.	37,520	26,114	11,406	333	137	196
Vision Obscurement	8,567	6,803	1,764	97	59	38
Condition of Driver	39,889	27,137	12,752	400	166	234
Roadway Conditions <sup>1</sup>	4,399	2,607	1,792	354	225	129
Weather Conditions	11,371	9,249	2,122	64	39	25
All Other Categories	6,291	4,210	2,081	81	33	48
Totals	169,069	123,904	45,165	1,811	903	908

<sup>1</sup>Surface condition, lighting, alignment, weather, etc.

PERCENTAGE DISTRIBUTION

Category for Comparison	All Accidents			Work Zones Only		
	Total	Urban	Rural	Total	Urban	Rural
Not Stated on Report	26.6%	23.0%	3.6%	14.1%	9.5%	4.6%
Due to Driver Violations	9.5%	5.2%	4.3%	12.5%	4.0%	8.5%
Movement Prior to Acc.	22.2%	15.4%	6.8%	18.4%	7.6%	10.8%
Vision Obscurement	5.1%	4.0%	1.1%	5.4%	3.3%	2.1%
Condition of Driver	23.6%	16.1%	7.5%	22.1%	9.2%	12.9%
Roadway Conditions <sup>1</sup>	2.6%	1.5%	1.1%	19.5%	12.4%	7.1%
Weather Conditions	6.7%	5.5%	1.2%	3.5%	2.1%	1.4%
All Other Categories	3.7%	2.5%	1.2%	4.5%	1.8%	2.7%
Totals	100.0%	73.2%	26.8%	100.0%	49.9%	50.1%

<sup>1</sup>Surface condition, lighting alignment, weather, etc.

TABLE 8B

## CONCLUSIONS

During calendar year 1979, of the 169,069 legally reported traffic accidents involving death, bodily injury or property damage, only 1,811 (or 1.1%) occurred within construction or maintenance work zones. Based on 1979 statistics reviewed for this study, percentage distribution for injury and property damage accidents within work zones were approximately the same as those at non-work zones. However, fatal accidents constituted 1.3% of the work zone accidents compared to only 0.6% for all other accidents. Tedious inspection of work zone fatal accident reports, in many instances, failed to indicate particulars, specifics or conditions related to a true work zone. It was found that some fatal accidents reported to have occurred within the "work zone" actually lacked any substantiating information to prove that any construction or maintenance activity was in progress or even existed at the time of the accident.

Statistical data for 1979 indicated that driver violations were a primary contributing factor in 79.4% of the work zone accidents and in 86.7% of all other accidents. It was also found that condition of drivers contributed to another 10.8% of the work zone accidents and 8.8% of all other accidents.

Roadway conditions (surface condition, lighting, alignment, weather, etc.) were found to be a primary contributing factor in 4.1% of the work zone accidents and in 0.7% of all other accidents. Additionally, roadway conditions were the secondary contributing factors in 19.5% of the work zone accidents and only in 2.6% of all other accidents.

Accident rate involving collision with fixed objects located within the work zones was found to be 7.7% compared to 3.8% for all other locations. In contrast, collision rate with parked cars was 4.2% for work zones compared to 9.4% for all other zones. It was also found that accident rates due to roadway alignment were increased within the work zones when curves, grades or both were involved.

Accidents of all types and severity consistently displayed a 75%-25% urban versus rural frequency of occurrence, whereas work zone accidents repeatedly reflected a 50%-50% split. The researchers speculated that this might be due to the ability to detour or divert traffic within urban work zone situations, a resource not readily available in rural areas hampered with narrower roads, shoulders, reduced visibility, etc. It might also be speculated that rural travellers might have been exposed to much more construction or maintenance activities during 1979 than did their travelling counterparts in the urbanized areas. Assuming this to be the case, it would infer that accidents occur in work zones more frequently than in non-work zones. However, considering the fact that in 1979, a total of only 1811 accidents occurred within the work zones, this might indicate that Louisiana may not have a severe accident problem within its construction and maintenance zones.



## RECOMMENDATIONS

Construction and maintenance work zones and related activities can provide a condition that creates a potentially hazardous situation to the motoring public. Therefore, it is recommended that project engineers be made aware of the consequences and pay particular attention to minimum traffic control requirements, augmented with sound engineering judgment and frequent inspections, to insure minimal hazard exposure to the motoring public. In addition, due to the inherent ambiguities within the standard Uniform Accident Report Form which provided the source of information for this report, a Departmental Work Zone Accident Reporting System might be in order. This would provide the Department with more accurate, reliable accident information than can be obtained from the present uniform report. This would be beneficial in defending the Department against the increasing number of law suits being filed by the motoring public. Inadequacies of the present system would tend to consistently embarrass the Department in the most minor of claims, although no unsafe practice would be in evidence.