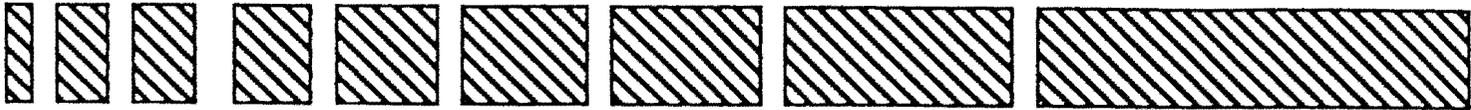


**IMPACTS OF INCREASED TRADE ON HIGHWAY SAFETY
ALONG THE TEXAS/MEXICO BORDER REGION**



**Study 10-7-93-1984
in Cooperation with**

TEXAS DEPARTMENT OF TRANSPORTATION



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DECEMBER, 1993**

**CENTER FOR GEOTECHNICAL & HIGHWAY MATERIALS RESEARCH
THE UNIVERSITY OF TEXAS AT EL PASO
EL PASO, TEXAS 79968
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**IMPACTS OF INCREASED TRADE ON HIGHWAY SAFETY
ALONG THE TEXAS/MEXICO BORDER REGION**

by

Rafael F. Pezo, Ph.D.

Gordon Cook, M.P.S.

Research Project 1984-1F

Research Project 10-7-93-1984

U.S./Mexico Highway Safety: How will increased trade impact
highway safety along the Texas border with Mexico?

conducted for the

Texas Department of Transportation

by the

Center for Geotechnical & Highway Materials Research

The University of Texas at El Paso

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METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	centimetres	cm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km

AREA				
in ²	square inches	645.2	centimetres squared	cm ²
ft ²	square feet	0.0929	metres squared	m ²
yd ²	square yards	0.836	metres squared	m ²
mi ²	square miles	2.59	kilometres squared	km ²
ac	acres	0.395	hectares	ha

MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg

VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft ³	cubic feet	0.0328	metres cubed	m ³
yd ³	cubic yards	0.0765	metres cubed	m ³

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi

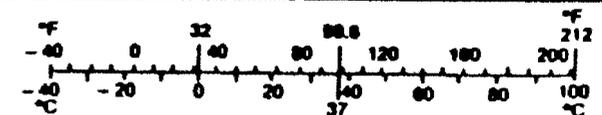
AREA				
mm ²	millimetres squared	0.0016	square inches	in ²
m ²	metres squared	10.764	square feet	ft ²
km ²	kilometres squared	0.39	square miles	mi ²
ha	hectares (10 000 m ²)	2.53	acres	ac

MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T

VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m ³	metres cubed	35.315	cubic feet	ft ³
m ³	metres cubed	1.308	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

DISCLAIMER

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Rafael F. Pezo

Gordon Cook

Research Supervisors

**NOT INTENDED FOR CONSTRUCTION,
BIDDING, OR PERMIT PURPOSES.**

IMPLEMENTATION

In this report some recommendations have been made which may be utilized during the development and implementation of a safety management system, as well as for possible projects for the highway safety improvement program and/or any planning and implementation of the state highway safety plan for the Texas/Mexico border region.

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ABSTRACT

This report addresses the impacts on highway safety due to increased trade along the Texas/Mexico border. To identify those areas that will be most affected, characteristics of the border region were reviewed; namely, population, the economy, and the *maquiladora* program, as well as accident records. The manuals of geometric design of highways and streets used in the United States and Mexico were reviewed, and visual assessments of the existing road conditions were performed. A comparison of Texas and Mexican vehicle laws was conducted. Also, a survey was conducted to identify public and trucking industry concerns, along both sides of the border. In addition, the NAFTA proposal was reviewed to assess probable effects this agreement, once implemented, may have on highway safety along the Texas/Mexico border. Furthermore, a preliminary accident prediction model for use in estimating the accident potential of Texas border highways is introduced. The report contains many contributions that may be useful to identify potential problems due to increased trade, and to formulate research topics to be considered by the Highway Safety Improvement Program.

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CHAPTER 1. INTRODUCTION

BACKGROUND

When neighboring communities increase their commercial interaction and "*open their doors*" to a dynamic spirit of free trade, there will be aspects and characteristics of these communities that will change. The degree and type of change will depend on the intensity and the level at which this cultural interaction takes place. The North American Free Trade Agreement (NAFTA) between Canada, the United States and Mexico, will accelerate this type of change.

The Texas/Mexico border region will be the area most highly impacted by NAFTA. Approximately 70 percent of the total United States/Mexican freight trade crosses this border, and 70 percent of that amount is transported through the highway system. This situation is cause for concern. An increase in trade implies that there will be an increase in traffic volume which will bring all types of vehicles and drivers onto the highway system of this region. Another cause for concern is the accelerated population growth on both sides of the border which will bring further challenges to the highway systems of this region.

The level of safety of the highway system may be jeopardized if adequate measures are not taken in a timely fashion. Maintaining a high level of safety is of high concern. Traffic-related accidents are major public problems that have major economic, social and political implications.

Aspects and characteristics of the Texas and Mexican communities that could affect the safety characteristics of the region to some degree have been reviewed. These include an overview of population characteristics and the *maquiladora* program, a review of highway characteristics and vehicle laws. In addition, the NAFTA proposal is reviewed as it pertains to highway safety. Finally, the accident records of the communities of the Texas/Mexico border region are discussed.

This research effort is important in that it identifies areas that need further research, immediate action, compromises, and/or discussions. With or without NAFTA, there are safety problems at the border region that will increase if adequate measures are not taken.

OBJECTIVE

The purpose of this research project is to assess, in a broad context, the impacts of increased trade on highway safety along the Texas/Mexico border region. In addition, the different critical issues that affect highway safety in the region are discussed.

Based on this study, a highway safety program for the border region can be developed. To achieve this broad goal, the following specific objectives were established:

- (1) Review of characteristics of the population, the vehicle regulations, and highway systems of both, the border communities of Texas and Mexico.
- (2) Review of NAFTA proposal in view of highway safety.
- (3) Determine public concerns with respect to highway safety along the border.
- (4) Review of accident records of the region.
- (5) Formulate preliminary macroscopic models for accident potential estimates.

SCOPE OF THE STUDY

This project is concerned with assessing the impact of increased trade and traffic on highway safety along the Texas/Mexico border. This chapter has described the importance and the objective of this study.

Chapter 2 presents an overview of the characteristics of the Texas/Mexico border. This includes aspects of population, a brief economic analysis, and a synopsis of the maquiladora program. Chapter 3 contains a general description of regional highway characteristics. It includes a comparison of both Texas and Mexico geometric design manuals, and a visual assessment of the highway system at the border region.

In Chapter 4, the vehicle laws of Mexico and Texas are reviewed and compared. Chapter 5 documents an assessment of the NAFTA proposal in view of its effects on highway safety. A brief background for this issue is presented followed by a description of current NAFTA trucking issues and its provisions.

Chapter 6 describes the results of a survey which focused on identifying public concerns with respect to highway safety. Characteristics of the population surveyed and the analysis of the responses are documented. Chapter 7 is a review of the accident records of the Texas and Mexican communities. First, a brief background of the accident records and the parameters used are included. Then, accident records of southern counties and major border cities of Texas are reviewed. Accident rates of the northern states of Mexico and the border counties of Texas are compared. The accident frequencies of the four major sister cities of the border region are also discussed.

Chapter 8 documents an analysis performed on the accident data gathered for selected sections of the Texas highways located along the border region. The development of a macroscopic prediction model of accidents is also discussed. Finally, Chapter 9 includes the summary, conclusions, and recommendations of this research effort.

CHAPTER 2. OVERVIEW OF THE BORDER REGION

The chapter contains an overview of the regional characteristics of the Texas/Mexico border relative to aspects of population, economic growth, and the maquiladora program. The intent of this chapter is to give a basic understanding of present conditions and to recognize the driving forces that affect regional public policies. These, as well as other issues, play significant roles in terms of highway safety.

POPULATION

In 1990, the population of Texas was roughly 17 million, while the Northern states of Mexico had an estimated population of 10 million. The age distribution in the Republic of Mexico and its Northern states (namely Tamaulipas, Nuevo Leon, Coahuila and Chihuahua) are comparable. Similar conclusions can be drawn about the population distribution in the United States and Texas.

The Mexican community has a high percentage of youth. Northern Mexico outranks Texas 23% to 16.4% in the 0-9 age group. Mexico again outranks Texas in the 10-19 age group (24.3% to 15.3%) and in the 20-29 age category (18% to 16.9%). Ages 20-29 is the leading risk group of traffic-related accidents and fatalities. Past an age of 29, Texas has a higher percentage of population.

Figure 2.1 illustrates the above comparisons between the United States vs. Mexico, and Texas vs. Northern Mexico. The young population of Mexico (age group 10-19) will be eligible for drivers licenses in the coming years; at which time, they will enter into the leading risk group of traffic-related accidents.

For the border region, the population of the four major cities of Texas and Mexico are also compared. They are: (1) Brownsville and Matamoros; (2) McAllen and Reynosa; (3) Laredo and Nuevo Laredo; and (4) El Paso and Ciudad Juarez. Taken from the United States Census Bureau and the Mexican —*Instituto Nacional de Estadística, Geografía e Informática*, figure 2.2 presents the comparison of population of these four sister cities for the years 1980 and 1990. The population of all the Mexican border cities prominently outnumbers those of their American counterparts.

ECONOMIC GROWTH

The economic growth of the region plays a major role in the development of the border communities. To compare the economies of the United States and Mexico, one must realize that there is a clear difference between these neighboring countries. For instance, the gross domestic product of the entire United States was over 5.8 trillion dollars in 1992, while Mexico grossed only 280 million dollars in the same year. However, the Mexican economic growth of 2.7% for 1992 was similar to the 3% growth rate of the United States (CIEMEX-WEFA, 1993).

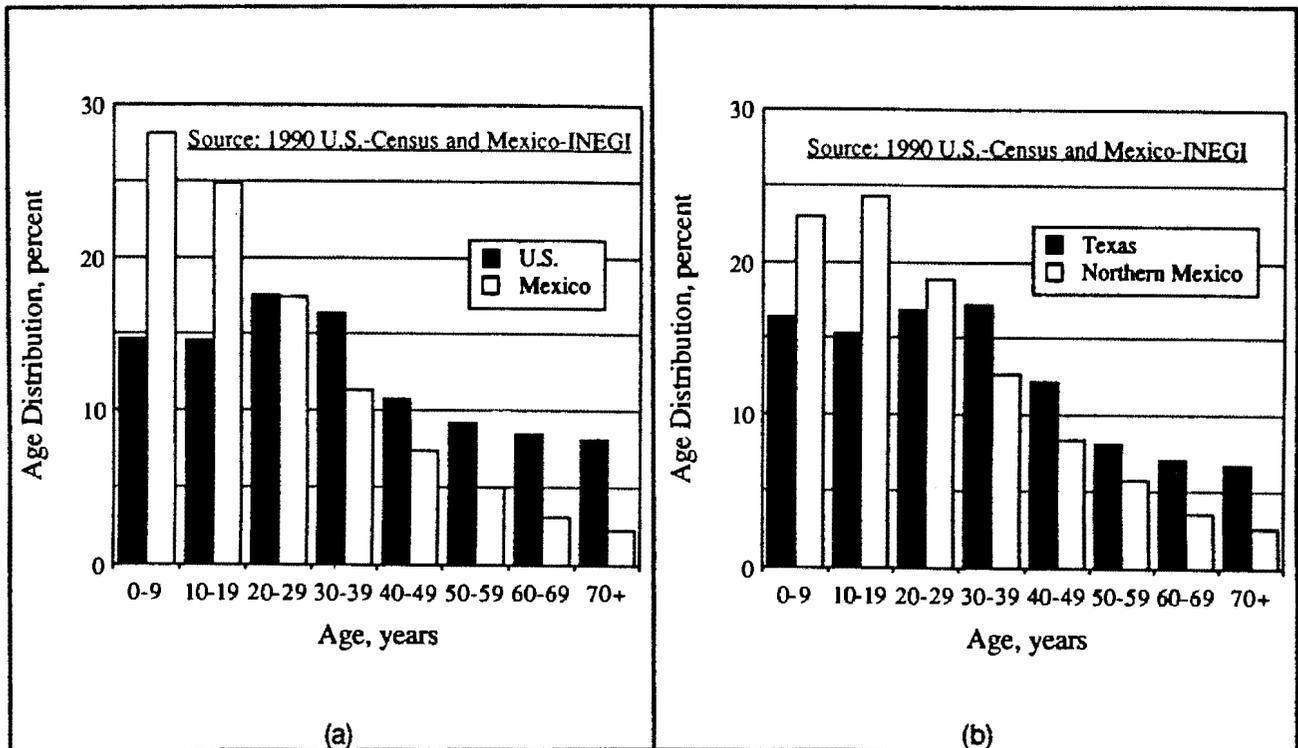


Figure 2.1. Comparison of the Age Distribution of (a) U.S. and Mexico, and (b) Texas and Northern Mexico.

Presently, most U.S. economic indicators are pointing towards a steady rate of expansion. Due to strong consumer spending in 1992 the economy's underlying growth rate was about 3%. Industrial production, which recently began to have an upward trend, is projected to grow by 3.5% in 1993, followed by 4.5% and 4.1% growth in '94 and '95.

The major downside of the United States economy is due to foreign economies. The Working Economic Forecasting Association (WEFA) has strong opinions about this issue.

According to WEFA (1993), *"If our major trading partners become mired in a longer or more severe recession than expected, exports of key manufactured goods will actually fall, and employment will, once again, turn down. The result could be renewed declines in industrial output, rather than the baseline's forecast of gradually improving production."*

With upward-pointing economic statistics, upside risks become more viable. With low interest rates and increasing public confidence, the United States may be able to pull out of an apparent economic recession. In addition to this, WEFA estimates that with an added government incentive, construction will be boosted and the industrial activities will recover.

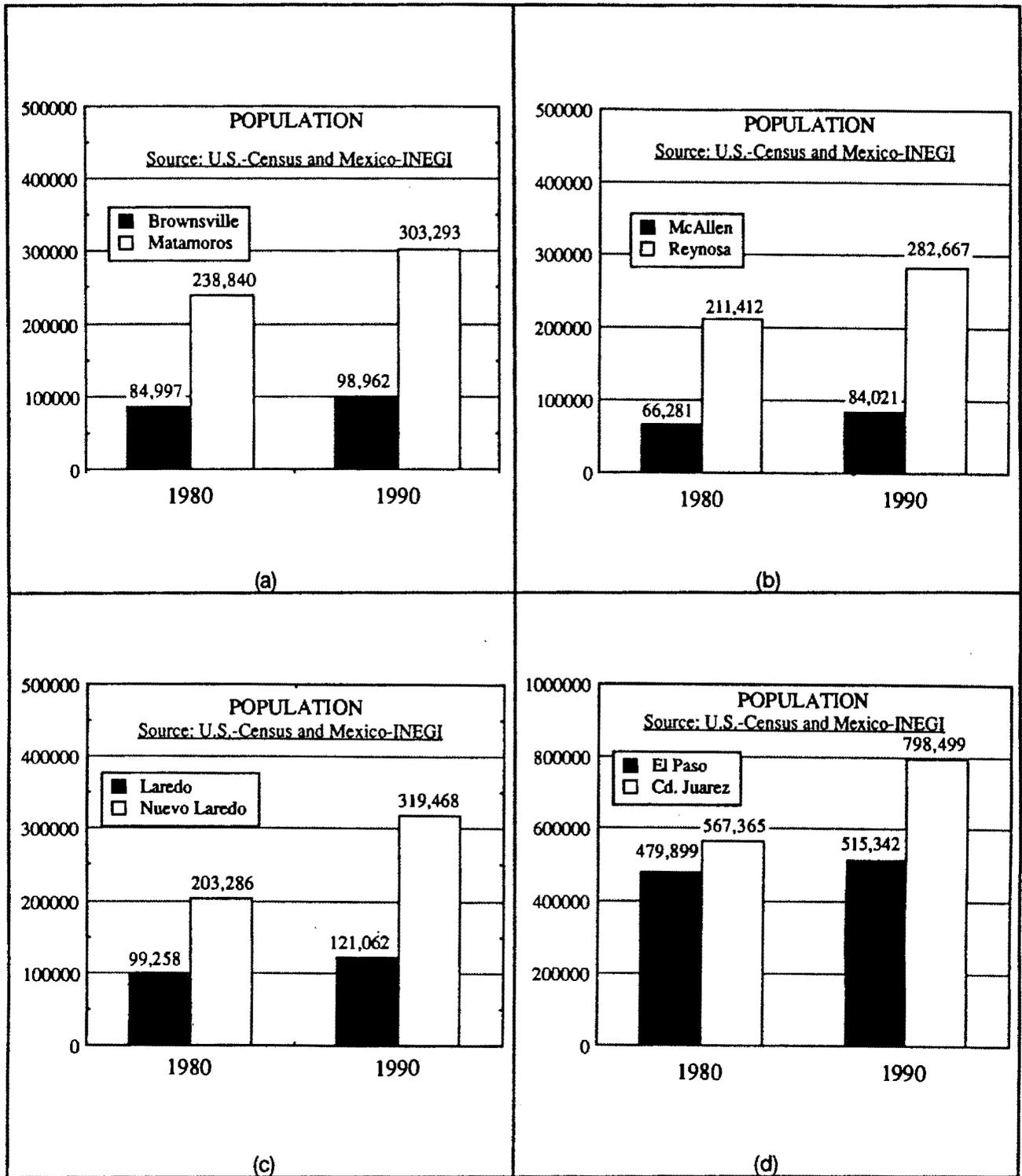


Figure 2.2. Population Comparison of the four major Texas/Mexico border cities for the years 1980 and 1990. Shown are: (a) Brownsville and Matamoros, (b) McAllen and Reynosa, (c) Laredo and Nuevo Laredo, and (d) El Paso and Ciudad Juarez.

For Mexico, 1992 marks the second consecutive year in which there has been a decline in growth; from 4.4% in 1990 to 3.6% in 1991 then to 2.7% in 1992. Although there has been a decline in the economy, Mexico has been able to *"keep its head above water"* by fostering its economic growth, which allows for an increase on a per capita basis, thus exceeding population growth.

In a manner of consistency, manufacturing activities reported a decline in 1992. The employment picture is even more dismal with a total employment decline of 3%. The WEFA analysis estimates that this is due to widespread adjustments in organizational and productive structures causing labor force cut backs, as Mexico prepares to face aggressive competition from the United States once NAFTA goes into effect. As a result, a wide gap has emerged between employment and economic growth. During the '88-'92 period, the Mexican economy grew at an annual rate of 3.6%, while employment increased only 0.6%.

Despite the dismal appearance of the above outlook, WEFA estimates that the Mexican economy will be able to overcome these issues and enter a period of sustained recovery and stable inflation. It was also suggested that if NAFTA is not approved, growing uncertainty of the viability of Mexican government policies will increase. This in turn would produce lower growth and higher inflation.

Nonetheless, WEFA projects that during the '93-'94 time period, Mexican imports will continue to override its exports. That is, exports will reach an 11.7% annual growth, and imports will increase at a rate of 13.5%. In addition to this, it was stated that a note-worthy shift will occur in the later '95-'97 period as the effects of NAFTA take hold.

MAQUILADORAS

Maquiladoras, also known as the border industrialization program, are assembly industries or manufacturing operations. The maquiladora program was initiated by the Mexican government, and its main purpose was to lure U.S. industry to the border in an effort to furnish employment for migrant workers. Initially, plants were primarily sewing shops, but eventually grew to handle operations as large as electronics assemblies (Burke et al, 1992).

Electronics, as well as other firms, found it more viable and less costly to operate in Mexico due to a decrease in transportation costs. It was no longer necessary to move products from Korea, Taiwan, and Singapore back to the United States.

In the long run both the U.S. and Mexico reaped the benefits from this arrangement. U.S. companies were able to produce products at a reduced cost; while Mexico was able to reduce their unemployment rate, and consequently, increase economic growth.

The maquiladora program faces many obstacles under the NAFTA proposal. Under NAFTA, by year seven, the maquiladora program will cease to exist as we know it today. Many feel that as a result, economic development will increase and improve, causing larger sales to both domestic markets. Currently, only 50% of maquiladora sales are allowed to the Mexican market. By 2001, maquiladoras will be able to sell up to 100% of the value of their production in Mexico. After this year, both countries will have an open sector in which there will be unrestricted trade. (CIEMEX-WEFA 1993)

According to WEFA statistics, main economic indicators during '92 show not only a recovery of industry but a dynamic growth. In 1991, the industry experienced 7.8% growth, and by August '92 had already experienced 16.7% growth. Currently the maquiladora program is experiencing growth in all areas of the industry. Figure 2.3 graphically illustrates the magnitude of the maquiladora program and pin-points trade zones along the Texas/Mexico border region.

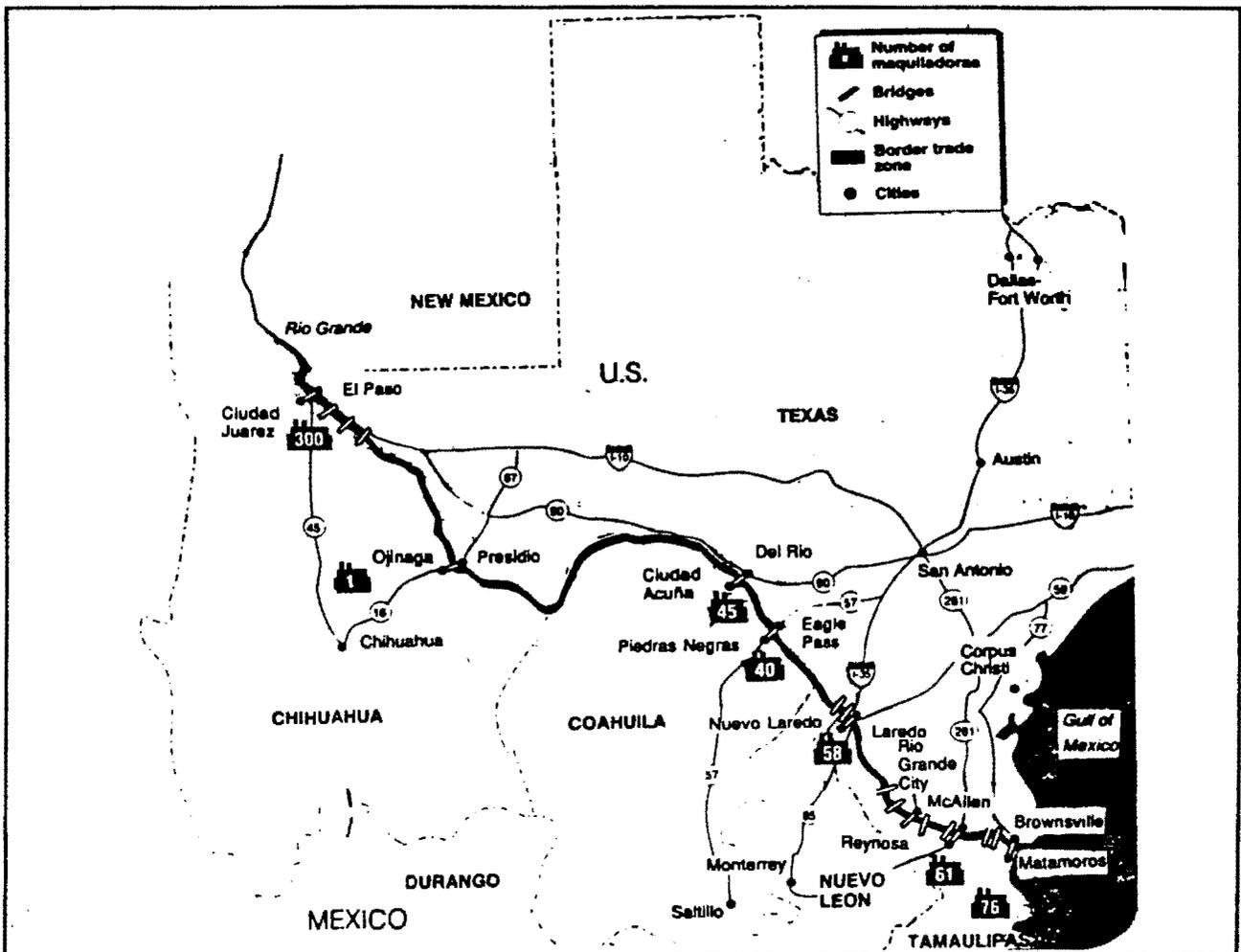


Figure 2.3. Illustration of the Maquiladora Program along the Border Region

As a whole, there has been an 8.4% increase from 1991 to 1992 in the number of plants, a 9.9% increase in people employed, and a 22.3% increase in gross production. Table 2.1 illustrates the main economic indicators of the maquiladora industry and Table 2.2 summarizes the performance of this industry along the border and the Mexican interior (CIEMEX-WEFA 1993).

Although there has been an across-the-board increase in industry, there are marked differences in performance levels among the border and interior programs. The border region had a 9.4% increase in number of plants between '91 and '92, and an 8.6% increase in employment. By comparison, during the same time, the Mexican interior had a 5.8% plant increase, and employment grew 13.4%. While the interior reported an 8.4% increase in the volume of imported raw materials, the border was still the more dynamic performer with a 26.3% overall growth rate. The ultimate impact of these statistics placed the border with the higher growth rate of 24% compared to the interior with 15.1%. Both figures are respectable, but one must consider the fact that the border's unexpected performance is largely due to a recovery from '91's production rate of 9.4%. (CIEMEX-WEFA 1993) Table 2.2 summarizes the performance of the maquiladora industry along the border and the Mexican interior.

SUMMARY

The Texas/Mexico border is experiencing population, economic, and trade growth. Compared to Texas, Mexico's population is younger and greater in number along the border. This aspect might have direct and indirect effects on highway safety simply because a younger population is the highest risk group for traffic accidents. Economic and trade growth may also bring about a population increase which would result in a higher traffic volume, and consequently more traffic accidents. Therefore, in-depth studies concerning the characteristics, behavior and integration of the border communities as related to traffic safety are warranted to insure a smooth and safe transition for both countries into the NAFTA endeavor.

TABLE 2.1. MAIN ECONOMIC INDICATORS OF THE MAQUILADORA INDUSTRY FOR THE YEARS 1989-1992. (Reproduced from CIEMEX-WEFA 1993)

	Jan-Aug 1991	Jan-Aug 1992	% Change	% Change		
				1991	1990	1989
Plants (number)	1895	2055	8.4	-0.7	17.1	18.6
Employment (number)	455,146	499,991	9.9	1.6	7.1	16.3
Mexican value added (billion dollars)	2.59	3.10	19.7	14.2	18.1	30.7
Imported raw materials (billion dollars)	7.46	9.19	23.2	11.7	11.0	20.9
Gross production (billion dollars)	10.05	12.29	22.3	12.3	12.7	23.2
Average wage, including benefits (dollars per hour)	2.00	2.25	12.5	14.9	10.9	17.9

TABLE 2.2 MAIN ECONOMIC INDICATORS OF THE MAQUILADORA INDUSTRY FOR THE BORDER AND MEXICAN INTERIOR (JAN—AUG 1992)

	BORDER Jan-Aug/92	% Change Previous Year	INTERIOR Jan-Aug/92	% Change Previous Year
Plants (number)	1508	9.4	548	5.8
Employment (number)	366,569	8.6	133,423	13.4
Mexican value added (billion dollars)	2.24	16.7	0.86	28.1
Imported raw materials (billion dollars)	7.78	26.3	1.41	8.4
Gross production (billion dollars)	10.02	24.0	2.27	15.1
Average wage, including benefits (dollars per hour)	2.38	13.3	1.87	10.0

Note: The border region encompasses only border cities and, therefore, excludes cities in the interior of border states.

CHAPTER 3. REVIEW OF HIGHWAY CHARACTERISTICS

This chapter briefly describes the highway characteristics of the Texas/Mexico border region. It includes a preliminary comparison of the geometric design manuals used by each country, followed by a series of comments in regards to the existing highway system. The objective is to make a preliminary assessment of the highways along the border region, which are expected to be affected by increased trade. In order to do so, the manuals of geometric design of highways and streets used in either country were first reviewed. The "*Green Book*" — *A Policy on Geometric Design of Highways and Streets, 1990*, published by the American Association of State Highway and Transportation Officials (AASHTO) was the U.S. manual used in this analysis. The Mexican manual reviewed was the "*Libro Negro*" — *Manual de Proyecto Geométrico de Carreteras, 1991*" published by the Secretaria de Comunicaciones y Transportes (SCT). The following is a preliminary comparison of certain aspects of geometric design procedures used by each of these countries.

PRELIMINARY COMPARISON OF DESIGN MANUALS

Both manuals emphasize the importance of a well-planned highway project. They state that when designing a highway or a road, the designer's first priority should be the safety of the users. In this regards, the *Green Book* and the *Libro Negro* recognize the importance of highway safety. They also recognize the importance of driver limitations, statistics, physical features (i.e., geology, topography) and characteristics of vehicles in the design process.

The *Green Book* strongly emphasizes the importance of the functional classification of the roads, their need for reinforcement and the hierarchies of movements; whereas, the *Libro Negro* puts greater emphasis on constructing roads for social and political benefits.

The *Green Book* also states that after the path of the roadway has been determined and its functional classification defined, the design hourly volume (DHV) should be the 30th highest volume for the projected year chosen. Conversely, the *Libro Negro*, although it indirectly refers to the *Green Book*, (i.e., use of 8-16% of AADT as DHV), allows for a much broader interpretation of the design values.

Specifications for the number and width of lanes, shoulders, medians, vertical alignment, overhead clearance, sight distances and design speed are very much alike in both manuals. In concept, the *Green Book* appears to be more strict than the *Libro Negro*.

Specific differences that rely on aspects such as turning radii, lateral clearances for underpasses, and horizontal alignment were also detected.

Turning radii

This is a very wide subject due to the existence of different types of vehicles. Generally, both manuals account for the same type of vehicles, but the *Green Book* is more specific, and accounts for longer and wider trucks. The largest vehicle listed for turning radii design in the *Libro Negro* is the large semitrailer, (DE-1525), which is the equivalent to the American WB-50. The *Green Book*, in contrast, accounts for larger trucks such as the interstate semitrailer (WB-67) which is 22.6m (74 ft) long, and even the largest of all, the turnpike double trailer (WB-114) 36.0m (118 ft) long.

The *Libro Negro* recognizes its limitation in this regards and states that "... *dado que una gran parte de ellos son de procedencia norteamericana, pueden utilizarse los datos obtenidos en este país, pero tomando en cuenta el tipo de vehículo predominante en las carreteras mexicanas. — (... given that most of these vehicles come from the U.S., data from that country can be used but taking into account the most predominant vehicle type on Mexican highways.)*"

Lateral Clearances for Underpasses

The *Green Book* specifies that "*The minimum lateral clearance from the edge of the traveled way to the face of the protective barrier should be the normal shoulder width,*" which, for the case of a U.S. highway, is 3.65 m. (12 ft); however, the *Libro Negro* states that "*La distancia entre la orilla de la calzada y la guarnición de la banqueta debe ser de 1.80 m. como mínimo para caminos de alta velocidad — (The minimum lateral clearance for high speed roads is 1.80 m. (6 ft)).*"

The difference between the U.S. and Mexican lateral designs is significant. According to U.S. studies, when an object is close to the side of the road, highway capacity is reduced and traffic-related accidents are more likely to occur. For this reason, the *Green Book* incorporates the use of a longer clearance.

Horizontal alignment

Horizontal alignment is one of the most important design aspects of roads and highways. Safety heavily depends on how well the vehicle speed and centrifugal force are controlled on curves. Several aspects influence the horizontal alignment criteria. These include elements such as curvature, radius of the curve, design speed, super elevation and side friction.

Although the same formulas are specified in both manuals, the design side friction factors recommended by the *Libro Negro* are, in general, higher than those of the *Green Book*. This implies that the *Green Book* is more conservative than the *Libro Negro*.

The side friction and superelevation factors are interrelated in design. In this respect, the *Libro Negro* recognizes the use of higher side friction values by stating that "... se emplea el procedimiento que distribuye uniformemente el coeficiente de fricción y la sobreelevación, de lo que resulta que las sobreelevaciones calculadas con este método son menores que las calculadas con el método AASHO, puesto que los coeficientes de fricción son mayores, pero siempre abajo de su valor máximo.— (the method which uniformly distributes the side friction and superelevation is applied; as a result, the superelevation estimates by this method are lower than those calculated by the AASHO method, since the side friction factors used are higher, though lower than the maximum)."

Table 3.1 includes the coefficient of friction values as functions of the design speed, as specified in the *Green Book* and *Libro Negro*. This shows evidence, in general, the U.S. manual provides a more conservative design of horizontal curves than its Mexican counterpart.

TABLE 3.1 COMPARISON OF COEFFICIENTS OF FRICTION USED IN DESIGN

DESIGN SPEED kph (mph)	SIDE FRICTION FACTOR (dimensionless)	
	<i>Green Book</i> (U.S.)	<i>Libro Negro</i> (Mexico)
30 (20)	0.17	0.28
50 (30)	0.16	0.19
80 (50)	0.14	0.14
110 (70)	0.10	0.125

VISUAL ASSESSMENT OF EXISTING ROADS ALONG THE BORDER REGION

In analyzing the design philosophies of the United States and Mexico highway system, some differences were detected. For this reason, it was decided to drive along the border region in order to make a visual assessment of the existing roads. This research effort was conducted on August 8 through August 15, 1993. The cities visited were El Paso, Cd. Juarez, Del Rio, Cd. Acuña, Eagle Pass, Piedras Negras, Laredo, Nuevo Laredo, Rio Grande, McAllen, Hidalgo, Edinburg, Reynosa, Brownsville and Matamoros.

The main areas of concentration included: (1) ports of entry, (2) roads approaching the cities, (3) truck routes in cities, (4) areas under construction, (4) pavement markings, and (5) signage.

Ports of Entry

Along the border region, the international ports of entry will be the zone most affected by an increase in trade. These ports will continue to play a significant role in the socio-economic development of the border region for the years to come, and especially with the approval of NAFTA.

The observations made by the research team reveal that both sides of the border are experiencing serious traffic congestion at the border crossings. Despite this congestion, there is a sense of safety due to slow movement of traffic; but this is a serious problem that must be addressed.

Other problems at the ports of entry include lack of emergency lanes and no lanes for transporting accident victims from one side of the border to the other. This problem is aggravated with the existing mixture of commercial & passenger traffic.

As an example, figure 3.1 illustrates a large amount of congestion at the international Bridge of the Americas that connects El Paso with Cd. Juarez. Figure 3.2 shows a large traffic queue occurring approximately one mile from the border crossing on IH-35 in Laredo, Texas.

Roads Approaching to Cities

Roads connecting cities along the Texas/Mexico border are considered to be comparable in many instances. The basic roadway system consists of two and four lane divided and undivided highways. It should be noted that, although Mexico has some four lane divided highways, they are limited in number.

The main area of difference comes from "*cosmetic*" and safety aspects — i.e., lack of shoulders, pavement markings and signage. Another difference, generally not found in Texas, is narrow roads due to the lack of shoulders. Generally, in the city limits, vehicles are parked along the road causing an even narrower roadway making transit dangerous. Figure 3.3 clearly illustrates this problem. A section of the Mexican Highway 2, that connects Matamoros to Reynosa, shows the lack of a shoulder.

Truck Routes in Cities

Lack of truck routes is a problem on both sides of the border. Currently, commercial trucks use routes which take them through residential areas that generally have narrow streets. These streets, which are unable to accommodate the driving maneuvers of large trucks, pose a potential hazard. In addition, these streets are exposed to a constant load which can lead to a rapid deterioration and to the decrease in the level of safety in these areas.

For the safety of the commercial driver, as well as the general public, commercial traffic should be diverted to less populated areas. To accomplish this, well-defined truck routes with easy access to the ports of entry are needed on both sides of the border. Several border cities need more attention with respect to their infrastructure development. Many need better roads, road maintenance and/or construction of loops. Such facilities will improve the level of safety, and consequently enhance international commerce. Figure 3.4. shows a truck-trailer entering a residential area near a church in Eagle Pass, Texas.



Figure 3.1. *Bridge of the Americas — International Border Crossing Connecting El Paso with Cd. Juarez.*

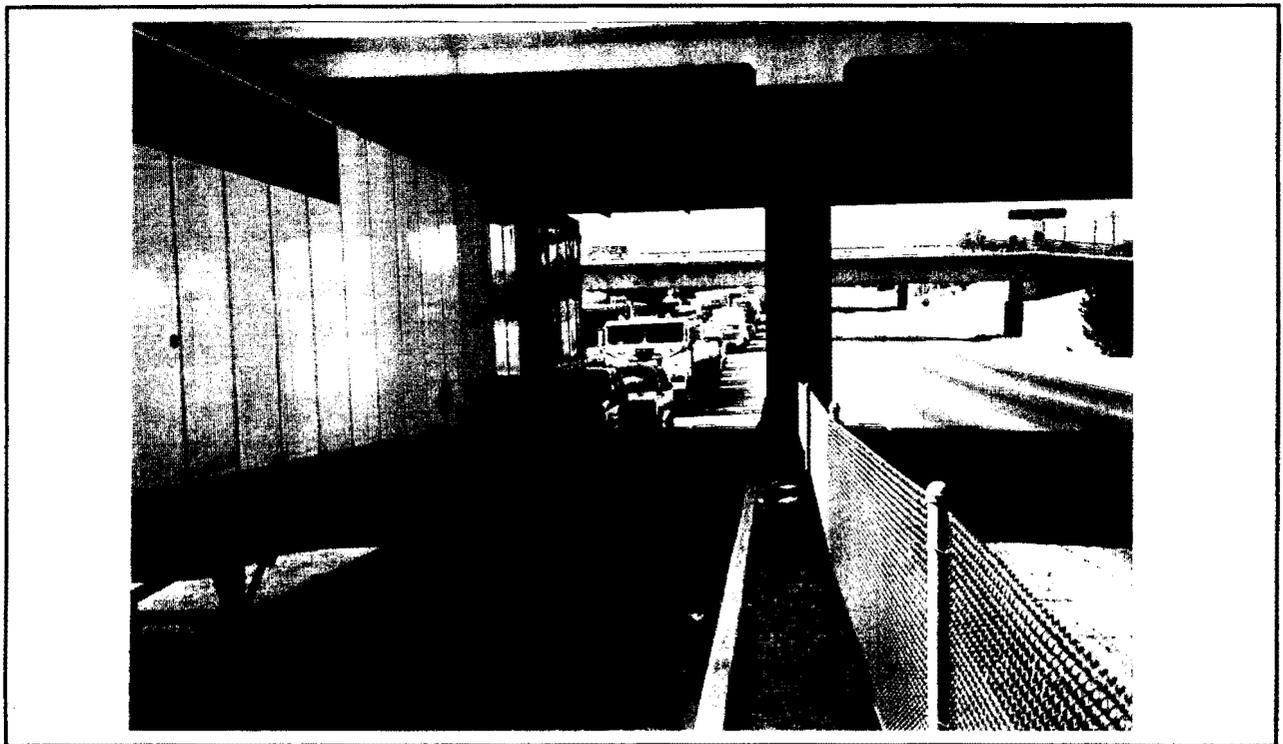


Figure 3.2. *IH-35 Leading to International Border Crossing In Laredo, Texas.*



Figure 3.3. Mexican Highway 2 Leading to Reynosa from Matamoros, Tamaulipas.



Figure 3.4. Truck-Traller Comblnation Turning Into a Residential Area In Eagle Pass, Texas.

Areas under Construction

Another aspect of concern is that of areas under construction. Based on observations made by the research team, Texas and Mexico have different procedures for providing traffic control devices in construction zones. For instance, Texas requires a strict methodology to control traffic in construction zones. Traffic control devices such as illuminated arrows, cones, barricades and warning signs are frequently seen. In Texas, the safety of those driving, as well as those working on the construction site are considered. Although Mexico has similar standards, it seems that the construction companies find it difficult to comply with such standards. The lack of signage and traffic control devices were evident in several locations, as seen in in figure 3.5.

Pavement Markings

Most countries have their own pavement marking standards. In the United States, a yellow line indicates two way traffic and a white line indicates one way traffic. On the Mexican side, certain levels of inconsistency were observed. Centerlines dividing roadways were often missing or were poorly maintained. In other instances, it was observed that some states (Tamaulipas) used a yellow centerline, while others (Coahuila) used a white one.

Figure 3.6 displays a structurally sound Mexican highway with no pavement markings. The picture shows a section of Highway 2 that connects Reynosa with Matamoros, Tamaulipas.

Traffic Signage

Proper use of signage and bilingualism of its message are aspects that must be brought to attention. This is particularly important along the Texas/Mexico border region.

The research team found some inconsistencies in the use of traffic signs. For instance, double signage was observed at several intersections in many of the Mexican cities visited along the border region. Figure 3.7 illustrates an intersection in Cd. Acuña, Coahuila with double signage; a traffic signal and a stop sign. At first, the research team was confused, but later came to find that this strategy was implemented in case of power failure.

The next aspect is bilingual signage, which was witnessed on both sides of the border at most of the international crossings. Local Mexican governments have put forth an effort to increase the amount of bilingual signage. However, due to the high interaction between the neighboring communities, the need to increase the amount of bilingual signage on both sides of the border is evident.

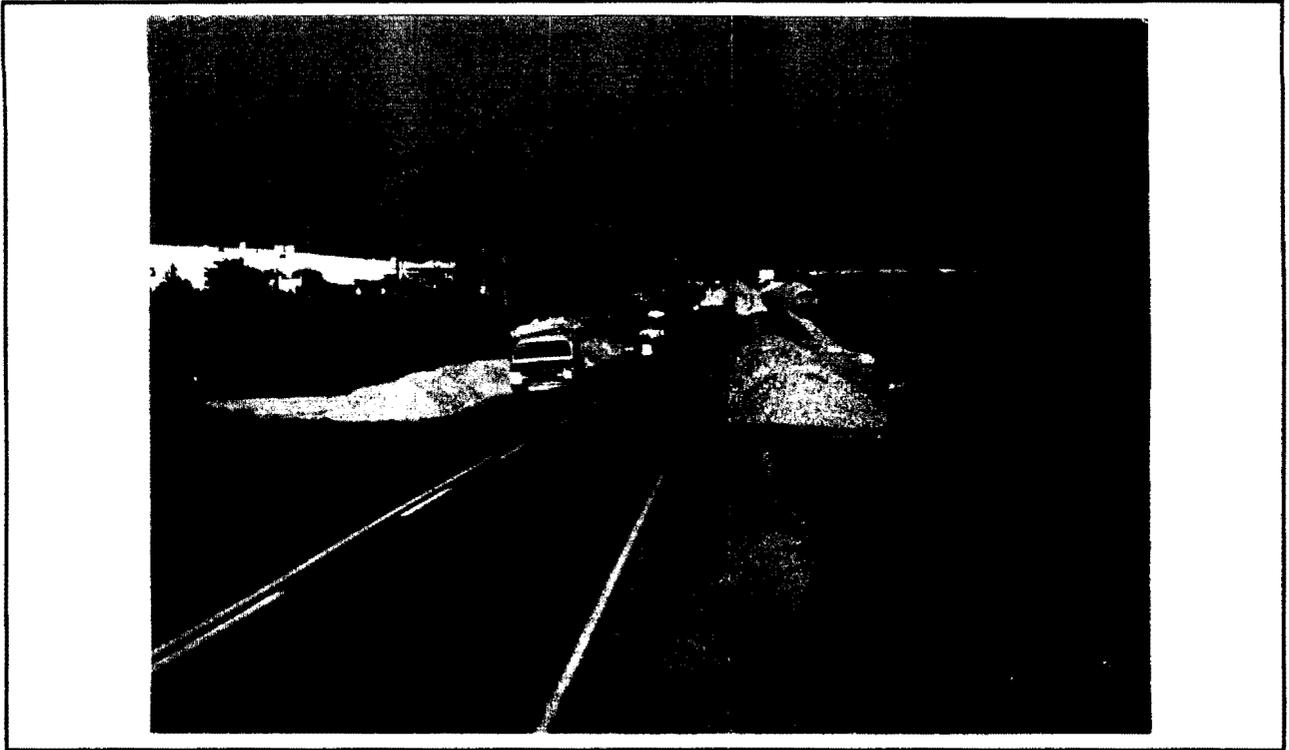


Figure 3.5. Widening of Adolfo Lopez Mateos Blvd. In Cd. Acuña, Coahuila.



Figure 3.6. Section of Mexican Highway 2 Between Reynosa and Matamoros, Tamaulipas.



Figure 3.7. Intersection In Cd. Acuña, Coahuila with Double Signage.

SUMMARY

The manuals of geometric design of highways and streets used in the United States and Mexico were reviewed. They are: the "*Green Book*" — *A Policy on Geometric Design of Highways and Streets, 1990*, published by the AASHTO, and the Mexican "*Libro Negro*" — *Manual de Proyecto Geométrico de Carreteras, 1991*" published by the SCT. In reviewing the "*Green Book*" and the "*Libro Negro*," it is evident that there are some similarities, but also differences in their philosophies. The main difference observed is that the *Green Book* strongly emphasizes the hierarchies of traffic movements and the functional classification of roads; whereas, the *Libro Negro* puts more emphasis on economical aspects and the need for social development.

Some of the characteristics of the existing roadway along both sides of the border were discussed. In particular, ports of entry, roads approaching the cities, truck routes in cities, areas under construction, pavement markings, and signage were discussed. It is believed that aspects such as these will be highly affected by an increase in traffic; thus, decreasing the level of traffic safety in the region.

CHAPTER 4. COMPARISON OF MOTOR VEHICLE LAWS

INTRODUCTION

The area of motor vehicle regulations is an important component of highway safety. All drivers possess some knowledge of their region's laws, but when they cross the border, it is expected that they know the laws in the foreign country. This section documents a preliminary comparison of Texas and Mexican vehicle laws. Specifically, this comparison deals with: (1) insurance requirements; (2) weight and measurement limitations; (3) speed limits; (4) vehicle registration requirements; (5) drivers license requirements; and, (6) use of safety requirements.

INSURANCE REQUIREMENTS

As required by the Safety Responsibility Act, all drivers in the state of Texas, including non-residents, must have at least the minimum amount of liability insurance of \$20,000 against injury or death of one person, \$40,000 against injury or death of two persons, and \$15,000 against property damage. Texas drivers must present this proof when renewing their licenses, registering vehicles, or obtaining the yearly inspection stickers. Due to high insurance premiums, payments can be, and frequently are made on a monthly basis.

Failure to have proper insurance normally results in fines. Should a non-resident driver violate the Safety Responsibility Act, the court will not allow the non-resident driver to obtain a Texas drivers license until this matter is resolved. The court will also notify the non-resident's licensing office of the offense. This notification has been the practice between U.S. states; however, this may not be deterrent to non-U.S. residents. In Mexico, the insurance requirements do not appear to be as strict. Chihuahua's state law requires that proof of insurance be presented only when a minor applies for a driver's license, suggesting that adult drivers need not have insurance.

Incidents of both Texas and Mexican drivers being uninsured are quite common along the border. (see Chapter 7 for details). Fraudulent companies and false proof of insurance cards are also known to exist.

Additional measures or stricter enforcement should be applied to insure that all drivers, Texas residents and non-residents alike, hold proof of financial responsibility at all times when operating in Texas. However, there is a weakness in this setup: *"Many drivers can obtain the required drivers license, registration and yearly inspection sticker, and then neglect further insurance payments until such time as a new license, registration or inspection sticker is needed."*

WEIGHT AND MEASUREMENT LIMITATIONS

The excessive weight of trucks damages the pavement. At times, commercial trucks are known to be overloaded. This poses a hazard to highway safety, especially with the increased traffic between the United States and Mexico.

The "1992-Texas Traffic Laws" published by Texas Department of Public Safety (DPS) provide a summary of vehicle weight and dimension limitations (including freight). Mexico has similar laws limiting weights and dimensions (*Leyes y Reglamentos Aplicables al Autotransporte por Carreteras de Jurisdicción Federal, 1985*). A comparison of the dimension limitations is presented in Table 4.1.

TABLE 4.1. COMPARISON OF DIMENSION LIMITATIONS

	TEXAS	MEXICO
Max Total Width	2.6 m (8.5 ft)	2.7 m (8.9 ft)
Max Total Length for Single Vehicle	13.7 m (45.0 ft)	N/A
Max Total Length except truck-trailer	19.8 m (65.0 ft)	18.0 m (59.0 ft)
Total Height	4.3 m (14 ft)	4.2 m (13.7 ft)
Max Trailer Length	18.0 m (59 ft)	14.6 m (48.0 ft)
Max Double Trailer Length	17.4 m (57.0 ft) + portion of converter	not permitted
Max Width with Freight Over Sides	2.6 m (8.5 ft)	3.1 m (10.2 ft)
Max Rear Overhang of Freight	1.2 m (4 ft)	1.0 m (3.3 ft)

In Texas, the maximum allowable total weight is 36 metric Tons (80,000 lb.). This weight limitation is based upon the vehicle type, number of axles and tractor-trailer combinations. The Texas Traffic Law explains in-detail these limitations. Figure 4.1 shows the diagram for a typical truck-tractor semitrailer combination.

Taken from Giermanski et. al. (1990), the Mexican weight limitations are included in Table 4.2. Giermanski stated: *"The maximum freight weight limits are determined on a per-axle basis according to the type of trailer. With special permission, the maximum allowable weight for freight is 44,900 kgf (99,000 lbs). Any cargo weighing over this amount would require special permission."*

In comparison, the weight limit for a trailer with two axles, four tires each, in Texas is 15 metric Tons (34,000 lb), but in Mexico it could be as high as 18 metric Tons (39,600 lb) for higher quality roads. This significant difference clearly poses an international problem, especially at the border when heavy Mexican vehicles enter Texas.

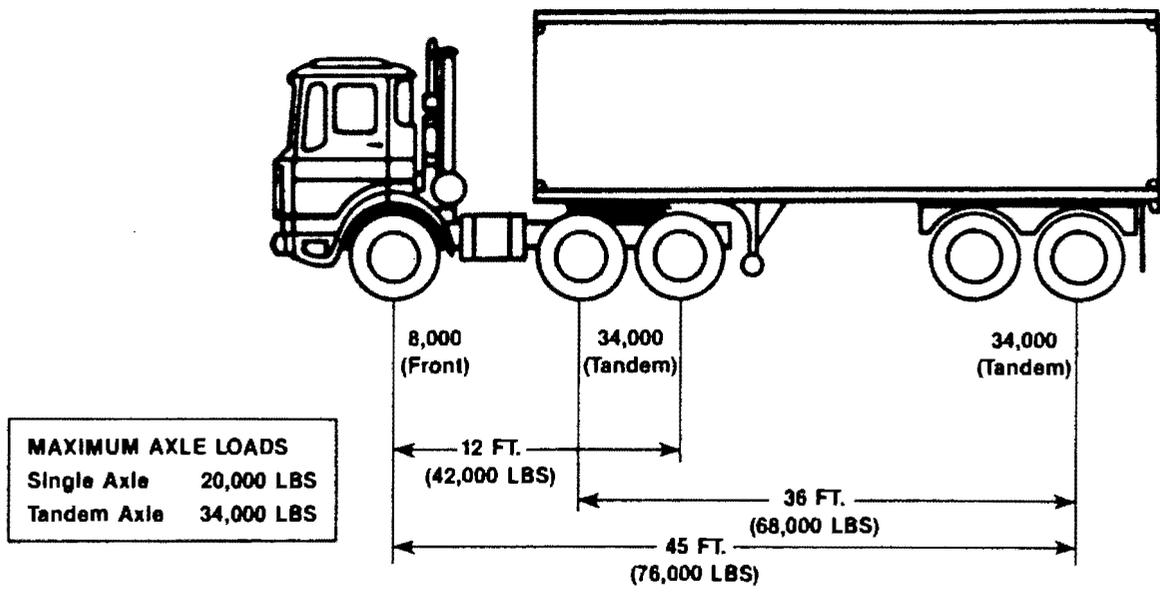


Figure 4.1. Weight Limits for a Truck-Tractor Semitrailer Combination

TABLE 4.2. WEIGHT LIMITS ON MEXICAN HIGHWAYS (Giermanski et. al., 1990)

Axles	Number of Tires	TYPE A (over 3,000 ADT)	TYPE B (1,500-3,000 ADT)	TYPE C (500-1,500 ADT)
1	2	5,500 kgf	5,000 kgf	N/A
1	4	10,000 kgf	9,000 kgf	7,500 kgf
2 (tandem)	2 tires per axle	4,500 kgf per axle	4,000 kgf per axle	3,500 kgf per axle
2 (tandem)	4 tires per axle	9,000 kgf per axle	7,500 kgf per axle	7,000 kgf per axle
3 (tandem)	4 tires per axle	7,500 kgf per axle	not permitted	not permitted

Presently, many commercial vehicles registered in Texas are being detected as overloaded. The Texas Department of Transportation (DOT) is installing additional weigh stations at the border. Likewise, the Mexican government, and some private companies that operate toll roads in Mexico are manning weigh stations.

SPEED LIMITS

The Texas Traffic Laws clearly define the speed limits for the different classifications of roads. However, cities, counties or local jurisdictions may alter them. The Mexican Federal law also imposes speed limits on their highways, and here again, the states and municipalities may alter them. Table 4.3 compares the speed limits in Texas and Mexico, in general terms.

TABLE 4.3. COMPARISON OF SPEED LIMITS

ROAD CLASS	TEXAS		MEXICO	
	DAY	NIGHT	DAY	NIGHT
URBAN (All vehicles)	48kph (30mph)	48kph (30mph)	50kph (31mph)	50kph (31mph)
Light vehicle in U.S. highway, or equivalent	89kph (55mph)	89kph (55mph)	100kph (62mph)	90kph (56mph)
Heavy vehicle in U.S. highway, or equivalent	89kph (55mph)	89kph (55mph)	70kph (44mph)	70kph (44mph)
Light vehicle in Interstate, or equivalent	105kph (65mph)	105kph (65mph)	100kph (62mph)	90kph (56mph)
Heavy vehicle in Interstate, or equivalent	97kph (60mph)	89kph (55mph)	70kph (44mph)	70kph (44mph)

Though these limits for highways appear very similar, in reality the situation on some urban roads is quite different. For instance, the speed limits seemed unreasonably low on some city roads in Mexico. It is common to see a speed limit of 50 kph (31 mph) in an arterial-type road where the equivalent road in a Texas city might be 72 kph (45 mph). This should be addressed because such a practice is contrary to traffic engineering fundamentals, as it fails the principle of drivers' expectancy.

VEHICLE REGISTRATIONS

Texas residents must have their vehicles registered with the state and inspected annually. Also, vehicles must comply with federal regulations regarding occupant safety, emissions, etc. In Chihuahua, motorized vehicles must also have several safety requirements. Applicants must provide a vehicle title, federal registration card, and pay all fees. Table 4.4 includes a comparison of motor vehicle features required in both Texas and the state of Chihuahua.

Commercial vehicles registered in both Texas and Chihuahua must also have flares, fusees, or reflectors, hazard warning signal lights, and a fire extinguisher. Additionally, Texas requires special brakes and mudflaps whenever the rear axle has four or more tires; Chihuahua requires a first aid kit. As shown, there are similarities and differences in these regulations. The differences must be addressed, especially with the increased trade between Texas and Mexico.

LICENSE REQUIREMENTS

The Texas DPS states that *"All drivers who reside in Texas must have a Texas drivers license; and new residents who are properly licensed have 30 days after entry into the state to secure a Texas driver's license."*

TABLE 4.4 COMPARISON OF SOME REQUIRED MOTOR VEHICLE FEATURES

	<i>Are the Regulations of Texas and Chihuahua similar?</i>
1. Brakes	Yes. But in Texas, certain specifications must be met.
2. Lights	Yes. Both laws require headlamps, tail lamps, turn signals; additionally on trucks, side lamps and side reflectors, hazard lamps, clearance lamps, and three identification lights. Both restrict red or flashing lights on the front of the vehicle.
3. Horn	Yes.
4. Muffler	Yes. Both restricting any cutouts, and meeting the established requirements.
5. Safety Glass	Yes.
6. License Plates	Yes. Both require front and rear plates; but in addition, Chihuahua requires accompanying window stickers.
7. Mirrors	Texas requires only one rearview mirror; while Chihuahua requires at least two.
8. Windshield Wiper	Yes.
9. Safety Belts	Texas only requires front seat belts; while Chihuahua does not have this requirement for vehicle registration.
10. Tires	Texas requires certain tread depth; while Chihuahua does not specify anything about it.
11. Window Tint	Texas allows its use; while, Chihuahua prohibit its use.

Texas offers several classes of license based on vehicle type and weight. Classified licenses are for all drivers except for those who drive commercial motor carriers or haul hazardous materials. This requires a commercial drivers license (CDL). Several endorsements are also available for the CDL's depending on the type of cargo and vehicle used (i.e., hazardous materials, double/triple trailer, tankers, combinations, etc.). Figure 4.6, which is taken from the Texas DPS (1992) *"Texas Drivers Handbook,"* illustrates the distinctions between license classes in Texas.

The requirements to obtain a Texas driver's license (Class C) are: (1) full name, (2) birth certificate, (3) physical description, (4) thumb-prints, (5) home address, (6) brief medical and mental history, (7) driving record, (8) payment of fee, (9) proof of financial responsibility, (10) pass required tests on rules, vision, and driving skills, and (11) a minimum age of 18 or 16 with a driving education. The license is valid for four years.

All drivers in Texas who operate a commercial motor vehicle must have a CDL, and this has additional requirements. For a Texas inter- or intrastate CDL, the driver must reside in Texas and meet Federal requirements. These are: (1) age 21 for interstate and 18 for intrastate, (2) read and speak English, (3) no medical, mental, nervous, or psychiatric problems or disorders, and (4) not be addicted to drugs or alcohol.

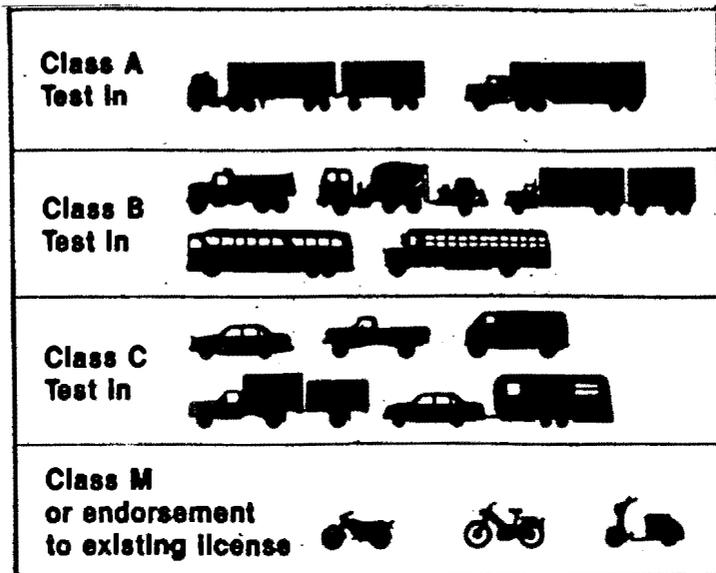


Figure 4.6. Distinction between Classes of Texas Driver's Licenses.

In Chihuahua, licenses are also divided into classifications: (1) Class I - motorcycle, (2) Class II - regular driver - any type of car, light truck but not for public service, and (3) Class III - commercial driver - public transport of people or cargo.

Anyone who wishes to operate a motor vehicle on Chihuahua public roads must have a driver's license. Application for an automobile license (Class II) requires (1) birth certificate, (2) photo ID, (3) medical exam certificate (physical and mental abilities), (4) certificate of driving skills, if applicable, (5) payment of fees, (6) proof of address, (7) proof of literacy, and (8) pass required tests. Applicants between the minimum age of 15 and 18 must also show proof of financial responsibility. This Class II license allows a driver to operate any type of automobile, vans or light trucks for private use and is valid for six years.

There is also a Mexican federal commercial drivers license. According to Giermanski's study, the requirements for such a license are: (1) Mexican citizenship, (2) 18 years of age, (3) satisfy the SCT (Secretary of Communications and Transportation) with experience and ability to drive a commercial vehicle, (4) pass basic skills, medical, driving, and auto mechanics exams, as required by the SCT, (5) know and be able to interpret the traffic and highway safety laws, (6) must not have criminal record, nor be an alcoholic or drug addict, (7) payment of fee, and (8) any other prerequisite the SCT might require.

As shown, the requirements for both regular and commercial drivers license are similar. However, the main difference found is that in Texas, one must show proof of insurance when obtaining the license; but in Chihuahua, only teenage drivers (15-18) are required to be insured.

Currently, driving in either country with a Texas or Mexican drivers license is not a problem. Operators who wish to drive in Texas with a drivers license other than from Texas are allowed the same privileges that their home state or country allows Texas drivers. Such a reciprocal agreement is already in effect with Mexico.

USE OF SAFETY REQUIREMENTS

In Texas, the use of safety belts is obligatory for only the front seat (driver and passenger). On such issues, Mexican states (Chihuahua) seem to leave many decisions to the municipalities. For example, in Cd. Juárez the use of the safety belts is obligatory for all passengers.

Another safety feature to consider is the use of child safety seats. In Texas, residents must restrain all children under the age of two in an appropriate seat, and all children between two and four years of age by either a child seat or seat belt. However, this does not apply to non-resident drivers. This is an issue of concern, as recent findings have shown that child restraint systems are very important to highway safety.

DISCUSSION

Since each side of the border has different insurance requirements, this situation poses a problem. Presently, the border communities have many uninsured motorists that are involved in accidents (see Chapter 7 for details). Thus, it appears that uniform insurance requirements need to be developed.

With respect to vehicle registration, it came to our attention Texas trooper Bob Newman's concern about motor vehicles that do not pass Texas vehicle requirements, which might be purchased at low cost and imported to Mexico. Once there, the vehicles can be registered under more lenient enforcement, and then, be back in Texas with Mexican registration (due to the reciprocal agreements). This probable situation could cause a disregard for Texas laws, and could pose a safety hazard on Texas highways. However, it seems that most Mexican trucking companies are trying hard to keep their equipment up to par. The Mexican government is even encouraging them to buy new equipment instead of used equipment. According to Leopoldo Garza of UCA (Unión de Crédito para Autotransporte), in Nuevo Laredo, the Mexican government is providing low interest rates for equipment loans, so that companies are better off buying new trucks than financing used ones. It appears that the Mexican government is taking positive steps by offering some incentives to discourage purchase of used vehicles.

Newman also expressed concerns for license requirements: *"suppose a driver fails the CDL test in Texas, what would stop him from going to Mexico and obtaining one there, either legally or by other means?"* Here again, if adequate law enforcement practices exist, this would not be a problem.

It also seems that uniform weight limits and the use of safety features (i.e., safety belts, child seats) need to be developed, and enforced. Law enforcement is the area that needs significant attention. Establishing uniform procedures for prosecution and consequences for traffic offenders would probably simplify traffic and vehicle law enforcement in the Texas/Mexico border region. An arrangement similar to the one shared by the American states would be desirable, but could be complicated by obvious cultural differences. In any case, law enforcement is perhaps one of the most important areas in which these two diverse communities need to work together to resolve their differences.

SUMMARY

Motor vehicle laws of Texas and the Mexican state of Chihuahua were compared. Aspects such as insurance, weight and measurement limitations, speed limits, vehicle registrations, license requirements, and use of safety features were addressed.

The major difference found in the insurance requirements was that all drivers must have proof of financial responsibility in Texas, whereas in Chihuahua, only minors (15-18) are required to have such proof. This suggests that adult drivers need not have insurance. In regards to weight limitations, it was found that Mexican limits are somewhat higher than those in Texas. As a result, it is possible that Mexican vehicles that meet Mexican requirements might not comply with Texas laws. On a different note, speed limits seem somewhat lower in Mexico. Lastly, vehicle registration and driver license requirements seem comparable.

On both sides of the border, uniform, strict and cooperative law enforcement appears to be essential. The development of an integrated enforcement program that can systematically address issues such as insurance, weight limitation and vehicle registration at the border could solve many of these differences, and thus providing a higher level of highway safety.

CHAPTER 5. ASSESSMENT OF THE NAFTA PROPOSAL

This chapter describes an assessment of the proposed North American Free Trade Agreement (NAFTA) as it relates to highway safety. It documents the background of the NAFTA proposal followed by the assessment and discussion of issues pertaining to highway safety.

BACKGROUND

Reciprocity appears to be the major obstacle in normalizing the transborder transportation system (IM³ 1988). The *Ruiz Cortinas Decree* (1955) established the legal precedent for U.S. motor carrier access into the Mexican border. The law of General Means of Communications established the right of foreign private motor carriers holding legal titles to transport goods to the Mexican border communities. These laws are not uniformly applied among the Mexican border communities, thereby restricting access to U.S. motor carriers. Access is given to U.S. private carriers more readily than U.S. for-hire motor carriers. Also, access is given to U.S. for-hire carriers from Texas border communities more readily than their counterparts located in Arizona and California. Nevertheless, U.S. motor carriers are denied access beyond the Mexican frontier zone. In contrast, Mexican motor carriers are not denied access to any of the U.S. border communities but are restricted to the community's commercial zone (IM³ 1988).

In 1986, the Honorable Ron Coleman in his address to the House of Representatives, Congress of the United States said:

"... Motor Carrier Safety Act of 1984 is another excellent example of a well-intentioned action that ultimately hurts the border economy without resolving the problem it was supposed to address. In an attempt to open the Mexican transportation market to U.S. trucking, the law has, in effect punished U.S. businesses along the border. There is a great deal of confusion over who is required to obtain certificates of registration, unclear safety requirements, and overburdened insurance requirements that do not reflect current economic conditions along the U.S./Mexico border..."

Many issues that describe the operational characteristics of the U.S. and Mexican motor carriers are still unclear. The most important include incorporations, U.S. inspections for insurance, registration, and safety requirements. In general, few U.S. motor carriers incorporate in Mexico as transportation companies because by law, transportation is an industry reserved for Mexican nationals. In the rare case in which a corporation has occurred, the principal family members or partners must have Mexican citizenship. Likewise, few Mexican motor carriers have incorporated in the U.S. in order to gain access to the U.S. interior. A major problem with the Mexican motor carriers is the lack of proper maintenance; the problem persists because of apparent failure in providing adequate safety inspection through the U.S. (IM³ 1988).

The bilateral understanding as applied between the border states of Chihuahua, Coahuila, and Tamaulipas, Mexico and Texas, United States is included in Table 5.1. The resolutions of the U.S./Mexican Border Transportation Conference, in which delegates from border communities of California, Arizona, New Mexico and Texas resolved to regulate access by Mexican motor carriers to the U.S., are included in Table 5.2. Taken from the Texas Centers for Economic and Enterprise Development, the specific Texas regulations of Mexican Motor Carriers are presented in Table 5.3. In general, these actions have been taken primarily to preserve border-crossing commerce and to provide for the safety and welfare of U.S. citizens and businesses.

ASSESSMENT OF THE NAFTA PROPOSAL

Once the North American Free Trade Agreement is implemented, businesses will find fresh opportunities as well as new challenges to international commerce. However, existing and potential problems must be identified and addressed in order to realize the smooth and successful implementation of NAFTA. Uniformity and harmonization of U.S. and Mexican laws, and subsequent enforcement, must be made in the following areas relating to traffic safety:

- (1) Vehicle and Equipment and Safety Standardization
- (2) Weight and Dimension Limitations
- (3) Highway Systems and Signage
- (4) Hazardous Materials and Transportation of
- (5) Licensing Requirements, Testing and Medical Standards for Truck drivers
- (6) Insurance

In addition, other factors, such as cultural backgrounds, ever increasing insurance rates, lack of enforcement, as well as fraudulent activities must be taken into account and addressed.

The removal of trade barriers is directly contingent upon the establishment of compatible transportation, technical and safety standards. *"The NAFTA proposal provides a timetable for the removal of barriers to the provision of land transportation services between NAFTA countries and for the establishment of compatible land transport, technical and safety standards"* (NAFTA Summary, August 12, 1992). Accordingly, two aspects of commercial vehicle transportation and safety standards and regulations must be addressed.

Upon review of U.S. regulation of Mexican motor carriers, it appears that a discrepancy exists between federal and border state statutes. Under federal statutes, motor carriers are defined as "for-hire or private".

TABLE 5.1. SUMMARY OF BILATERAL UNDERSTANDING AS APPLIED TO THE BORDER STATES OF MEXICO AND TEXAS

State Department of
and Public Transportation
Motor Vehicle Division
Austin, Texas 78779

Mexico

SUMMARY OF BILATERAL UNDERSTANDING AS APPLIED BETWEEN THE BORDER STATES OF CHIHUAHUA, COAHUILA, AND TAMAULIPAS, MEXICO AND TEXAS

I. PASSENGER CARS, PICKUP TRUCKS (NOT EXCEEDING 2,000 LBS. MANUFACTURER'S RATED CARRYING CAPACITY) AND TRAILERS AND SEMITRAILERS (NOT EXCEEDING 4,000 LBS. GROSS WEIGHT)

Operation under license plates issued by the proper State or Federal Authorities of Mexico allowed for the length of time the plates are valid.

II. COMMERCIAL VEHICLES: Trucks, Truck Tractors, Trailers, Semitrailers, and Taxis.

A. All Commercial vehicles (with the exception of pickup trucks, trailers and semitrailers as described in Article I above) are permitted only to operate into but not beyond the city limits of the cities as paired below:

- | | |
|----------------------------------|---|
| 1. Ciudad Juarez and El Paso | 7. ****Nuevo Laredo and Laredo |
| 2. Zaragoza and Yaleta | 8. Nuevo Guerrero and Falcon Heights |
| 3. *Caseta and Fabens | 9. *Ciudad Mier and Roma-Los Saenz |
| 4. Ojinaga and Presidio | 10. Ciudad Camargo and Rio Grande City |
| 5.***Ciudad Acuña and Del Rio | 11. **Reynosa and Hidalgo (See Par. B.) |
| 6. Piedras Negras and Eagle Pass | 12. Rio Bravo and Progreso |
| | 13. ****Matamoros and Brownsville |

- * Only most direct route of travel permitted between crossing and adjacent town.
 - ** Since the principal cities are not adjacent to the border, taxis may travel into Texas for a distance not to exceed 15 miles from point of crossing.
 - *** Mexico licensed taxis may operate beyond Del Rio city limits West on U.S. 90 to Spur 349 to Amistad Dam and East on U.S. 90 to Laughlin Air Force Base. Mexico licensed commercial vehicles may operate beyond the Del Rio city limits West on U.S. 90 to Spur 349 to Amistad Dam into Del Rio, a total distance of approximately ten (10) miles.
 - **** Commercial vehicles registered in Mexico crossing at Matamoros are authorized to move over the approximately 2 miles of State Highway 48 between the city limits of Brownsville and the property of the Brownsville Navigation District, Cameron County.
 - ***** Operation allowed within extra-territorial Jurisdiction of the City of Laredo (3 1/2 miles beyond City limits).
- B. Commercial vehicles registered in Mexico crossing at Reynosa are authorized to move northward from the City of Hidalgo along Texas Spur 115 to its intersection with Farm Road 1016 and from that point westward along Farm Road 1016 to a total distance of approximately 3.0 miles from the city limits of Hidalgo, and return by reverse route.
- C. City Bus Operation — No reciprocity; must be licensed in Texas.
- D. Motor Bus Operation — May operate to and from Texas terminals of cities listed in paragraph A above provided such buses are operating a through service into and from the interior of Mexico.
- E. Chartered Buses — May obtain \$5.00 one trip registration permit to operate into or through the State of Texas.
- F. Pickup trucks (refer Article I above) are not permitted to pick up and deliver (operate intrastate) within this State, nor shall such vehicles be permitted to pull trailers or semitrailers when the gross weight of such trailers and semitrailers exceed 4,000 lbs.

III. MISCELLANEOUS

Applicable to all classifications of vehicles.

- A. Any vehicle based, housed, or garaged and operated in this State must be registered in Texas.
- B. All operations must conform to Texas Laws and Regulations.
- C. A current license plate must be displayed on the rear of each vehicle operating in Texas except that license plates issued to Truck Tractors may be displayed on the front of the vehicle, and the distinguishing number thereon must be legible. The license receipt issued thereof must be in the operator's possession.
- D. All operations in violation of the provisions above will subject the operator to a fine and registration of the vehicle in Texas for the balance of the registration year from date of violation plus a 20% penalty.

Effective November 1, 1980

TABLE 5.2. U.S./MEXICO BORDER TRANSPORTATION CONFERENCE

RESOLUTIONS
(Revised)

WHEREAS, delegations from border communities of California, Arizona, New Mexico and Texas recognize the need for changes in current legislation regulating access by foreign motor carriers to the United States ("U.S.") to preserve cross border commerce, and the need to provide for the safety and welfare of U.S. citizens and businesses,

NOW, THEREFORE, be it hereby . . .

RESOLVED, that foreign motor carriers, no matter where in the foreign country they originate, be provided access to border "commercial zones" which shall include all territory within a radius not exceeding 50 miles of the border crossing through which the foreign motor carrier enters the U.S. A "commercial zone" may be expanded in radius upon the submission of, and appropriate hearing thereon, of evidence meeting the present criteria of the U.S. Interstate Commerce Commission ("ICC") for the establishment of a "commercial zone", however, ICC border "commercial zones" presently existing which are greater in area than a 50 mile radius should continue in existence unaffected by subsequent modification to the criteria defining a "commercial zone", and foreign motor carriers permitted to operate in a "commercial zone" shall not be permitted to engage in domestic cartage; and .

RESOLVED FURTHER, that generally the Federal Motor Carrier Safety Regulations should apply to all foreign motor carriers, however, foreign motor carriers operating only in the border "commercial zone" which do not carry hazardous materials should be exempt from the Federal Motor Carrier Safety Regulations, except, notification and reporting of accidents and drivers' hours of service regulations, further, such carriers should only be required to comply with the Motor Carrier Safety Equipment Requirements of the state or states a part of which is included within the border "commercial zone"; and

RESOLVED FURTHER, that a certificate of registration should not be required of foreign motor carriers operating in the border "commercial zone", or in the alternative that such certificate of registration be issued in an expeditious manner for annual or shorter periods of time, not less than 24 hours, at the border crossing of entry; and

RESOLVED FURTHER, that foreign motor carriers be required to satisfy the minimum financial responsibility requirement, such requirement being satisfied with annual or trip insurance for intermittent operations in the border "commercial zone", and

RESOLVED FURTHER, that evidence of compliance with requirements imposed on foreign motor carriers operating in a border "commercial zone" should be reviewed at U.S. Customs and that further enforcement be performed by Justice Department Immigration and Naturalization Service check points currently existing and other regulatory agencies which should uniformly adopt the border "commercial zone" concept.

TABLE 5.3. TEXAS REGULATION OF MEXICAN MOTOR CARRIERS

Issues	State Law Regulating the Issue (by Type of Carrier, if applicable)	Reference: State Statute	State Agency (ies) Responsible for Authorizations/ Enforcement
Definitions of Foreign Motor Carriers	<ol style="list-style-type: none"> 1. A motor carrier is any person owning, controlling, managing, operating any motor propelled vehicle used in transporting property for compensation over any public highway. 2. Motor carrier does not include for-hire transportation wholly within an incorporated community and the immediately adjacent community(ies). Motor carriers do not include private carriers. 3. A Mexican commercial motor carrier is a motor carrier (for-hire) of property residing or domiciled in Mexico. 	<p>MTR Chapter 5 Section 5.4 (8 a,b)</p> <p>VCS Art. 911b Section 1(g)</p>	<p>Texas Railroad Commission & Department of Public Safety</p>
Foreign Ownership of Motor Carrier Operations	No Restriction	VCS Art. 911b Section 18b(2)	Texas Railroad Commission & Department of Public Safety
Access Rights (Operating Authority)	<ol style="list-style-type: none"> 1. Mexican for-hire motor carriers are restricted to operations within the ICC Commercial Zone of border communities. 2. Mexican for-hire carriers may provide point-to-point service in an ICC Commercial Zone. 3. Mexican private motor carriers have unrestricted access to the State of Texas. 	VCS Art. 911b Sect. 18 b (2)	Texas Railroad Commission & Department of Public Safety
Reciprocity	4. If U.S. Commercial (for-hire) motor carriers do not have rights of ingress/egress to Mexico, Mexican commercial motor carriers may not transport property (a) from a Texas commercial zone to Mexico and (b) between points within a commercial zone	VCS Art. 911b Section 18b(b)	
Licensing Regulations: Motor Carriers	<p>Texas Registration (for-hire carriers only)</p> <ol style="list-style-type: none"> 1. Annual: \$10 per vehicle with cab card 2. Form 4E (Registry of ICC authority): \$100 insurance filing and \$10 per vehicle with cab card 3. Trip: \$20 stamp per trip, duration limited to 7 days 	MTR Chpt. 5 Section 5.507	Issuance: Department of Public Safety Texas Railroad Commission Enforcement: Texas Department of Public Safety
Licensing Requirements: Drivers	Mexican drivers must possess a commercial Drivers License (CDL) or its equivalent (Mexico's federal license - Licencia Federal de Conductor)	VCS Art. 6687B-2	Issuance - Department of Transportation Enforcement - Any peace officer
Reciprocity	A driver of a Mexican commercial motor carrier may drive in Texas with a Licencia Federal de Conductor if, and only if, a U.S. driver of a U.S. commercial motor carrier may drive in Mexico with a U.S. Commercial License (CDL). If not, a Texas CDL is required for Mexican drivers of Mexican commercial motor carrier vehicles	VCS Art. 911b Section 18 b (c) (1)	

TABLE 5.3. TEXAS REGULATION OF MEXICAN MOTOR CARRIERS

Issues	State Law Regulating the Issue (by Type of Carrier, if applicable)	Reference: State Statute	State Agency (ies) Responsible for Authorizations/ Enforcement
Licensing Requirements: Equipment	Texas Vehicle Registration 1. Annual 2. Trip (24 hours) license required to operate beyond city limit within the country of entry and adjacent county if located on the Texas-Mexico border. 3. No license required if operating within the city limits or port-of-entry community - except for-hire carriers must possess a Texas Railroad Commission stamp.	VCS Art. 6675A	Issuance: Texas Department of Transportation Enforcement: Department of Public Safety
Insurance Requirements: (Annual & Trip)	All vehicles require insurance. Minimum limit Commercial vehicles 26,001 lbs. or more \$20,000 liability per person \$40,000 per accident \$15,000 property Commercial vehicles 48,001 or more \$500,000 combined single limit 26,000 lbs. or less (not regulated)	(TCL Art. 670 1b 1(10) MTR Chap. 5, Section 5.503 (c) 2	Department of Public Safety Texas Railroad Commission
Safety Equipment standards including truck emissions	Safety standards are specific for parts and accessories of tractors and trailers including all wheel brakes (Section 396, 49 CFR)	Art. 6701d VCS Section	Any Peace Officer
Hazardous Materials Regulations	Federal standards outlined in Hazardous Materials Transportation Act (Pub L 93-633 and Section 386, 49 CFR)	Art. 6701d Section 139	Department of Public Safety
Trailer Size Restrictions	Maximum size limits 59 feet Semi Trailer 28.5 feet Double Trailers (each)	6701d-11 Section 3 (6)(c)(2)	Any Peace Officer
Road Weight Restrictions (Commercial Vehicle only)	Weight laws based on: Gross Weight 80,000 lbs. Single Axle 20,000 lbs. Tandem Axle 34,000 lbs. Bridge formula	6701d-11 Section 5	Department of Public Safety
State Taxes Applicable to Motor Carriers	LPG and diesel tax		Comptroller's Office

Federal regulations limit access of Mexican motor carriers to the U.S. border community ICC commercial zones, with few exceptions. However, under Texas statutes, motor carriers are defined as "for-hire" only, and Mexican private motor carriers may and do operate beyond the ICC commercial zone of Texas border communities. This discrepancy between federal and state statutes renders an accessibility problem in New Mexico and Arizona. (IM³ 1988)

These discrepancies or lack of harmonization between federal and state regulations could create potential problems upon the implementation of NAFTA. "The lack of harmonization between federal and state statutes represents a significant non-tariff barrier to trade. Unless remedied, Mexican motor carriers have the potential to achieve a competitive advantage over U.S. carriers during NAFTA's first three years. While U.S. motor carriers are prohibited from transborder operations in Mexico's Frontier Zone, Mexican motor carriers will have access to three of four U.S. border states" (BTA-preliminary study 4/30/93). Furthermore, this concern was voiced in numerous interviews that we conducted with U.S. trucking companies (see Appendix A for details).

Interviews with U.S. trucking companies, as well as survey results, emphasize the importance of U.S. national harmonization of laws and regulations regarding land transport and safety standards. Such harmonization of statutes must be equally enforced for U.S. as well as Mexican motor carriers.

The second aspect of compatible land transport technical and safety standards that must be addressed is harmonization of U.S. and Mexican laws, rules and regulations regarding equipment, safety standards, hazardous materials, weight restrictions, drivers and licensing, highway systems and signage, and insurance requirements. "... *the NAFTA partners will endeavor to make compatible, over a period of six years, their standards-related measures with respect to motor carrier and rail operations...*" (NAFTA Summary, August 12, 1992).

According to interviews, surveys and various reports and articles, each of the components of land transport and the governing regulations must be addressed forthwith. Gradual compatibility over the next six years could pose significant problems.

Presently, approximately 70 percent of U.S./Mexican freight is transported across the Texas/Mexico border via the highway system. With the implementation of NAFTA, an increase in commerce with a corresponding increase in traffic is expected. This increased traffic is expected to pose increased threats to highway safety. Accordingly, to minimize the expected threats due to increased trade, immediate endeavors must be made to harmonize U.S./Mexican rules and regulations regarding land transport and safety standards.

VEHICLE SAFETY STANDARDS

The Mexican banking (financial) system is currently providing financial incentives applicable towards the purchase of state of the art commercial trucking equipment (CANACAR 1993). Nevertheless, many outdated trucks that do not meet U.S. Safety Equipment Standards (Section 393, 49 CFR) are seen on Texas highways. They may also be seen beyond the U.S. commercial zone in a state of non-compliance.

Among those interviewed and surveyed (see Chapter 6), this was a major concern. Furthermore, it was questioned why some carriers were not held to the weight, equipment, and safety standards. It has been suggested on more than one occasion that strict enforcement would induce restraint of trade.

WEIGHT LIMITATIONS

With the implementation of NAFTA, equipment, safety standards, and weight restrictions all emerge as major concerns. These issues are usually enforced in the U.S. for U.S. commercial transport. Currently, Mexican transports are allowed to pull two 48-foot trailers into the Commercial Zone. This potential danger is magnified in light of the fact that many Mexican carriers do not meet DOT safety standards. Few Mexican weigh stations are in operation and Mexican vehicles are not weighed upon entering the U.S. Consequently, many of these vehicles exceed U.S. weight restrictions and as such pose a threat to others using Texas highways. After the agreement comes into effect, harmonization of weight restrictions and safety standards will be sought by year three. Meanwhile, the problem of trucks exceeding their weight limits and non-compliance in terms of safety laws may get worse (Texas trooper Newman).

"Currently weight limits are not enforced for lack of road scales (in Mexico). This allows truck operators to overload their vehicles: thirty, forty ton and heavier loads are common" (Giermanski 1990). Of the Mexican trucking companies surveyed and interviewed, two issues emerged as major concerns: lack of stringent enforcement of weight and dimension limits, and inadequate roadways in Mexico.

HIGHWAY SYSTEMS

The lack of enforcement of weight limits and dimensions contributes to the conditions of the roadways along the border. U.S. highways are designed with maximum capacity of 36 metric Tons (80,000 lb). In contrast, the weight capacity on Mexican highways is specified using weight-per-axle measurement, as described in Chapter 3. Since heavier loads on six or more axles are not permitted in Mexico, except under special circumstances, it is not known what the actual total weight is. However, as stated by Giermanski, *"It is known, that given the overweight loads carried by Mexican commercial truckers, the Mexican highways are deteriorating at a significant rate."*

It should be mentioned that Mexico has taken great strides to provide better highways. In some cases, the maquiladoras are subsidizing costs of these roads. Some super highways have been completed and others are under construction but the high tolls may prove to be a deterrent. In this case, older inferior roads would continue to be used.

SIGNAGE

Another factor that must be addressed is signage on both sides of the border. A move is underway to standardize signage and to convert it to the metric system. Few U.S. border cities have the signage in both English and Spanish, as well as the metric conversions. Research also shows that signage south of the border is rarely bilingual and that there is a lack of signage, especially in warning signs on construction zones and reduced speed lanes. However, as evidenced by a trip along the Texas/Mexico border, attempts are being made to upgrade and provide driver information along Mexican roadways. It has been suggested that perhaps a lack of funding is largely responsible for Mexico's lack of signage and traffic control devices. It has also been suggested that highway safety programs must be developed and implemented in the border region, to inform and instruct commercial drivers (U.S. or Mexican) in recognition, knowledge and comprehension of all foreign traffic signage and control devices.

HAZARDOUS MATERIALS

US federal law requires that transportation of hazardous materials be provided for according to Section 107, 171-179, 393 49 CFR of the Hazardous Materials Transportation Act (Pub 1. 93-633 and Section 386, 49 CFR). *"The NAFTA Partners will endeavor to make compatible over a period of six years..., standards relating to the transportation of dangerous goods..."* (NAFTA Summary, August 12, 1992).

According to interviews conducted by the research team, Mexican transport of hazardous materials on U.S. highways is of major concern. It is believed that most Mexican carriers do not meet the U.S. federal laws and regulations in this area. Furthermore, most Mexican carriers can not afford the cost to insure a hazardous load (\$1 million) and do not meet U.S. land transportation safety and equipment standards. Some of those interviewed gave accounts of leaky Mexican transports traveling through U.S. city neighborhoods. Others interviewed, told of Mexican tankers transporting hazardous materials (usually oil and gas) only after 10 p.m. so as to decrease the chances of traffic-related accidents. In other words, as stated by Tom Masters of Groendyke Transports, *"it was safer to transport in the dead of night when fewer motorists, ie. potential hazards, were out in force."* Others interviewed expressed a desire that the hazardous materials laws be uniformly and prudently enforced both sides of the border (see Appendix A for more details).

LICENSE REQUIREMENTS

It appears that commercial drivers license requirements in the United States and Mexico are similar, as described in Chapter 4. In Mexico, the commercial drivers license is issued by the federal government, whereas in the U.S., individual states issue CDLs. Differences lie in the degree and manner in which drivers are tested in the areas of vehicle operations testing, hazardous materials safety and knowledge, maintenance and inspection of vehicle equipment, and insurance requirements. Currently, Mexico provides for stricter training and knowledge in terms of licensing requirements of hazardous material safety and transportation.

The Texas border areas are experiencing problems in terms of false auto insurance documents. Also, there is great concern about falsely secured CDLs (ie. the driver not meeting medical or other criteria). These problems must be dealt by law enforcement agents on both sides of the border. It has been suggested by U.S. insurance providers that Mexico and the U.S. might benefit by a mutual exchange of driver information as practiced among U.S. states (see Appendix A for more details).

INSURANCE

The issue of vehicle insurance (passenger and commercial) is already a significant problem in the border area. In El Paso, for example, less than 40 percent of registered vehicles are insured, as stated by Larry Medina of Pan American Insurance Associates. This can be attributed to two factors: culture and cost. El Paso is largely an Hispanic community. Many are first and second generation citizens with a long history (by means of culture) of distrust of institutions such as banks and insurance companies. In addition, border insurance rates are generally higher than cities of comparable size in the U.S. interior. A large number of border citizens, Hispanic or otherwise, may not be able to afford such rates.

Texas state law (Safety Responsibility Act) requires that all drivers, including non-residents, must meet certain insurance requirements. In order to renew drivers licenses, register vehicles, or obtain yearly inspection stickers, Texas residents must by law, show proof of insurance. The current practice of defaulting on monthly insurance payments leaves many motorists uninsured, and as such poses a significant problem for the border region. (Chapter 4)

Also, of increasing concern, is the number of false insurance documents that have surfaced. In interviews and insurance round-table discussions, this issue was of major concern as well as the increasing number of disreputable "insurance agents" or persons posing as agents, BOTH sides of the border. One interesting note: *"Many Mexican nationals, who can afford to do so, insure their vehicles with reputable U.S. insurance companies."*

To ensure that Texas border residents and foreigners alike are in compliance with motor vehicle insurance requirements more consistent and adequate law enforcement may be advisable. In the round-tables with the insurance companies, an interesting proposal was suggested. The insurer should notify the Texas DPS should the insured default on payments. Then, the DPS sends a notice that compliance must be met within 10 days or an officer will physically remove the vehicles license plates. In order for the motorist to receive the vehicle plates back, a stiff fine and proof of insurance must be made. The fine will pay for the time and wages to enforce said law. Similar programs are in existence in other states. However, the question still remains as to how to enforce insurance regulations on Mexican nationals driving in the United States.

SUMMARY

With the increase in commerce, comes a corresponding increase in traffic which in turn can be interpreted as a threat to highway safety. In order to minimize the inevitable, measures must be taken forthwith to ensure uniformity of vehicle equipment and weight regulations as well as safety, licensing and insurance requirements. This means that such measures must be strictly and adamantly enforced on both sides of the border. Due to cultural differences, this will be a mighty task.

CHAPTER 6. PUBLIC CONCERNS OF HIGHWAY SAFETY IN THE BORDER REGION

INTRODUCTION

This chapter includes the results of a survey conducted in the Texas/Mexico border communities. Simple questionnaires were prepared in order to identify the public's concerns and general feelings about increased trade and its consequences that could affect traffic safety along the border. The following is a description of the objectives, details and procedures used to analyze the questionnaire responses. Next, the characteristics of the population surveyed, the statistical analysis and the findings obtained through this effort are presented.

DESCRIPTION OF THE QUESTIONNAIRE

The questionnaire consisted of 12 questions. The questions were simple, clear, and unbiased so that the population surveyed, from U.S. and Mexico, could respond fairly. The same questionnaire was prepared in both English and Spanish to eliminate any difficulties that could be encountered due to the language barrier.

Tables 6.1 and 6.2 present the questionnaire as distributed in its English and Spanish versions, respectively. Over 1400 questionnaires were distributed to the public along the entire Texas/Mexico border region. A total of 724 questionnaires were returned. This shows a significant public response.

The first four questions inquired about general characteristics of the individual being surveyed. Question 5 differentiated those who were or were not employed in the trucking industry. It was important to include this question because of the effects that increased trade might have on the trucking industry. With question 6, the concerns of individuals with drivers licenses from different states were identified. Question 7 categorized drivers by the area in which they do most of their driving. Question 8 asked about a driver's opinion with respect to overall present driving conditions along the border.

Question 9 simply sought public opinion of the NAFTA proposal. Question 10 inquired about individual's concerns when driving in his/her own country. Question 11 was similar to Question 10, but applies to driving in a foreign country. Finally, Question 12 presented the idea of distributing a set of regulations and guidelines to foreign drivers when entering either Texas or Mexico, and asked how drivers felt about it.

TABLE 6.1. QUESTIONNAIRE — ENGLISH VERSION

UTEP	PROJECT 1984	SURVEY	Taken By: _____
			Date: _____

1. Sex: Male _____ Female _____

2. Age: _____
 15-19 20-29 30-39 40-49 50-59 60-69 70+

Nº 1701

3. Level of education:
 Grade School _____ High School _____ College _____ Other _____

4. Do you understand: English _____ Spanish _____ Both _____

5. Are you in the trucking industry? Yes _____ No _____
 If so, are you? Management _____ Labor _____
 Where is your work base? _____

6. In what state was your drivers license issued? _____

7. In what area do you do most of your driving?
 Border Region _____ Mexican Interior _____
 U.S. Interior _____ All of the above _____

8. Which of the following best describes present driving conditions along the border region?
 Safe _____ Average _____ Dangerous _____

9. Are you pro NAFTA (North American Free Trade Agreement)?
 Yes _____ No _____
 Yes, but with certain reservations _____ Undecided _____

10. Once NAFTA is implemented what concerns you most about driving in YOUR country?
Concerned Undecided Don't Care

A. Foreign drivers (Insurance, driving habits)	_____	_____
B. License requirements for foreign drivers	_____	_____
C. Foreign drivers knowledge of local signage and laws	_____	_____
D. Condition of foreign owned vehicles	_____	_____
E. Excessive weight of commercial vehicles	_____	_____
F. Other, specify _____	_____	_____

From the above choices (A-F), what concerns you most? _____

11. Once NAFTA is implemented what concerns you most about driving in a FOREIGN country?
Concerned Undecided Don't Care

A. Local drivers (insurance, driving habits)	_____	_____
B. Safety standards (road conditions, emergency lanes)	_____	_____
C. Signage (reflectivity, condition, lack of, location)	_____	_____
D. Law enforcement	_____	_____
E. Travel Accommodations (rest areas, parking, motels)	_____	_____
F. Other, specify _____	_____	_____

From the above choices (A-F), what concerns you most? _____

12. When entering a foreign country would you like to receive a set of regulations and guidelines for driving in that foreign country?
 Yes _____ No _____ Don't Care _____

TABLE 6.2. QUESTIONNAIRE — SPANISH VERSION

UTEP	PROYECTO 1984	Taken By: _____ Date: _____
------	---------------	--------------------------------

Nº 1701

1. Sexo: Masculino _____ Femenino _____
2. Edad: _____

15-19	20-29	30-39	40-49	50-59	60-69	70+
-------	-------	-------	-------	-------	-------	-----
3. Nivel de educación: Primaria/Secundaria _____ Preparatoria _____ Univ. _____ Otro _____
4. Entiendes: Inglés _____ Español _____ Ambos _____
5. Trabajas en la industria del transporte? Si _____ No _____
 Si es así, que posición ocupas? Administrativa _____ Laboral _____
 Y dónde esta la oficina principal de tu trabajo? _____
6. En que estado obtuviste tu licencia de manejar? _____
7. En que área manejas más? Area Fronteriza _____ Interior de México _____
 Interior de E.E.U.U. _____ Todas las regiones mencionadas _____
8. Qué término mejor describe las condiciones de manejo en la frontera?
 Seguros (+) _____ Ordinarios (+/-) _____ Peligrosos (-) _____

9. Estas en favor del Tratado de Libre Comercio de Norte América(NAFTA)? Si _____ No _____
 Si, pero con ciertas reservas _____ Indeciso _____
10. Una vez que NAFTA sea implementado, qué te preocupa más cuando manejas DENTRO de tu país?

	Estoy Preocupado	Estoy Indeciso	No me Importa
A. Conductores extranjeros en nuestros caminos (Seguro de vehículo, estilos de manejo)	_____	_____	_____
B. Requerimientos de licencia de manejar de los conductores extranjeros	_____	_____	_____
C. Conocimiento de las señales y leyes de tránsito por parte de los conductores extranjeros	_____	_____	_____
D. Condiciones de los vehículos usados por conductores extranjeros	_____	_____	_____
E. Excesos de carga	_____	_____	_____
F. Otro, especifique: _____	_____	_____	_____

 Ahora bien, cuál de todas (A-F) es la que más te preocupa? _____
11. Una vez que NAFTA sea implementado, qué te preocupa más cuando manejas FUERA de tu país?

	Estoy Preocupado	Estoy Indeciso	No me Importa
A. Conductores locales(estilos de manejo, seguro de vehículo)	_____	_____	_____
B. Seguridad en las carreteras	_____	_____	_____
C. Señales de Tránsito (ubicación apropiada, mensajes confusos, poco mantenimiento)	_____	_____	_____
D. Policía de Tránsito	_____	_____	_____
E. Servicios(áreas de descanso, espacios de estacionamiento)	_____	_____	_____
F. Otro, especifique: _____	_____	_____	_____

 Ahora bien, cuál de todas (A-F) es la que más te preocupa? _____

12. Al entrar a otro país, te gustaría recibir un folleto de reglamentos y guías de tránsito de ese país?
 Si _____ No _____ No me importa _____

Initial surveys were taken in the El Paso/Cd. Juarez area. They served as a test for refining the final questionnaire, which was later distributed to the entire border region, both by mail and during a trip along the border. Surveys were conducted at many places such as shopping malls, ports of entry, university campuses, parks, and truck stops. Trucking companies were visited to target the commercial drivers.

Packages of questionnaires were mailed to the many trucking companies that operate on both sides of the border region. University of Texas Pan-American and Laredo State University also aided by distributing hundreds of questionnaires to the general public in their respective border areas.

ANALYSIS OF THE RESPONSES

Upon the return of the questionnaires, the responses were entered into a database using SAS, the *Statistical Analysis Software*. A binary code was used in order to clearly identify each of the twelve replies. Special care was constantly taken to ensure consistency during the process of inputting the replies.

SAS was also used to analyze this database. In general, the analysis consisted of tabulating the responses and comparing them based on the different characteristics of the population surveyed.

CHARACTERISTICS OF POPULATION SURVEYED

The population surveyed represented people with different backgrounds, education, age, gender, nationalities, and geographic localities within the border region. As mentioned before, a total of 724 questionnaires were returned. When this number is compared to the population of the entire border region (roughly a total of 4 million people) this shows that about 1 out of 5000 people were surveyed.

373 or 51.5 percent of the responses came from the El Paso/Cd. Juarez area, 16 or 2.2 percent from the Del Rio/Cd. Acuña/Eagle Pass/Piedras Negras areas, and 335 or 46.3 percent of the responses were from the Laredo/Nuevo Laredo/McAllen/Reynosa/Brownsville/Matamoros areas. This clearly shows that the responses were not received from one specific area, but rather they represent the population of the entire border region.

511 or 70.6 percent were male, while 213 or 29.4 percent were female. The age distribution of the population surveyed is displayed in Figure 6.1.a. All age groups were represented, some more than others. This distribution is believed to be comparable to that of the population of the Texas/Mexico border region.

The population surveyed represented a wide variety of educational backgrounds. 8.4 percent graduated from Grade School, 28.9 percent from High School, 55.5 percent from College. With regards to language proficiency, 53.1 percent claimed to be bilingual, 26.9 percent understood only English, and 20.0 percent understood only Spanish.

The population surveyed also depicted a diversity of highway uses. Of this population, 56.8 percent claimed to do most of their driving within the border region, 4.3 percent in the interior of Mexico, 31.6 percent in the interior of the U.S., and the remaining 7.3 percent in all the areas. Additionally, 35.1 percent were directly involved in the trucking industry.

Of those surveyed, 52.9 percent had a Texas drivers license, 29.0 percent had various Mexican licenses (from various states), 10.6 percent had a U.S. license from states other than Texas, and the remaining 7.5 percent had no driver license. These results are illustrated in figure 6.1.b

ANALYTICAL INFERENCES

The inferences are first presented with respect to the opinions of the general population surveyed, then in detail, they are documented with respect to the different categories of the population.

Question #8 — *“Which of the Following Best Describes Present Driving Condition along the Border Region.”* The main responses were:

	General Population	Texas Licensees	Mexican Licensees
Safe	5.7%	7.8%	3.8%
Average	56.2%	58.7%	51.9%
Dangerous	38.1%	33.4%	44.3%

In general, it was found that 56.2 percent of the population surveyed felt that present driving conditions at the border region are average, while 38.1 percent felt that conditions are dangerous. Only 5.7 percent felt conditions are safe. It also appears that Texas licensees, English speaking and bilingual people had a better perception of the driving conditions than Mexican licensees and those who spoke only Spanish. Likewise, those involved in the trucking industry had a better perception than those not involved.

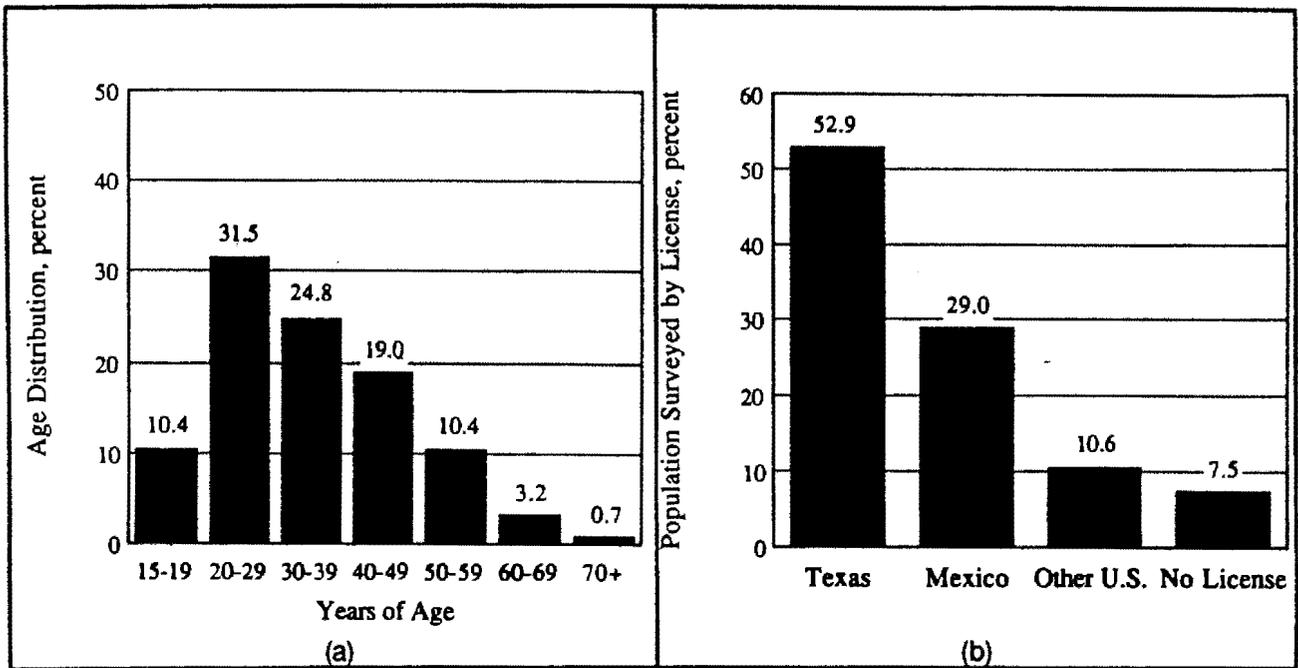


Figure 6.1. Characteristics of the 724 People that Responded to the Questionnaire. Shown are in (a) its Age Distribution, and in (b) its Distribution by Drivers License Place of Issue.

Question #9 --- "Are you pro - NAFTA (North American Free Trade Agreement)?" The main responses were:

	General Population	Texas Licensees	Mexican Licensees
Yes	36.0%	28.0%	57.4%
Yes, but with certain reservations	27.1%	29.5%	21.1%
No	17.5%	20.6%	6.2%
Undecided	19.4%	21.9%	15.3%

The responses revealed that the majority was in favor of NAFTA (63.1 percent). Of the remaining, 19.4 percent were undecided, and 17.5 percent were opposed. It was also found that those who were bilingual and those who understood only Spanish were much more in favor of NAFTA than those who understood only English.

Similarly, those involved in the trucking industry showed more skepticism concerning NAFTA than those not involved. But clearly, those with a Mexican license were, by far, much more in favor of NAFTA than those with a Texas license.

Question # 10 --- "Once NAFTA is implemented what concerns you most about driving in your country?"

The main concerns were:

	<u>General Population</u>
A - Foreign Drivers (Insurance, driving habits)	44.2%
B - License Requirements for foreign drivers	6.4%
C - Foreign drivers knowledge of local signage and laws	19.9%
D - Condition of foreign owned vehicles	15.4%
E - Excessive weight of commercial vehicles	8.9%
F - Other	5.2%

As shown, the main concern of the population surveyed is the foreign drivers, their insurance and driving habits, followed by the foreign drivers knowledge of local signage and laws.

Among those who claimed to be bilingual, to understand only English, or to understand only Spanish, their biggest concerns respectively were:

	<u>Bilingual</u>	<u>Only English</u>	<u>Only Spanish</u>
A - Foreign Drivers (Insurance, driving habits)	43.3%	58.3%	28.6%
B - License Requirement for foreign drivers	7.9%	6.0%	3.4%
C - Foreign drivers knowledge of local signage and laws	21.8%	4.0%	35.3%
D - Condition of foreign owned vehicles	14.3%	22.5%	9.2%
E - Excessive weight of commercial vehicles	7.9%	2.6%	19.3%
F - Other	4.8%	6.6%	4.2%

Foreign drivers are, by far, the main concern of both the bilingual and English speaking populations when driving in their own country. In contrast, the main concern of the Spanish speaking population surveyed was foreign drivers knowledge of local signage and laws.

The secondary concern of the English speaking population was the condition of foreign owned vehicles, while for the Spanish speaking population it was foreign drivers. For the bilinguals it was foreign drivers knowledge of local signage and laws. Excessive weight of commercial vehicles was also of great concern to the Spanish speaking population when driving in their own country.

Among those who were or were not involved in the trucking industry, their biggest concerns when driving in their own country were:

	Truckers	Non-Truckers
A - Foreign Drivers (Insurance, driving habits)	36.8%	47.9%
B - License Requirement for foreign drivers	9.2%	5.0%
C - Foreign drivers knowledge of local signage and laws	16.2%	21.7%
D - Condition of foreign owned vehicles	25.9%	10.3%
E - Excessive weight of commercial vehicles	4.9%	10.9%
F - Other	7.0%	4.2%

This shows that foreign drivers are, once again, the biggest concern for both groups. For those involved in the trucking industry, the condition of foreign owned vehicles was a secondary concern, while for those who were not, foreign drivers knowledge of local signage and laws were of concern.

Among those with Texas drivers licenses and those with Mexican drivers licenses, their main concerns when driving in their own country were:

	Texas licensees	Mexican licensees
A - Foreign Drivers (Insurance, driving habits)	54.4%	32.9%
B - License Requirement for foreign drivers	6.3%	6.0%
C - Foreign drivers knowledge of local signage and laws	10.5%	37.7%
D - Condition of foreign owned vehicles	19.6%	7.8%
E - Excessive weight of commercial vehicles	3.2%	10.2%
F - Other	6.0%	5.4%

The primary concern of Texas licensees was foreign drivers. For Mexican licensees, foreign drivers knowledge of local signage and laws was the primary concern. The secondary concern of Texas licensees was condition of foreign owned vehicles, whereas Mexican licensees were concerned about foreign drivers. These figures can also be interpreted as Texas licensees are more skeptical of foreign drivers and their vehicles than their Mexican counterparts.

Question # 11 --- "Once NAFTA is implemented what concerns you most about driving in a foreign country?" The main concerns of those who responded to this question (514) were:

	<u>General Population</u>
A - Local Drivers (Insurance, driving habits)	24.9%
B - Safety Standards (road conditions, emergency lanes)	29.6%
C - Signage (reflectivity, condition, lack of, location)	10.3%
D - Law enforcement	29.2%
E - Travel Accommodations (rest areas, parking, motels)	2.7%
F - Other	3.3%

As shown, the main concerns of the population surveyed were the safety standards and law enforcement.

Among those who claimed to be bilingual, to understand only English, or to understand only Spanish, their biggest concerns respectively were:

	<u>Bilingual</u>	<u>Only English</u>	<u>Only Spanish</u>
A - Local Drivers (Insurance, driving habits)	26.1%	29.7%	15.7%
B - Safety Standards (road conditions, emergency lanes)	30.0%	23.9%	34.3%
C - Signage (reflectivity, condition, lack of, location)	7.1%	2.2%	28.7%
D - Law enforcement	31.3%	38.4%	12.0%
E - Travel Accommodations (rest areas, parking, motels)	1.5%	2.2%	6.5%
F - Other	3.4%	3.6%	2.8%

Clearly, law enforcement was, by far, the main concern of both the bilingual and English speaking populations when driving in a foreign country. In contrast, for the Spanish speaking population surveyed, the main concern was the safety standards.

The secondary concern of the bilingual and English speaking populations was the safety standards, while for the Spanish speaking population it was the signage. Local drivers (insurance, driving habits) were also a high concern for the bilingual and the English speaking populations when driving in a foreign country.

Among those who were or were not involved in the trucking industry, the biggest concerns when driving in a foreign country were:

	Truckers	Non-Truckers
A - Local Drivers (Insurance, driving habits)	25.0%	24.9%
B - Safety Standards (road conditions, emergency lanes)	29.0%	29.8%
C - Signage (reflectivity, condition, lack of, location)	2.9%	14.0%
D - Law enforcement	34.9%	26.3%
E - Travel Accommodations (rest areas, parking, motels)	3.5%	2.4%
F - Other	4.7%	2.6%

This shows that law enforcement was the biggest concern for those involved in the trucking industry when driving in a foreign country. Safety standards was the biggest concern of those not involved in the trucking industry when driving in a foreign country.

Among those with Texas drivers licenses and those with Mexican drivers licenses, the main concerns when driving in a foreign country were:

	Texas licensees	Mexican licensees
A - Local Drivers (Insurance, driving habits)	25.5%	25.1%
B - Safety Standards (road conditions, emergency lanes)	27.9%	31.9%
C - Signage (reflectivity, condition, lack of, location)	2.0%	22.7%
D - Law enforcement	41.0%	12.9%
E - Travel Accommodations (rest areas, parking, motels)	0.0%	4.9%
F - Other	3.6%	2.5%

The Texas licensees' primary concern was, by far, law enforcement. In contrast, the Mexican licensees' primary concern was the safety standards. The Mexican licensees were far more concerned about the signage when driving in a foreign country than The Texas licensees.

Question # 12 --- "When entering a foreign country would you like to receive a set of regulations and guidelines for driving in that foreign country?" The main results were:

	General Population	Texas Licensees	Mexican Licensees
Yes	86.6%	82.2%	94.3%
Don't care	8.2%	11.3%	2.9%
No	5.2%	6.5%	2.8%

When asked if you would like to receive a set of regulations and guidelines for driving in that foreign country, the majority replied Yes, which shows an overwhelming response to such a practice. In particular, the Spanish speaking population and Mexican licensees responded positively to this question.

SUMMARY

A questionnaire was developed in both, English and Spanish, and distributed to the entire border region. Surveys were conducted at many places such as shopping malls, ports of entry, university campuses, parks, and truck stops. Trucking companies were also visited to target the commercial drivers. University of Texas Pan-American and Laredo State University also aided by distributing hundreds of questionnaires to the general public in their respective border areas. A total of 724 questionnaires were returned from a population that represented different backgrounds, nationalities, and geographic localities within the Texas/Mexico border region.

From the analysis of responses, it was found that the majority felt that present driving conditions at the border region are average, and that the majority was in favor of NAFTA. Additionally, it was found that drivers with a Texas license were highly concerned of foreign drivers, their insurance and driving habits, and the condition of foreign owned vehicles when driving in their own country; whereas, the main concern of Mexican drivers was foreign drivers knowledge of local signage and laws. When driving in a foreign country, law enforcement was found to be the main concern of drivers with a Texas license and/or those involved in the trucking industry; whereas safety standards and signage was the main concern of those with a Mexican license. Finally, it was found that the majority would like to receive a set of regulations and guidelines for driving in the foreign country. In particular, the majority of the Spanish speaking population surveyed and Mexican licensees responded affirmatively to this question.

CHAPTER 7. REVIEW OF ACCIDENT RECORDS

INTRODUCTION

Preventing accidents is one of the most effective means of improving highway safety. Accordingly, by conducting research studies and locating high-risk areas, a safe environment for transportation can be provided. The rates of traffic-related accidents, fatalities, and injuries comprise several important safety related statistics. Common bases used for calculating the accident rates are (1) population, (2) number of registered vehicles, and (3) vehicle-miles of travel. With these statistics, accident comparisons can be made. However, these comparisons have fundamental limitations and many questions can be raised about their accuracy. It is important to emphasize this point because traffic death counts vary from country to country. Also, there are many differences in the reporting of accident data. Moreover, many accidents can go unreported, probably due to lack of funding, the inability to collect large amounts of information, or for various other reasons. Nevertheless, this chapter attempts to compare the accident statistics of Texas and Mexico within the limitations of the data.

OBJECTIVES

The main objectives of this section were to review and to compare the accident records of the Texas and Mexican communities. Specifically, the following were performed:

- (1) Review of the accident rates based on population and number of registered vehicles of the southern counties of Texas.
- (2) Review of accident statistics of the four major border cities of Texas.
- (3) Comparison of accident rates of Texas with those of Mexico.
- (4) Comparison of accident frequencies of the four major sister cities of the Texas/Mexico border.

In addition, an attempt was made to review in-depth the characteristics of drivers involved in accidents. For this purpose, 1992-accident records at two selected sections of IH-35 (one at the border area and the other in the interior of the state) were analyzed.

DATA COLLECTION

The accident records in Texas are reflected in the annual reports of the Texas DPS for the years 1988 through 1992. The number of registered vehicles for the southern border counties of Texas were obtained from Texas DOT.

The population figures for the U.S. were obtained from the Census Bureau while, the figures for Mexico were obtained from the "Borderbase," a computerized system developed by the Institute for Manufacturing and Materials Management, IM³, at The University of Texas at El Paso. In some cases, the population figures for a particular year were not available. To solve this problem, a linear interpolation procedure was used to estimate the annual population figures. The accident records of Mexico were obtained from the "*Anuario Estadístico de los Estados Unidos Mexicanos*" published by the *Instituto Nacional de Estadística, Geografía e Informática*, INEGI. In addition, the accident records of the border cities of Mexico were personally obtained from the *Departamento de Peritaje* of each city.

With respect to the analysis of driver characteristics, data was obtained through "LANCER," a Texas DOT software system that interacts with the *Master Accident Listing* database.

ACCIDENT RATES OF THE SOUTHERN COUNTIES OF TEXAS

The accident records from the 14 southern border counties of Texas were reviewed to make some comparisons with statewide records. This was done to assess the relative differences in traffic safety in the Texas/Mexico border region and in Texas.

Figure 7.1 represents the Texas county map which shows the 14 border counties considered in this analysis. They were: (1) Cameron, (2) Hidalgo, (3) Starr, (4) Zapata, (5) Webb, (6) Maverick, (7) Kinney, (8) Valverde, (9) Terrel, (10) Brewster, (11) Presidio, (12) Jeff Davis, (13) Hudspeth, and (14) El Paso.

Figure 7.2 shows the comparisons of accident and fatality rates, and the vehicles per population of the border counties with those of the state of Texas for the years 1988, 1989 and 1990. For this, all border county records (i.e., accidents, fatalities, registered vehicles and population) were considered.

Figure 7.2.a shows that the border counties have, in general, higher accident rates per vehicle than the entire state of Texas. For instance, in 1990, the border counties had an accident rate per 10,000 registered vehicles of 338.1, while the whole state had only 292.7. This means that the border counties had a higher rate of accidents (15%). This may put into perspective the safety conditions of the border region as compared with the entire state.

The registered vehicles per 1,000 people of the border counties are compared with the statewide values in figure 7.2.b. The state of Texas, as a whole, has steadily had more vehicles per 1,000 people than the border counties. The average value for the U.S. (711) is higher than that of the border region.

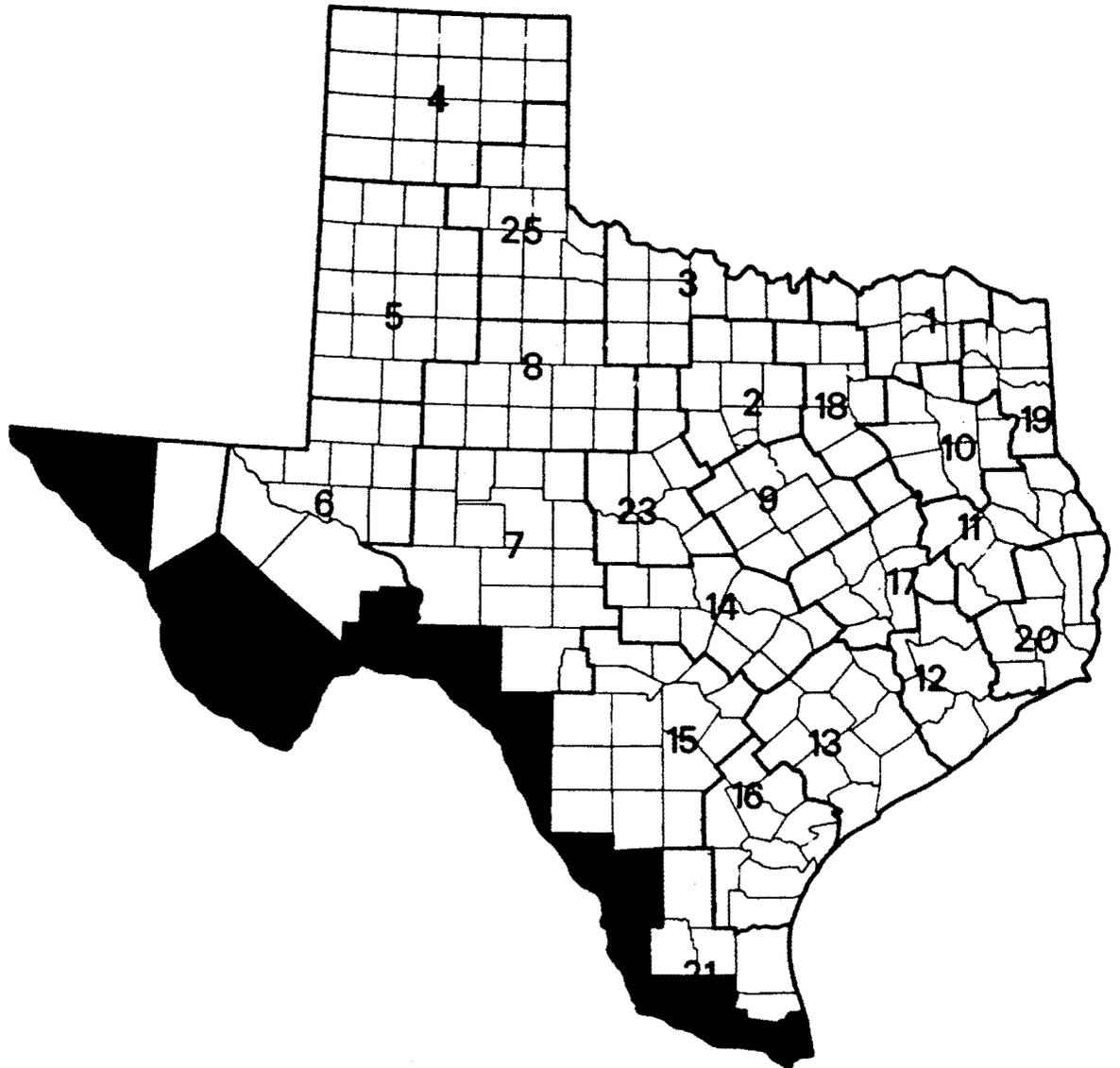


Figure 7.1 Texas County Map with the border counties shown shaded.

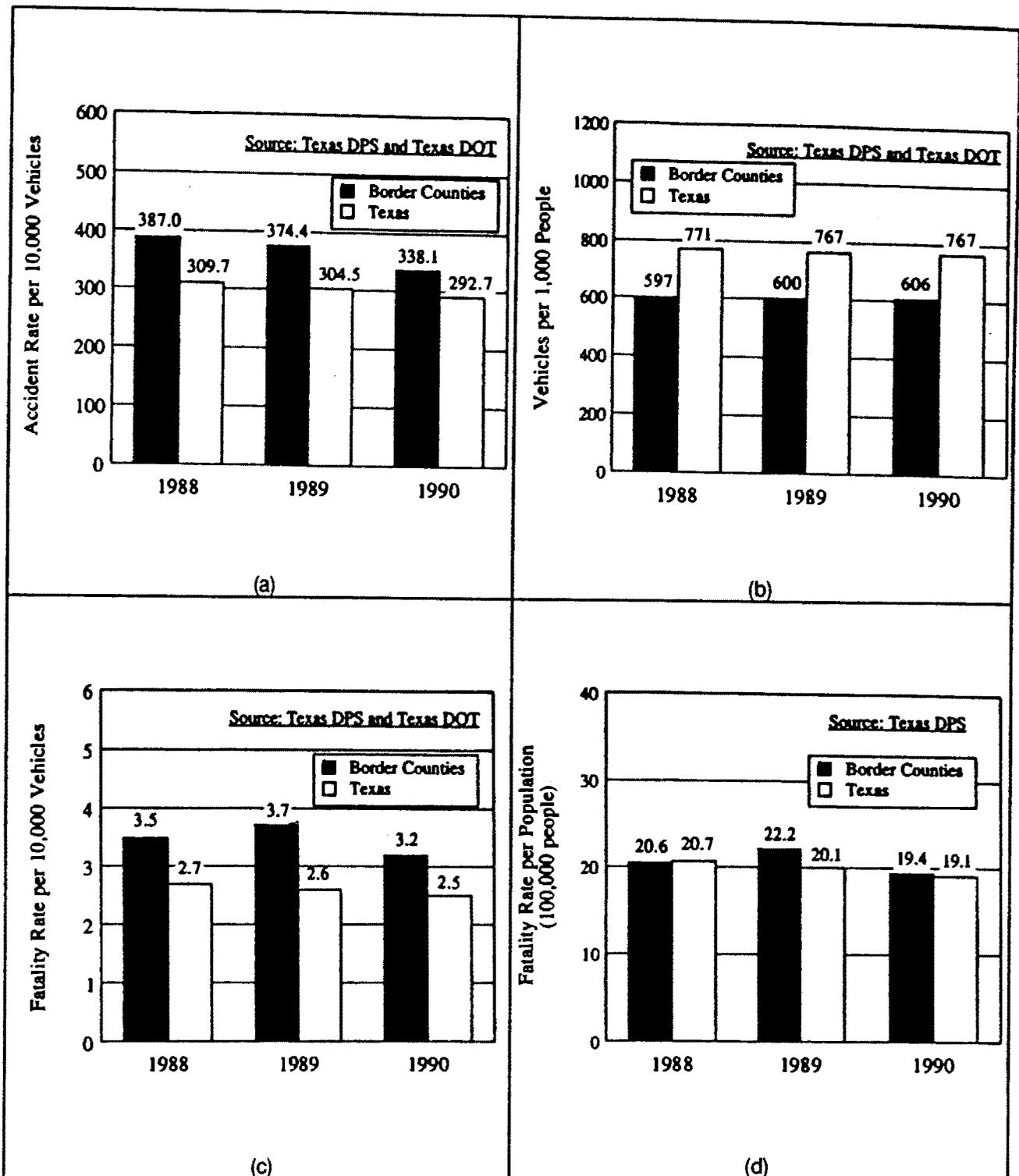


Figure 7.2 Comparison of Accident and Fatality Rates and Registered Vehicles per population of the Border Counties with those of the Entire State of Texas for the Years 1988, 1989, and 1990.

Figure 7.2.c includes a comparison of the fatality rates per 10,000 vehicles. Again, the border counties had higher rates than those of the state. For example, in 1989, the border counties had a fatality rate per 10,000 registered vehicles of 3.7, while the state rate was similar to the U.S. rate (2.6). This implies that the traffic safety exposure rate is considerably higher in the border region.

The fatality rates per 100,000 people are reflected in figure 7.2.d. These rates, which are also referred to as the *personal safety ratio*, are based on the entire population of the regions considered. The border region has slightly higher rates than the state of Texas.

The accident rates of the four most populous counties in the Texas border region were compared with those of Mexico. Figure 7.3 illustrates the accident rates per 10,000 registered vehicles for the following counties: (a) Cameron, (b) Hidalgo, (c) Webb, and (d) El Paso. The Webb and El Paso counties had considerably higher accident rates; whereas, Hidalgo county showed the highest accident rate increase (12 percent) over this five year period.

Figures 7.4 and 7.5 depict the trends in fatality rates per 10,000 registered vehicles and per 100,000 people for the above four counties, respectively. Again, El Paso, Hidalgo, and Cameron counties show higher death rates per 10,000 registered vehicles than the Texas state average. Furthermore, in 1989 Hidalgo county (4.3) and in 1990 Cameron county (4.1) had a 65 percent higher fatality rate than the average rate for the state of Texas. With respect to the personal safety ratio (see fig 7.5), Hidalgo county showed a much higher fatality rate in 1989 and 1990; while the other counties had, in general, lower rates than Texas.

ACCIDENT STATISTICS OF THE FOUR MAJOR BORDER CITIES OF TEXAS

The accident records of Brownsville, McAllen, Laredo and El Paso were reviewed in order to identify trends in frequencies, causes, location and types of accidents. The statistics of these cities were obtained from the Texas DPS through the "Motor Vehicle Traffic Accidents" report, for the years 1988, 1989, 1990, 1991 and 1992.

Table 7.1 includes the total number of traffic-related accidents, injured and killed for the cities of Brownsville, McAllen, Laredo and El Paso. In addition, this table includes the population of these cities for the years considered. In this regards, it should be emphasized, once again, that those numbers (population figures) were obtained by linear interpolation. In all categories, the city of El Paso has the highest statistics of the four.

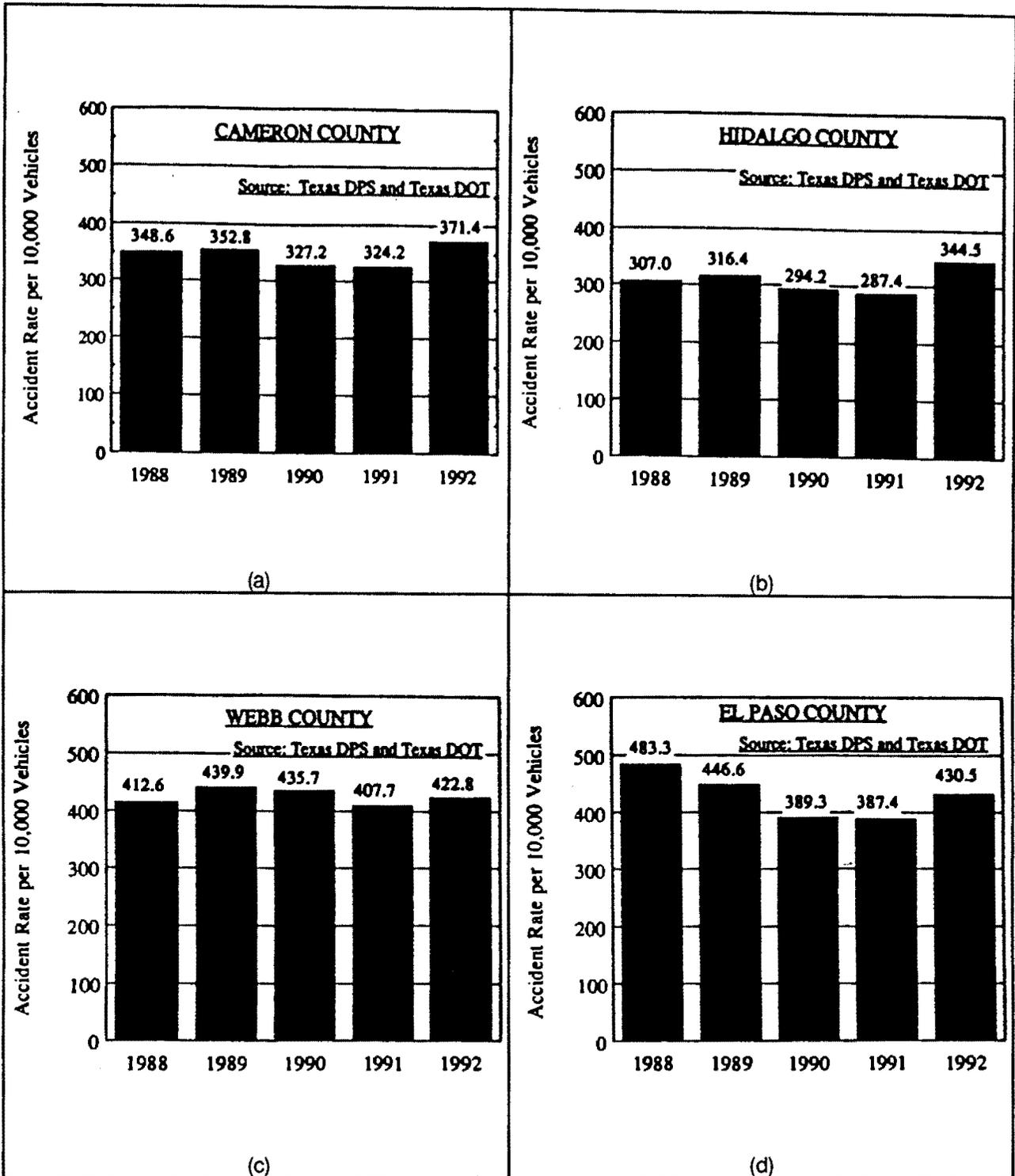


Figure 7.3 Accident Rates per 10,000 Registered Vehicles of the Four Most Populous Border Counties of Texas for the Years 1988, 1989, 1990, 1991 and 1992.

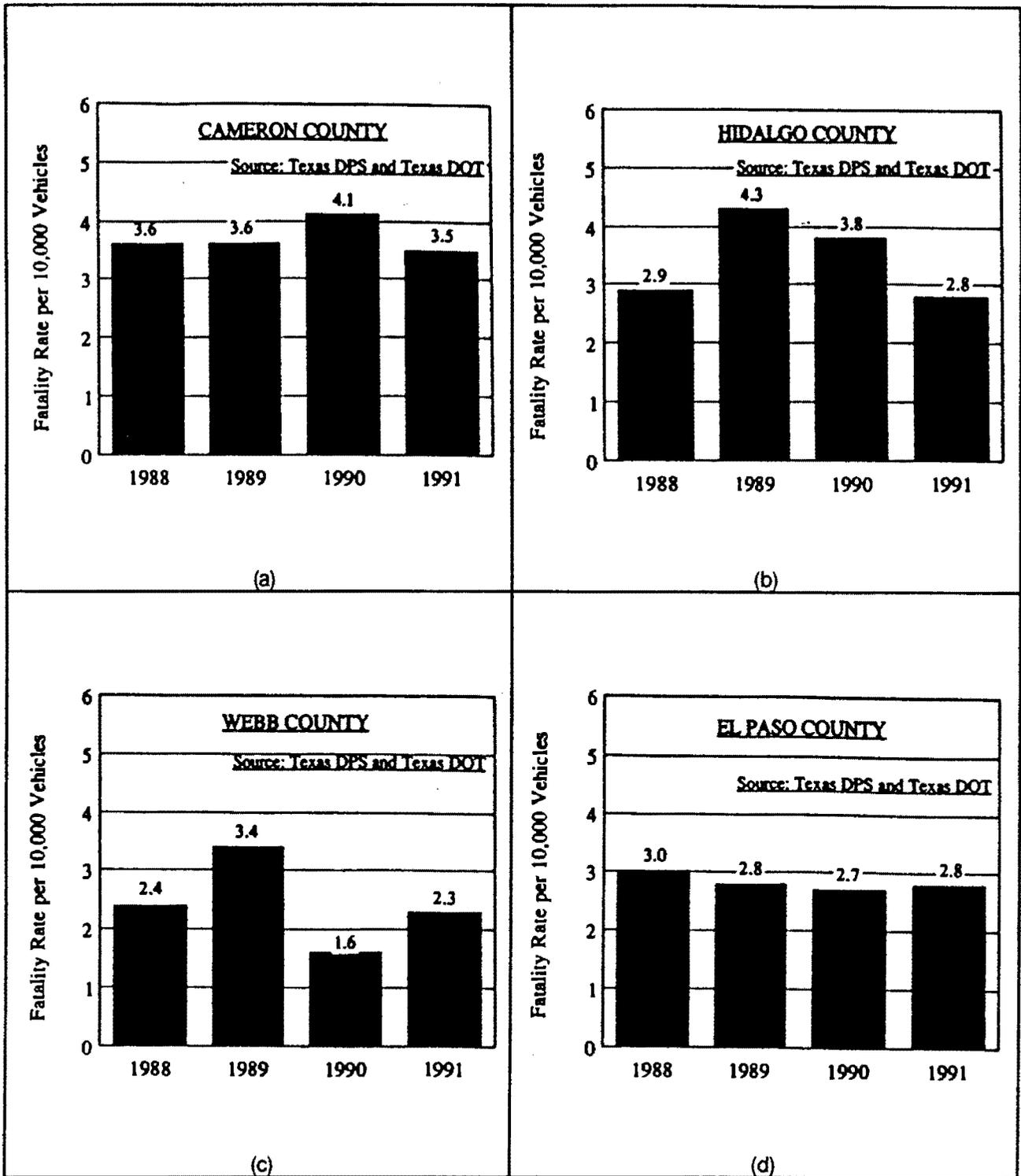


Figure 7.4 Fatality Rates per 10,000 Registered Vehicles for the Years 1988, 1989, 1990 and 1991 of (a) Cameron county, (b) Hidalgo county, (c) Webb county, and (d) El Paso county.

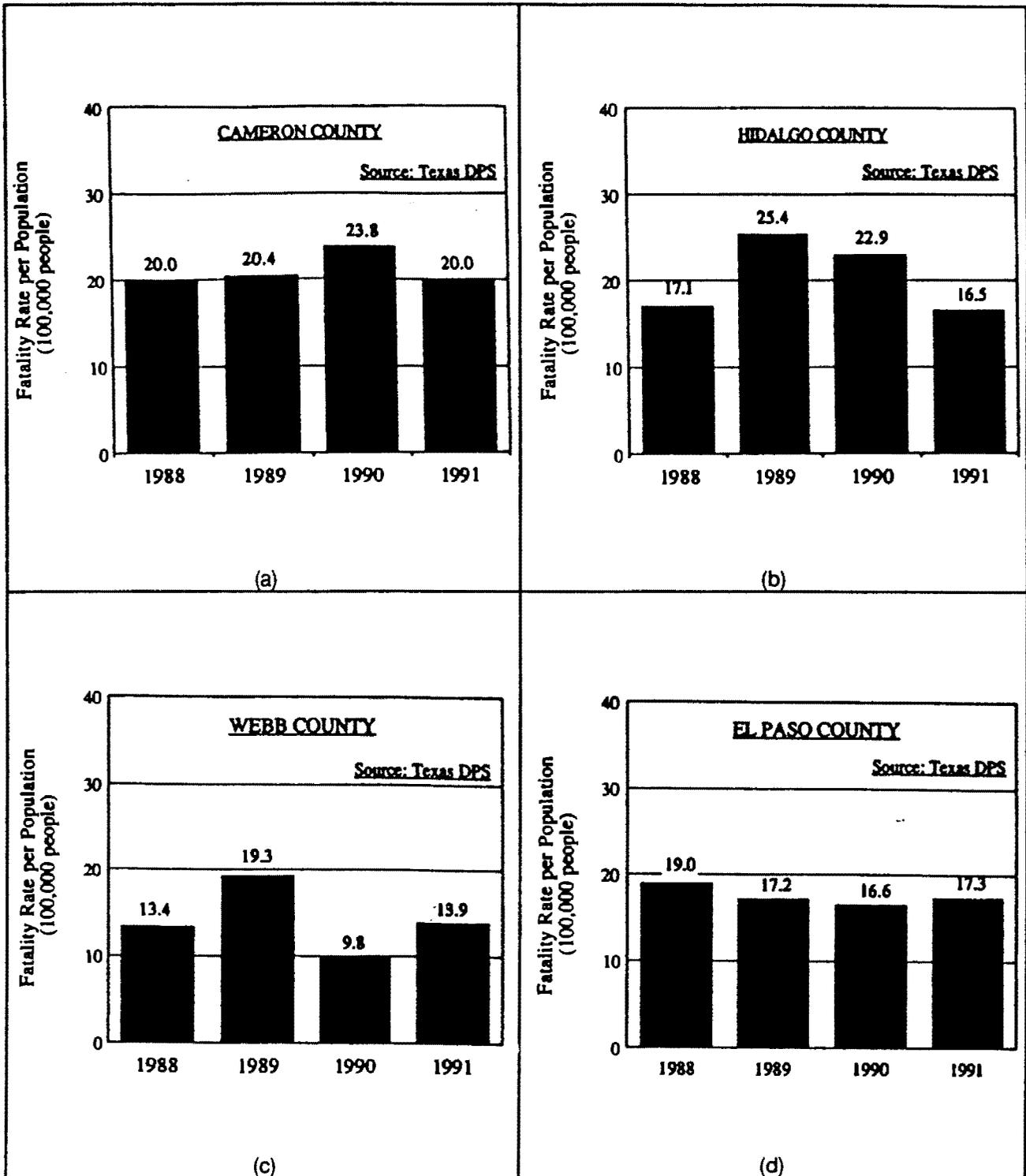


Figure 7.5 Fatality Rates per 100,000 People for the Years 1988, 1989, 1990 and 1991 of (a) Cameron county, (b) Hidalgo county, (c) Webb county, and (d) El Paso county.

TABLE 7.1 TOTAL NUMBER OF ACCIDENTS, INJURIES AND FATALITIES IN BROWNSVILLE, MCALLEN, LAREDO AND EL PASO.

BROWNSVILLE					LAREDO				
Year	Population	Accidents	Injured	Killed	Year	Population	Accidents	Injured	Killed
1988	96169	2263	1385	11	1988	116701	2747	1538	13
1989	97565	2421	1338	11	1989	118882	3146	1669	15
1990	98962	2183	1308	14	1990	121062	3364	1909	8
1991	100359	2387	1541	14	1991	123242	3211	1875	13
1992	101755	2765	1833	12	1992	125423	3121	1812	15

McALLEN					EL PASO				
Year	Population	Accidents	Injured	Killed	Year	Population	Accidents	Injured	Killed
1988	80473	2070	1505	5	1988	508253	16209	8876	89
1989	82247	2243	1687	6	1989	511797	15089	8682	80
1990	84021	2204	1736	9	1990	515342	13042	8741	82
1991	85795	1762	1671	10	1991	518886	13217	8685	88
1992	87569	2315	2037	10	1992	522431	13827	9065	90

For comparison purposes, the personal safety ratio for each city was estimated using the information included in Table 7.1. Figure 7.6 represents the trend of the fatality rates of the cities of Brownsville, McAllen, Laredo, and El Paso over the last five years. The city of El Paso has the highest fatality rate of the four border cities. Given this fact, El Paso has the greatest traffic safety problems.

From 1988 to 1992, in the four cities compared, the most frequent type of accidents were collisions between two or more vehicles in traffic (~75%), followed by collisions with fixed objects or parked vehicles (~13%). Driving at an unsafe speed and failure to yield right of way accounted for 45 percent of these accidents; whereas, driving while under the influence (DWI) accounted for another 10 percent.

More than 50 percent of these accidents occurred within the limits of these cities. The case of Laredo was particularly critical with roughly 70 percent of the accidents occurring on city streets.

Passenger vehicles accounted for roughly 65 percent of the accidents, while trucks and commercial vehicles comprised 25 percent of the accidents. Laredo shows a steady rate of increase for number of trucks and commercial vehicles involved in accidents. In 1988, these vehicles constituted 28 percent of vehicles involved in traffic-related accidents. In 1992, the rate increased to 34 percent of involvement.

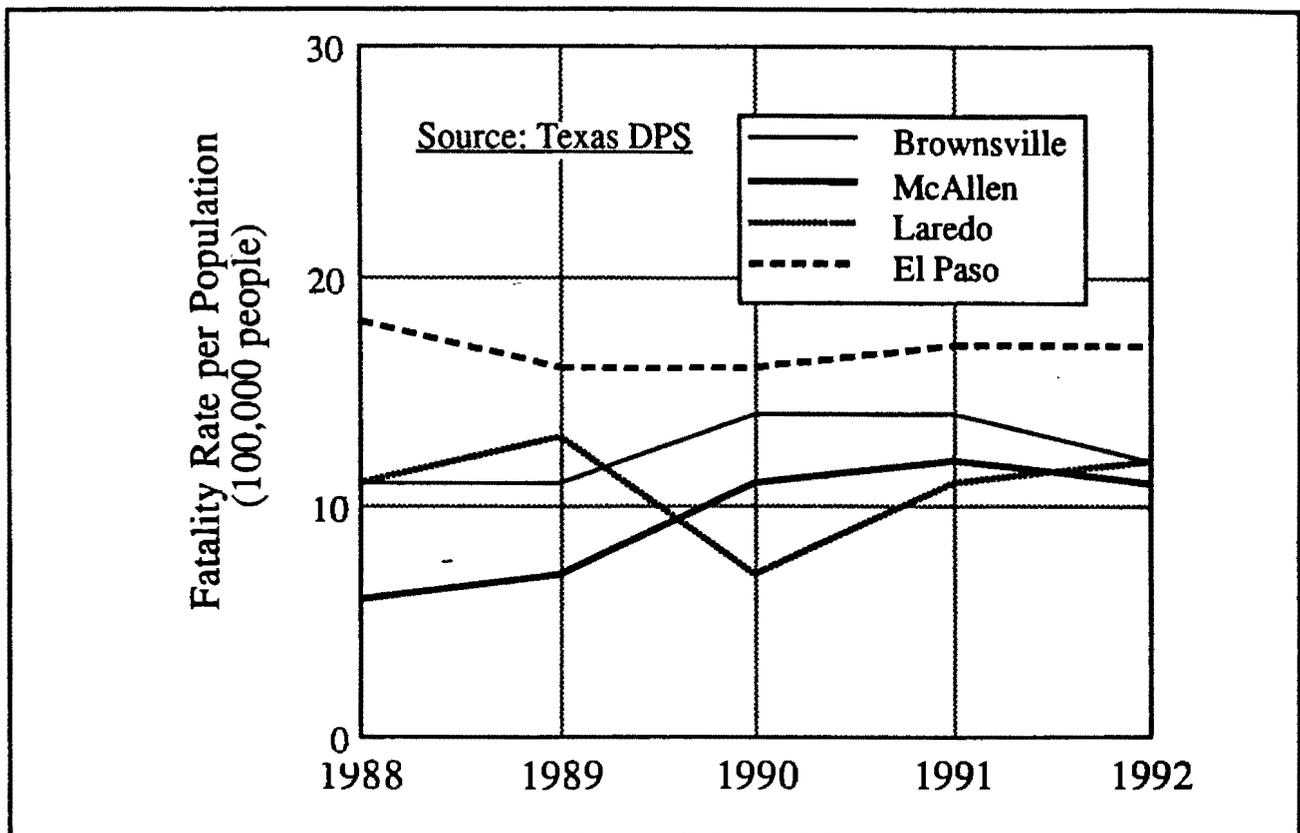


Figure 7.6. Comparison of Fatality Rates per Population for Brownsville, McAllen, Laredo and El Paso for the years 1988, 1989, 1990, 1991 and 1992.

ACCIDENT RATES OF TEXAS AND MEXICO, THE SOUTHERN BORDER TEXAS COUNTIES AND FOUR NORTHERN STATES OF MEXICO

The accident records of Texas and Mexico were compared. The comparison was limited by the availability of data, and by the different reporting procedures employed by the two countries. In any case, this comparison was done in an attempt to estimate the relative differences in the traffic safety conditions of Texas and Mexico.

The accident and fatality rates and the number of registered vehicles per population of Texas and Mexico for the years 1988, 1989 and 1990 are compared in figure 7.7. Figure 7.7.a exhibits Texas' and Mexico's traffic-related accident rates. Texas has a slightly higher rate. Figure 7.7.b shows the stark differences in the number of registered vehicles per 10,000 people between Texas and Mexico. Figure 7.7.c contains a comparison of fatality rates per 10,000 vehicles. Mexico's fatality rate is much higher than that of Texas. In 1989, the fatality rate in Mexico was ten times higher than the rate in Texas; nevertheless, the personal safety (fatality rate per population) was lower in Mexico than in Texas in 1988 and 1990 (see figure 7.7.d).

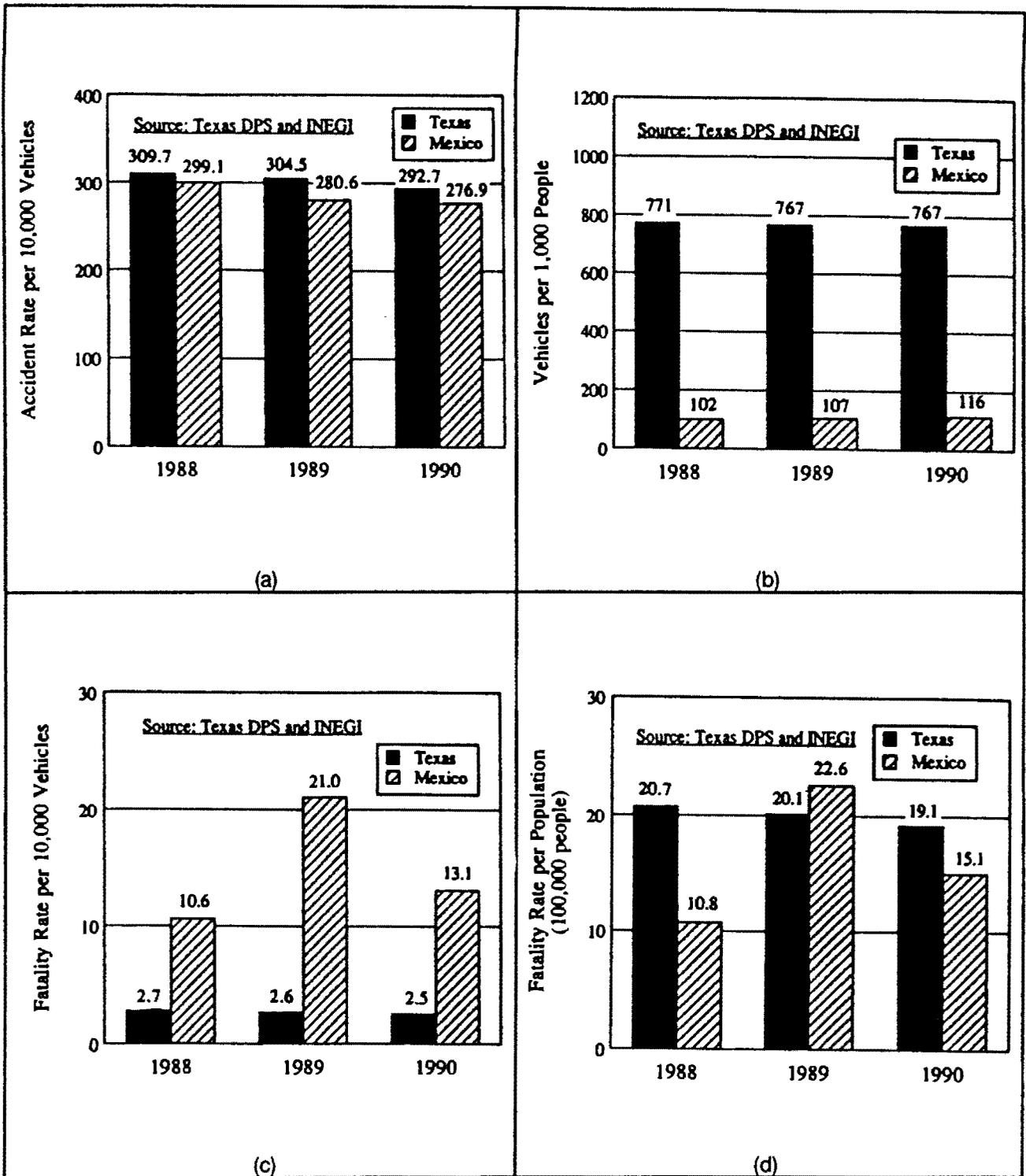


Figure 7.7 Comparison of Accident and Fatality Rates and Number of Registered Vehicles per population of Texas with those of Mexico for the Years 1988, 1989, and 1990.

Additionally, the accident trends of the border counties of Texas were compared with those of the bordering northern states of Mexico. Again, the number of accidents and registered vehicles for the border counties of Texas were considered as a whole; whereas the states of Mexico that border Texas were individually considered. These were Tamaulipas, Nuevo Leon, Coahuila, and Chihuahua.

In figure 7.8 accident rates based on the values for 1989 and 1990 are reported. The state of Nuevo Leon had the highest accident rate. This might be due to the fact that the city of Monterrey, which is not part of the border region, is included. Except for Nuevo Leon, the accident rates of the Mexican states were lower than those of the Texas border counties. This may be interpreted as the Texas border counties have lower levels of traffic safety.

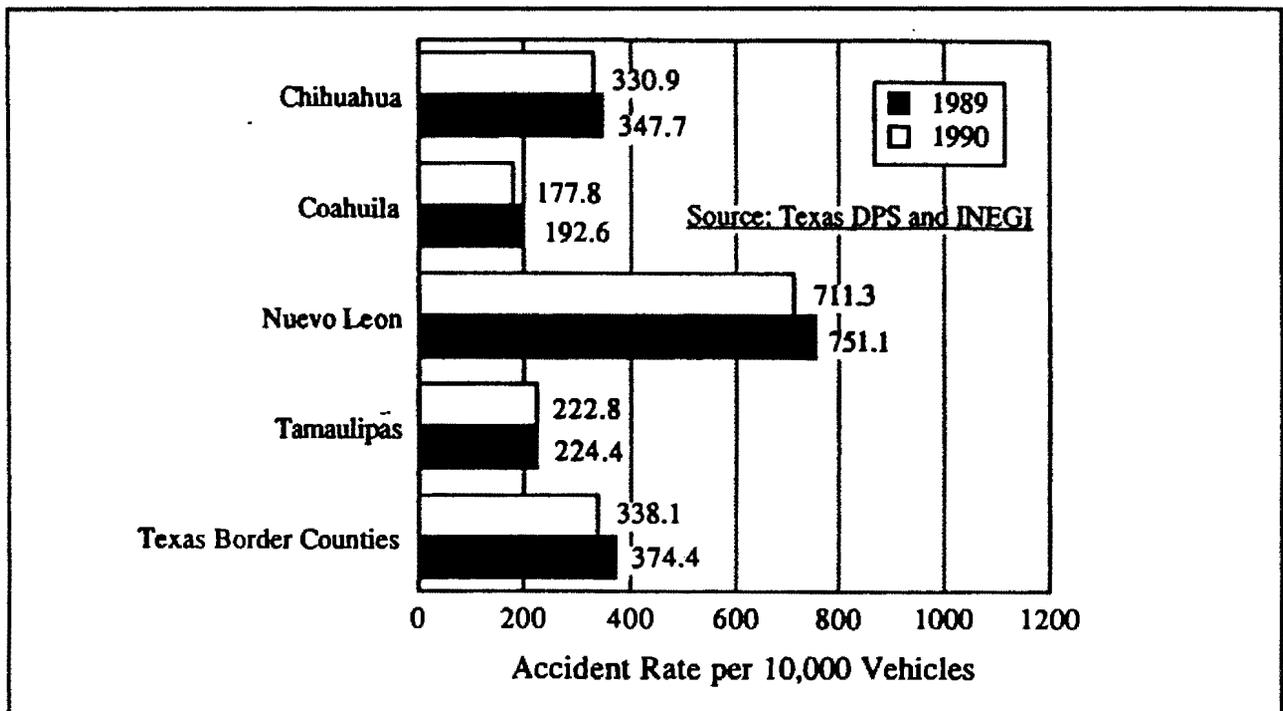


Figure 7.8. Comparison of Accident Rates per 10,000 Registered Vehicles of the Texas Border Counties and Four States of Mexico in 1989 and 1990.

FREQUENCY OF ACCIDENTS IN THE FOUR MAJOR SISTER CITIES AT THE TEXAS/MEXICO BORDER.

The accident frequencies in the four major sister cities of the Texas/Mexico border are reviewed in this section. The traffic volumes, number of vehicle registrations, and road mileage were not available for this stage of the study. Therefore, this section does not contain comparisons of accident rates, but rather it simply documents the accident information available.

The accident frequencies in the four sister cities at the Texas/Mexico border are in figure 7.9. This figure was constructed using information collected from the Texas DPS and *Departamentos de Peritaje* of the Mexican cities. Figures 7.9.a and 7.9.b represent the number of accidents for the years 1990, 1991, and 1992 in Brownsville & Matamoros and El Paso & Cd. Juarez, respectively. Figures 7.9.c and 7.9.d depict the number of traffic-related accidents, fatalities, injured and traffic-related accidents due to DWI for McAllen & Reynosa for the year 1991 and 1992, respectively. Figures 7.9.e and 7.9.f present the same information for the cities of Laredo & Nuevo Laredo. The Texas border cities, in general, have a higher number of traffic-related accidents than their Mexican sisters. This may be attributed to the higher number of registered vehicles and corresponding mileage on the American side.

Typically, the number of traffic-related accidents due to DWI and the number of traffic-related fatalities occur at higher rates in the border cities of Mexico. For example, in 1992, Reynosa reported that DWIs comprised nearly 21 percent of total traffic-related accidents, while McAllen reported only 5 percent. In 1991, Nuevo Laredo reported 27 fatalities, whereas Laredo had only 13.

ACCIDENT RECORDS OF SELECTED SECTIONS OF IH-35 — A CASE STUDY

The characteristics of vehicles and drivers involved in traffic-related accidents along the border region and in the interior of Texas were compared as a case study. This was done in order to assess the relative differences in driving conditions between the interior of Texas and its border region. For this purpose, the accident records of two sections of IH-35 were reviewed. They were: (1) a 22.4-km (14-mile) section North of Laredo, and (2) a 27.2-km (17-mile) section South of Dallas. Figure 7.10 shows their location.

The accident records of these two sections are compared in Table 7.2. As shown, the Dallas and Laredo sections had a comparable number of accidents and vehicle to accident ratios. In addition, the length of the sections was also comparable. In this way, it is believed that this comparison is justified.

The accident records indicated that passenger cars were involved in 53 percent of the accidents in the Laredo section, while in the Dallas section, the figure was 15 percent higher. Also in the Laredo section, a greater percentage of trucks (45 %) were involved in accidents as compared to that of the Dallas section (32 %). This may be interpreted as: *"If one is involved in a traffic accident, the chances of colliding with a truck are much higher in the Laredo section than in the Dallas section."*

In the Laredo section, only 74 percent of all drivers had proof of insurance; whereas in the Dallas section, 99 percent of all drivers showed proof of insurance. These figures can be interpreted as: *"If one is involved in a traffic accident, the chances of the other driver not carrying a proof of insurance are 1 out of 4 in the Laredo area, as compared to 1 out of 100 in the Dallas area."*

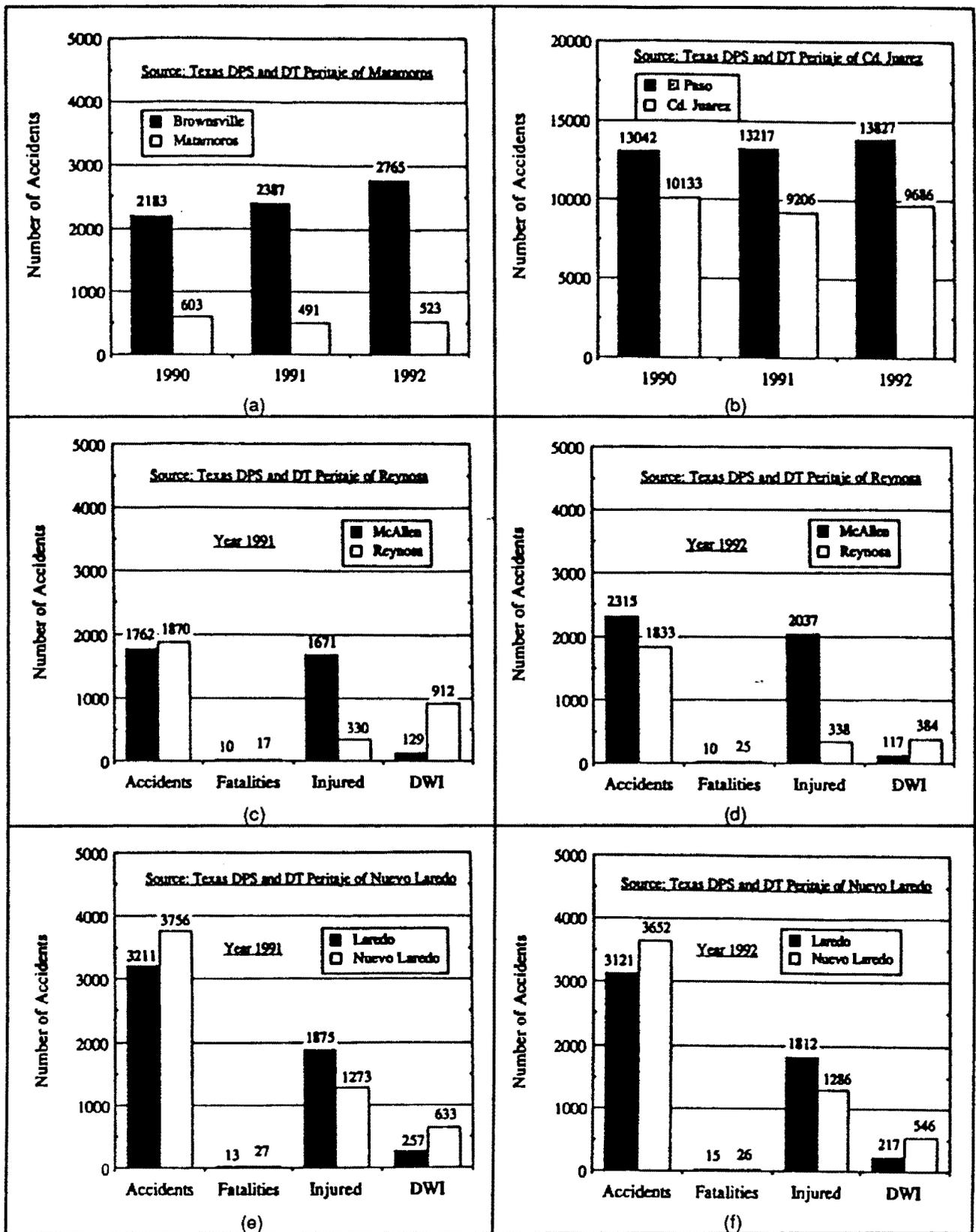


Figure 7.9 Accident Frequencies In the Four Major Sister Cities along the Texas/Mexico Border Region.

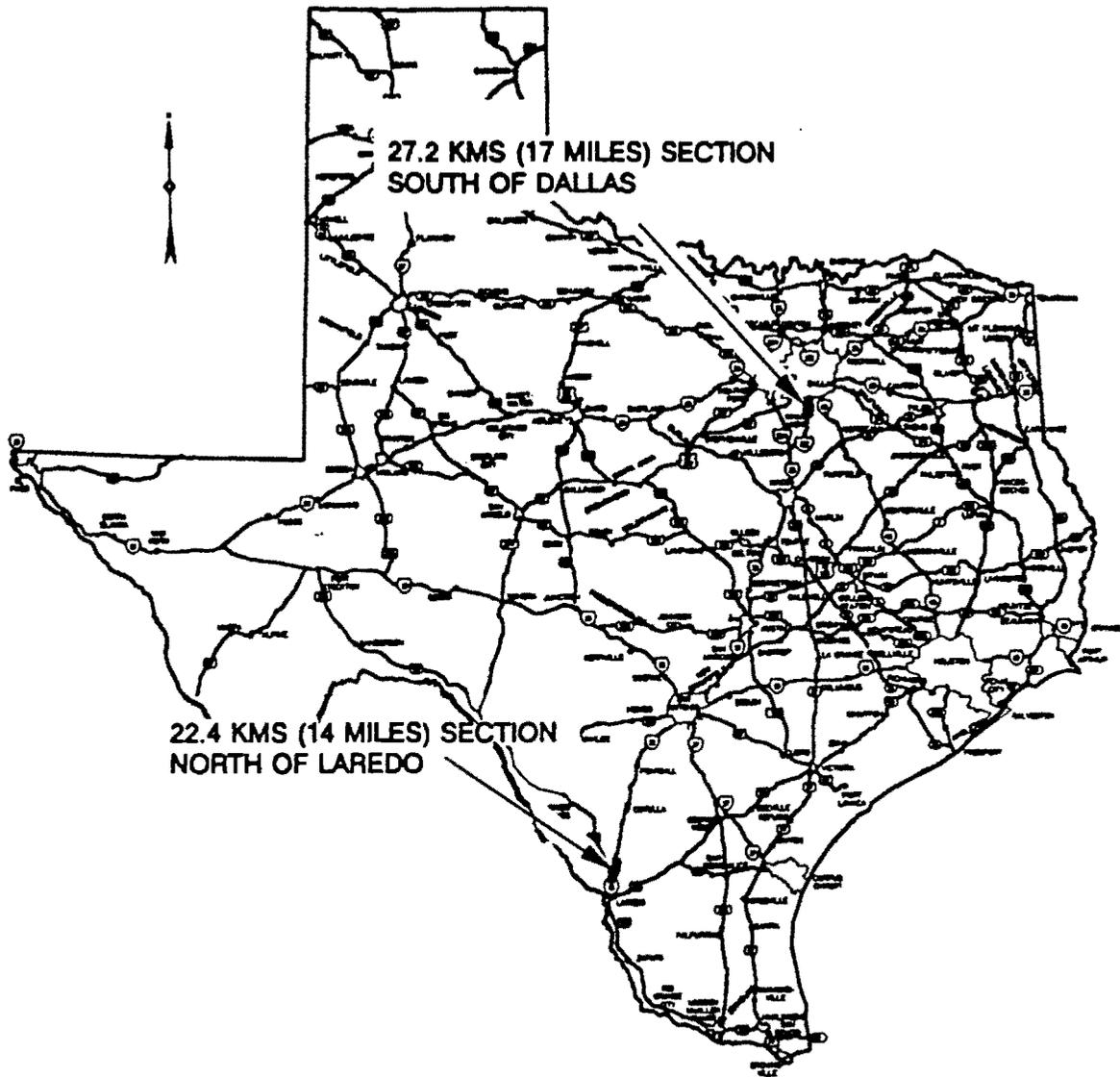


Figure 7.10. Location of the Dallas and Laredo Sections of IH-35

TABLE 7.2. COMPARISON OF 1992-ACCIDENT RECORDS OF IH-35 SECTIONS

DESCRIPTION	SECTION NORTH OF LAREDO	SECTION SOUTH OF DALLAS
Number of Accidents	499	562
Number of Vehicles Involved	986	1135
Ratio Vehicles/Accident	1.98	2.02
Length of Section	22.4 km (14 miles)	27.2 km (17 miles)
<u>Types of Vehicles Involved</u>		
Passenger Cars (passenger, passenger & trailer, passenger & house)	53 %	68 %
Trucks (buses, single unit trucks, truck-trailer combinations, road equipment)	45 %	32 %
Others (motorcycle, unknown vehicles)	2 %	—
<u>Characteristics of Drivers Involved</u>		
All Drivers	(74 % with insurance) (22 % w/o insurance) (4 % not shown insurance)	(99 % with insurance) (0 % w/o insurance) (1 % not shown insurance)
With Texas License	80% (77.8 % with insurance) (22.0 % w/o insurance) (0.2 % not shown insurance)	86% (98.7 % with insurance) (0.0 % w/o insurance) (1.3 % not shown insurance)
With Mexican License	12% (66.0 % with insurance) (32.0 % w/o insurance) (2.0 % not shown insurance)	—
With License other than Texas or Mexican	8 %	14 %

Of the drivers with a Texas license involved in accidents, only 77.8 percent had proof of insurance in the Laredo section, but in the Dallas section, 99 percent had proof of insurance. This can be interpreted as: *"If one is involved in a traffic accident in the Laredo area with a driver who happens to have a Texas license, the chances of that driver having a proof of insurance are roughly 3 out of 4; but if the same accident occurs in the Dallas area, the chances are much higher, 99 out of a 100."* This is another cause for concern along the border region; particularly because, in Texas carrying proof of insurance is the law.

Of the drivers with Mexican licenses involved in accidents in the Laredo section, only 66 percent carried proof of insurance. This can be interpreted as: *"If one is involved in a traffic accident in the Laredo area with a driver who happens to have a Mexican license, the chances of that driver having a proof of insurance are roughly 2 out of 3."* Again, this should be a major concern.

SUMMARY

Accident records from the Texas and Mexican communities were reviewed and compared. First, accident rates based on number of registered vehicles and fatality rates based on population and number of registered vehicles from the southern counties of Texas were reviewed. This was followed by a review of accident statistics in the four major border cities of Texas, namely Brownsville, McAllen, Laredo and El Paso. The accident rates of Texas were compared with those of Mexico, as well as the accident rates of the southern counties of Texas with those of four northern states of Mexico. Accident frequencies in the four major sister cities along the Texas/Mexico border were reviewed. Finally, as a case study, 1992-accident records at two selected sections of IH-35 (one at the border area and the other in the interior of Texas) were analyzed to assess the characteristics of vehicles and drivers involved in those accidents.

The comparison of accident and fatality rates per 10,000 registered vehicles of the border counties with those of the entire state revealed that the border counties of Texas had higher accident and fatality rates than the entire state of Texas. This clearly indicated that the Texas border has more traffic-safety problems than the rest of the state.

In regards to the accident statistics of the four major border cities of Texas, it was found that El Paso has, by far, the highest fatality rate per population. It was also found that accidents involving trucks and commercial vehicles are on the rise in border cities, especially in Laredo.

Although accident reporting procedures in Texas are different than those used in Mexico, it was still necessary to compare the available data to assess the differences in traffic safety conditions. In Texas, accident rates per 10,000 registered vehicles were slightly higher than those of Mexico. However, fatality rates per 10,000 registered vehicles in Mexico were higher than those of Texas. Accident rates in Texas border counties were generally higher than those of the bordering states of Mexico; except for Nuevo Leon, which had the highest rate of all.

Accident frequencies in the sister cities along the border were also compared, though these frequencies alone could not provide definitive conclusions. Still, relative information was found. For instance, the Mexican border cities had higher percentages of traffic accidents due to DWIs than those of Texas; and, there were more traffic deaths reported in the Mexican border cities than in their American counterparts.

Based on the accident records of the two selected sections of IH-35 (north of Laredo and south of Dallas), it was evident that drivers in the border city of Laredo have a greater risk of being involved with uninsured drivers and heavy vehicles than those in the Dallas area of IH-35.

CHAPTER 8. ASSESSMENT OF ACCIDENT POTENTIAL

This chapter documents an analysis of accident records conducted with the purpose of developing a model that can be used for assessing the accident potential of Texas highways along the border region. Although this model is preliminary, its use offers significant benefits to management of many fields (i.e., transportation planning, traffic safety, public safety, public health, etc.) due to its ability to forecast the number of traffic-related accidents as impacted by an increase in traffic volume.

BACKGROUND

There are several models used to forecast the number of traffic-related accidents. Conventional models relate accident occurrence to traffic volume (Mahalel, 1985). Persaud and Dzbik (1993) have suggested the use of a new improved model; that is,

$$E(P) = a T^b \quad (8.1)$$

where, $E(P)$ is the accident potential per year per kilometer, T is the annual average traffic volume (AADT) in thousands, and "a" and "b" are regression parameters that describe the operating conditions during the time period. In this study, Persaud and Dzbik's approach is used.

For this analysis, twelve highway sections were selected. The criteria for selecting the sites were location (in the border region), importance, and growing traffic volume. Table 8.1 includes the some characteristics of the roadways studied; while figure 8.1 shows their geographical locations.

ANALYTICAL PROCESS

To evaluate the accident potential along the Texas/Mexico border using Persaud's model, one must be privy to certain information. First, the annual average daily traffic (AADT), the length, and of course, the accident records of the roadway sections must be known. This information which was supplied by Texas DOT also corresponded to the years 1984 through 1991. With that, the accident potential model was developed through statistical methods. Next, the AADT of the sections was projected for the years 2000 and 2010. The AADT projections were then used in the model to estimate the number of accidents that may occur at these sections for the years 2000 and 2010.

To forecast the AADT's for the years 2000 and 2010, two statistical methods were used. One method was the "*Linear Regression of the Moving Average, (LRMA)*" which gave the lower projection of traffic volume (lower bound); and the other method was the "*Simple Projection of the Average Annual Growth, (SPAG)*" which gave the higher projection of traffic volume (upper bound).

TABLE 8.1. CHARACTERISTICS OF THE ROADWAYS STUDIED

#	ROADWAY	CONTROL SECTION	MILE POINT		LENGTH		LOCATION	REASONS
			BEG.	END.	MILE	KM		
1	IH-10	2121 02	23.4	24.6	1.2	1.9	District 24 El Paso El Paso County	1) 3rd highest AADT in Texas 2) proximity to US-54 and border
2	IH-10	2121 06 0002 05	16.3 16.9	16.9 18.6	2.3	3.6	District 24 McNary Hudspeth County	1) major highway leaving west Texas
3	US-62	0374 02	12.6	18.3	5.7	9.1	District 24 El Paso El Paso County	1) major arterial in El Paso 2) near IH-10
4	SPUR 239	0161 01 0161 03	0.0 2.1	2.1 3.5	3.5	5.6	District 7 Del Rio Val Verde County	1) runs from border to downtown Del Rio
5	US-90	0023 01	2.4	4.2	1.8	2.8	District 7 Del Rio Val Verde County	1) major route from Del Rio toward San Antonio
6	US-57	0276 01 0276 02	6.2 0.0	14.7 12.7	21.2	34.2	District 15 Eagle Pass Maverick County	1) located in smaller border community
7	IH-35	0018 05 0018 06	0.0 5.5	7.0 11.9	13.4	21.6	District 21 Laredo Webb County	1) major highway going to north
8	IH-35	0018 06	0.0	5.5	5.5	8.9	District 21 Laredo Webb County	1) inside Laredo city limits 2) near junction with US-83 & US-81
9	US-59	0542 02	2.9	15.8	12.8	20.6	District 21 Laredo Webb County	1) route toward San Antonio
10	US-83	0039 06	0.0	9.0	9.0	14.5	District 21 McAllen Hidalgo County	1) runs from Laredo to Brownsville
11	US-77	0039 08 0039 09	29.5 31.7	31.7 32.2	2.8	4.5	District 21 Brownsville Cameron County	1) major northern route from Brownsville
12	US-281	0255 08	5.1	7.6	2.5	4.0	District 21 Edinburg Hidalgo County	1) major northern route from border

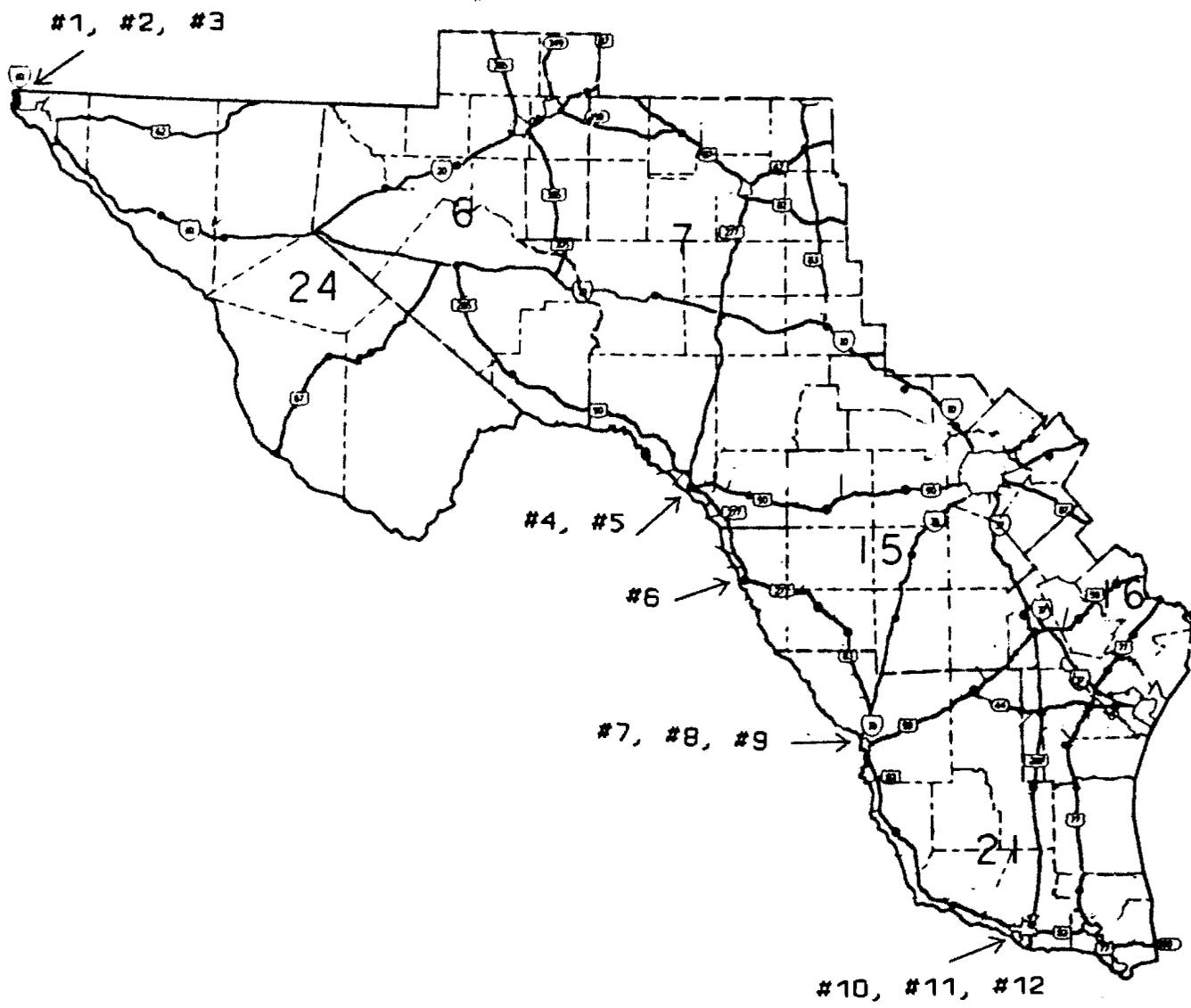


Figure 8.1 Road Map of Texas Border. Shown are the 12 Sections Studied.

Using the statistical analysis software (SAS), an accident potential model was developed using the regression procedure. The accident potential model proposed for the Texas highways bordering with Mexico is as follows:

$$E(P) = 0.053 (T)^{1.583} \quad (8.2)$$

where, E(P) is accident potential per year per kilometer, and T is traffic volume (AADT) in thousands. This model had a high coefficient of determination (0.814), a low standard error of the estimate (0.917), and a high F_{value} (406). This clearly shows the power of the model.

The benefits of the model can be seen by the following example.

A 21.6-kilometer section of a Texas road located along the border region has a 14,284 average annual daily traffic projection for the year 2000. The estimate of the accident potential for this section is:

$$E(P) = 0.053 * (14,284)^{1.583} * 21.6$$

$$E(P) = 77 \text{ accidents}$$

This result means that 77 traffic-related accidents can be expected in this 21.6-kilometer section for the year 2000.

Appendix B contains detailed information of the twelve sections of highway selected for this study. It includes a Texas DOT district map where the sections studied can be clearly identified. It also includes a chart of AADT's and accident records from 1984 to 1991, as well as the AADT's projections and accident predictions for the years 2000 and 2010.

It should be recognized, however, that the proposed model has several limitations. For instance, the model did not consider differences in road characteristics (i.e., type, number of lanes, divided, etc.).

This is clearly a major drawback because of the inability of differentiating the number of lanes, urban or rural areas, or if they were divided or undivided highways, or even if any road improvement took place within the time period studied. Because of this, the model is considered a preliminary one, and further research is needed in this area.

SUMMARY

This chapter presents a model that can be used to assess accident potential. For this study, twelve sections of roadway along the Texas/Mexico border were selected. Their AADT's and accident records for the years 1984 through 1991 were collected and analyzed. As a result, a preliminary model (Eq. 8.2) was developed and its use is recommended to obtain a forecast of traffic-related accidents on Texas highways along the border region.

CHAPTER 9. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

The overall level of U.S. trade with Mexico has tripled in the past 10 years. Economic indicators reveal that trade between the U.S. and Mexico will continue to grow, especially now, with the approval of the North American Free Trade Agreement (NAFTA). Although NAFTA's contributions to the economies of these two nations can be substantial, certain aspects such as public health, public safety, the transportation infrastructure and the environment can be substantially affected by increased trade, unless adequate measures are taken in a timely fashion.

The Texas economy is greatly influenced by trade with Mexico. Many expect that the primary beneficiaries will be the cities along the Texas/Mexico border, which will receive significant increases in business activity and jobs. Nonetheless, the same border communities also expect increases in social problems due to population growth and its demands, as well as increases in traffic volume with its unfortunate consequences of traffic congestion and traffic accidents, injuries and fatalities.

The purpose of this research was to review the impacts of increased trade on the level of traffic safety of the Texas/Mexico border region; to identify those aspects that need attention and immediate action; and, to formulate a list of research topics to be considered for the Highway Safety Program.

In undertaking these tasks, the characteristics of the border region, namely the population, the economy, and the *maquiladora* program were reviewed. These are aspects that have both direct and indirect effects on highway safety. The manuals of geometric design of highways and streets used in the United States and Mexico were reviewed to determine the similarities and differences. A visual assessment of the existing conditions of the highways along the Texas/Mexico border was performed in an effort to identify the aspects that required immediate attention. The Texas and Mexican vehicle laws were also compared to determine their similarities and differences. The NAFTA proposal was reviewed to assess the probable effects this agreement, once implemented, may have on highway safety along the Texas/Mexico border region. A survey was conducted to identify public concerns on both sides of the border. This study also reviewed the accident records of the border communities in an effort to assess, to some degree, what areas have lower levels of traffic safety and what kinds of issues need to be addressed. Finally, this study introduces a preliminary accident prediction model for use in estimating the accident potential of the highways along the Texas border.

This investigation has several contributions. It puts into perspective the "*grounds*" (i.e., population and economic growth) that government agencies dealing with highway safety must be aware of while planning and implementing highway safety plans. Another contribution is the identification of the differences in philosophies between the U.S. and Mexican geometric design manuals. The investigation also addresses the major problem areas such as ports of entry, roads approaching the cities, truck routes in border cities, areas under construction, pavement markings, and traffic signage. Another aspect studied was the Texas and Mexican (Chihuahua) vehicle laws, which included such issues as insurance, weight and dimension limits, speed limits, vehicle registrations, license requirements, and safety feature usage. This study reinforced the need for cooperative law enforcement and identified public concerns. A total of 724 people filled out a questionnaire expressing their opinions about traffic safety along the border — opinions that must be considered for any highway safety plan. The study also analyzed the frequency, characteristics and differences of traffic accidents along the Texas/Mexico border, and pin-points traffic-related problems often found at the border region. These statistics are important because they represent the foundation of any highway safety program, as well as the criteria of its effectiveness.

A few caveats are in order. Despite the positive contributions of this study, certain limitations regarding this review, particularly accident records, should be taken into account. Traffic-related accidents and fatalities are counted differently from one country to another and since many traffic accidents can go unreported it is difficult to make a sound comparison of accident records between the Texas and Mexican communities. Perhaps if the accident reporting system used in both the U.S. and Mexico were similar, the task of comparing accident records could be facilitated. Similarly, if the traffic safety exposure rate expressed in 100 million vehicle-miles traveled (VMT) would have been used, an additional effective measure of the level of traffic safety may have been obtained.

CONCLUSIONS

The Texas/Mexico border region currently faces a major challenge with respect to traffic safety. Increase in trade represents an increase in traffic, which in turn can result in more traffic accidents, injuries and fatalities. Consequently, there is a need to develop and implement a state highway safety program with a multi-disciplinary safety management system for the border region.

From the several investigations performed on many traffic safety issues along the Texas/Mexico border, specific conclusions were drawn. These are grouped accordingly: (1) population characteristics, (2) highway characteristics, (3) vehicle laws, (4) public concerns, and (5) accident records.

Concerning population characteristics, the following was concluded:

- (1) Compared to Texas, Mexico's population is younger in age and greater in number along the border. This aspect might have direct and indirect effects on highway safety simply because a younger population is the highest risk group for traffic accidents.
- (2) Business and trade along the border region will continue to grow, especially now, with the approval of NAFTA. Such growth will have a direct impact on traffic safety.

Concerning characteristics of the highway system, the following was concluded:

- (1) The main difference found between the "*Green Book*" (AASHTO 1990) and the "*Libro Negro*" (SCT 1991) was that the first emphasizes the hierarchies of traffic movements and the functional classification of roads; whereas, the latter puts more emphasis on economical aspects and the need for social development.
- (2) Issues such as ports of entry, roads approaching the cities, truck routes in cities, areas under construction, pavement markings, and signage need attention. These issues, which are impacted by increased traffic, affect the level of traffic safety on the border.

From the comparison of Texas and Mexican (Chihuahua) vehicle laws, the following was concluded:

- (1) The vehicle registration and driver license requirements are comparable.
- (2) Insurance requirements are different. For instance, Texas requires that all drivers carry proof of insurance, whereas in Mexico (Chihuahua), only minors (15-18) are required to carry such proof. This suggests that adult drivers need not have insurance.
- (3) Mexican weight limits are somewhat higher than those in Texas. As a result, it is possible that Mexican vehicles that meet Mexican requirements might not comply with Texas laws.
- (4) Compared to Texas, speed limits seem somewhat lower in Mexico.
- (5) Cooperative law enforcement is needed on both sides of the border.

Regarding public concerns of the border communities, the following was concluded:

- (1) The majority feels that the present driving conditions along the border region are average. Texas licensees perceive these conditions more favorably than Mexican licensees.

- (2) The majority is pro NAFTA. The bilingual and those who only understand Spanish are much more in favor of NAFTA than those who only understand English.
- (3) When driving in their own country, drivers with a Texas license are highly concerned about foreign drivers, their insurance and driving habits, and the condition of foreign owned vehicles. The main concern of Mexican drivers is foreign drivers knowledge of local signage and laws.
- (4) When driving in a foreign country, law enforcement is, by far, the main concern of drivers with a Texas license and/or those involved in the trucking industry; whereas safety standards and signage are the main concerns of those with a Mexican license.
- (5) When driving in a foreign country, the majority would like to receive a set of regulations and guidelines for driving in that foreign country.

Concerning accident records, the following was concluded:

- (1) The border counties of Texas have higher accident and fatality rates than the entire state of Texas. This shows that the Texas border has more traffic-safety related problems than any other region in the state.
- (2) The city of El Paso has, by far, the highest fatality rate per population as compared to the other major border cities of Texas, namely Brownsville, McAllen and Laredo.
- (3) Accidents involving trucks and commercial vehicles are on the rise in border cities, especially in Laredo.
- (4) "*Speed under limit unsafe*" and "*fail to yield right-of-way to vehicles*" are the major causes of traffic accidents in the cities of Brownsville, McAllen, Laredo and El Paso.
- (5) In Texas, accident rates per 10,000 registered vehicles are slightly higher than those of Mexico. However, fatality rates per 10,000 registered vehicles in Mexico are higher than those of Texas.
- (6) Accident rates in Texas border counties are generally higher than those of the bordering states of Mexico, except for Nuevo Leon, which had the highest rate of all.
- (7) Mexican border cities have higher percentages of traffic accidents due to DWIs as well as traffic deaths than their Texas counterparts.

- (8) Drivers in the Laredo area of IH-35 (border region) have a greater risk of being involved in an accident with an uninsured driver and a truck or commercial vehicle than those in the Dallas area of IH-35 (Texas interior).

From the accident potential analysis, the following was concluded:

- (1) Accident potential models can be developed by using the historic AADT's and the corresponding accident records of highway sections. Their benefits can be significant due to the ability of the model to forecast traffic-related accidents.

RECOMMENDATIONS

Following the scheme proposed by the Transportation Research Board (1991), this study recommends action in the following areas:

Crash Avoidance

- (1) An in-depth study of the characteristics, age distribution, education, interactions between sister cities and their effects on traffic safety of the border communities.
- (2) An in-depth study of accident records based on 100 million vehicle-miles travelled (VMT) for the entire Texas/Mexico border region.
- (3) An in-depth study for specific areas along the border to assess in detail the causes of traffic accidents, to identify hazardous highway locations and features, and to estimate the impact of commercial vehicles on traffic safety in these specific locations.
- (4) An in-depth study to develop safety educational programs for the general public of the border communities that address issues such as DWI, pedestrians, etc.; and for engineers and those involved in highway safety that address issues such as crash investigation, site improvement, collection of data and special highway safety projects.

Occupant Protection

- (1) An in-depth study of safety feature usage (i.e., safety belt, child seat, etc.) along the border to assess the magnitude of compliance with the law.
- (2) An in-depth study of safety feature usage (i.e., safety belt, child seat, etc.) along the border to develop programs to encourage their use.

Management of Highway Safety

- (1) An in-depth study to develop reliable accident potential models that can be used by any public agency involved in forecasting traffic accidents along the Texas/Mexico border region, so that adequate measures can be taken.
- (2) An in-depth study of vehicle insurance aspects in the U.S. and Mexico — this study should address the insurance issues on both sides of the border (the rates should be examined in order to find common ground to harmonize the insurance policies).
- (3) An in-depth study analyzing various responsibilities of certain law enforcement agencies (i.e., U.S. Customs, Railroad Commission, Texas DPS, Texas DOT, ICC, and local government agencies, etc.) to clarify which agencies have jurisdiction in which areas.
- (4) Coordination and communication between agencies on both sides of the border to share vital information (i.e., driver records, insurance, etc.).
- (5) A comprehensive safety management system in which agencies such as public health, Texas DPS, Texas DOT, emergency response teams, universities and any other groups concerned with traffic safety are involved to coordinate their efforts.
- (6) An in-depth study to develop a uniform manual of traffic control devices for the border region — public concern indicates that safety standards and signage are difficult to comprehend by Mexican drivers on Texas roads.
- (7) Public concern indicates that Mexican law enforcement is negatively perceived by Texas drivers and trucking companies. Improvement must be made in this area.

Driver Information and Vehicle Control Technology

- (1) An in-depth study to evaluate existing traffic safety and educational programs — this study will serve to develop an easy-to-read, easy-to-understand brochure that will provide pertinent information for both Texas and Mexican drivers when crossing the border.
- (2) Use of traffic control devices in construction zones and pavement markings in Mexico appears to be insufficient. Improvement must be made in this area.

APPENDIX A. INTERVIEWS

Appendix A contains various interviews conducted with trucking and insurance companies, as well as the Texas Railroad Commission and the Texas Department of Public Safety. The purpose of these interviews was to document their main concerns and suggestions pertaining to traffic safety along the Texas/Mexico border region.

TRUCKING COMPANIES AND RELATED ASSOCIATIONS

Date: 8/9/93
Association: CANACAR (Cámara Nacional del Autotransporte de Carga)
City: Piedras Negras
Name: Gerardo Arizpe

Major Concerns:

- Coahuila does not have adequate roads.
- Fear that U.S. drivers will not drive in Mexico.
- Mexico fears that poor facilities or lack there-of will put them at a disadvantage.
- Traffic congestion on existing bridge is substantial. Would like to see new bridge.

Points of Interest:

- New programs offering incentives are in place. This in turn will assure newer land transport equipment on Mexican and U.S. roads.

Date: 8/10/93
Company: Celadon
City: Laredo
Name: Tony Ramirez

Major Concerns:

- Mexico needs to equalize safety standards to meet U.S. standards.
- Would like to see uniform international hazardous materials signage.
- Mexico needs to upgrade its highway system.

Suggestions:

- A system of transition drivers rather than brokers.
-

Date: 8/10/93
Company: UCA (Unión de Crédito para el Auto Transporte)
City: Nuevo Laredo
Name: Leopoldo Garza Benavides

Points of Interest:

- Purpose is to promote and renew the vehicle fleets of land transportation companies.
 - They are supported by banks in the above mentioned effort, i.e., BancoMex, Nacional Financiera, etc.
 - Will only give credit to a company that will buy and use new equipment.
 - Proposing several finance plans all of which will make it easier to buy a new vehicle rather than a used one.
-

Date: 8/11/93
Company: Central Freight
City: Pharr
Name: Bill Fugitt

Major Concerns:

- Mexican carriers do not adhere to U.S. laws governing excessive weight, hazardous chemical transportation, and vehicle/equipment maintenance.
- Would like to see uniform international hazardous material signage on all vehicles transporting hazardous materials.
- Fear wages will decrease due to NAFTA. This in turn will sacrifice safety.
- Possibility of business bypassing border cities.

Points of Interest:

- Central Freight who is presently owned by Roadway also owns 49 percent of Transportes Nuevo León, their Mexican sister company.
 - Would like to see educational programs to lessen language and cultural barriers.
-

Date: 8/12/93
Company: Merchants Fast Motor Lines
City: McAllen
Name: Dennis Lovell

Major Concerns:

- Mexican trucks do not conform to U.S. standards. They are allowed to pull two 48-foot trailers into U.S. commercial zone.
- Mexican law enforcement.
- Feels U.S. 281 is unsafe.
- Will not send drivers into Mexico. Feels it's too dangerous and Mexican *Sindicatos* are influential.

Points of Interest:

- Feels Texas DPS is lax in enforcement towards Mexican trucks. This may result in more traffic accidents.
- Feels all Mexican trucks coming into U.S. should be inspected at the border and checked for insurance.
- This company does not allow their drivers into Mexico.

Date: 9/8/93
Company: Groendyke Transports
City: El Paso
Name: Tom Masters

Major Concerns:

- Legitimate insurance of his vehicles should they go south of the border
- Favoritism being extended towards Mexico — they have more U.S. interior access than we have access to the Mexican interior.
- Mexican vehicles and companies are not subject to the same laws.
- Mexican trucking companies are not able to comply with hazardous materials laws.
- Mexican government is offering subsidized incentives to compete with U.S. companies, this may put smaller U.S. companies at a disadvantage.

Suggestions:

- U.S. and Mexican interior access must be equitable at same dates.
- Establish uniformity in vehicle laws.
- Mexican hazardous materials haulers must carry insurance that complies with U.S. laws while driving on U.S. roads.
- Uniformity, compatibility, consistency, and a "*level playing field*" in all areas

Date: 9/14/93
Company: DAJ Enterprise
City: El Paso
Name: Doug Johnson

Major Concerns:

- Leniency of law enforcement concerning vehicle regulations, insurance and safety standards of U.S. or Mexican trucks.
- Existing U.S. infrastructure. In El Paso, the bridges and roadways are currently inadequate. With NAFTA we will not be able to handle the increased influx of traffic.
- Mexican draymen are performing the U.S. draymen's job illegally at cheaper rates.
- Major trucking companies from other parts of the U.S. positioning themselves at border region hoping to gain a foothold in Mexican/U.S. transportation.
- Insurance or lack thereof.
- Need for clear definition of hazardous materials, their routes designated and enforced.
- Customs clearance is currently inefficient. It must speed up.

Suggestions:

- Jurisdiction in terms of law enforcement must be defined and duly enforced.
- The "powers that be" must take initiative to enforce laws.

Date: 9/21/93
Company: Herman-Miles Trucking
City: El Paso
Name: Joe Wardy

Major Concerns:

- Wants dedicated commercial routes in El Paso area and enforcement of trucks to adhere to their routes.
- Completion of Loop 375 as a commercial route is a must.
- Government enforcement agencies are grossly under staffed therefore, laws are not adequately enforced or regulated for U.S. as well as Mexican drivers.
- Must be strictly defined as to which law enforcement agencies will enforce which laws.

Suggestions:

- People not involved in border industry should not be involved in making decisions affecting border industry. Instead, those at the border, involved in border trade, should be included in all decisions affecting the border economy.
- Must address existing problems at the border to realistically tackle future problems.

INSURANCE COMPANIES

Date: 9/7/93
 Company: Pan American Insurance Associates
 City: El Paso
 Name: Larry Medina

Major Concerns:

- Policies sold by Mexican "agents" to drive in the U.S. are sometimes fraudulent because the U.S. has no jurisdiction in Mexico and on Mexican insurance "agents".
- Border cities are largely Hispanic. There is limited compliance with insurance regulations due to prohibitive costs and culture — some Hispanics do not trust banks, insurance companies, etc.; therefore, they do not buy insurance.
- To comply with Texas regulations the insured motorist often makes the first months payment to receive proof of insurance, then defaults on subsequent payments.

Suggestions:

- If the insured motorist defaults on payment, a notice should be sent to the Texas DPS. In turn, the Texas DPS will issue a notice that the motorist's license plates will be removed within 30 days if non-compliance persists.
- Can foreign vehicles be checked for proof of insurance at the border crossing?

Date: 9/17/93
 Event: Roundtable with Insurance Companies
 Attendance: Gloria Reyna and Irene Permenter — Reyna Insurance Agency.
 Jimmy Rogers, Jr. — Rogers & Belding Insurance Agency Inc.
 Larry Medina — Pan American Insurance Associates.
 City: El Paso

Jimmy Rogers, Jr.

Background: Rogers & Belding insures Mexican nationals with registered vehicles.

Projections: With the implementation of NAFTA, it is believed that American insurance companies will have strong ownership positions in Mexican companies. There will be American based companies in Mexico providing policies that will cover the insured motorist in both countries. This will eliminate the need for separate policies.

Concerns: Licensing criteria, accountability of driver, quality of vehicle and driver must be regulated, and Mexican infrastructure.

Suggestions: Countries need a way to share driving records such as states in the U.S. do. We need a general accord between countries to enforce and standardize insurance and other requirements.

Larry Medina.

Background/Suggestions: See interview (Pan American Insurance 9/7/93)

Projections: Some American insurance companies are currently in Mexico in association with Mexican companies, i.e., Aetna & Seguros Monterrey.

Concerns: Fraud in many forms (from agents, from non-agents, and from insured motorists). Government agencies are understaffed, therefore it is difficult to enforce the laws. Many existing problems have not been addressed, therefore more problems will be created.

Irene Permenter

Background: Reyna Insurance Agency sells primarily trip policies and general auto coverage. They also run a drivers safety school.

Suggestions: It would be beneficial for both countries to require a driving class emphasizing safety and knowledge of the roads on both sides of the border.

TEXAS RAILROAD COMMISSION

Date: 9/16/93
City: Austin
Name: Nim Graves, Manager of Public Assistance

Major Concerns:

- Mexican trucks on U.S. roads without the federally mandated insurance coverage.
- U.S. Customs or Texas DPS are not checking Mexican vehicles entering the U.S. for valid insurance policies, Railroad stamps and/or cab cards.
- U.S. Customs or Texas DPS are not enforcing U.S. weight standards on Mexican trucks.
- Brokers or insurance agents are selling coverage to Mexican trucks, but not affixing the Railroad stamp.

Suggestions:

- U.S. Customs should check the listing of legitimate insurance companies provided to them by the Texas Insurance Board. If Mexican carriers are not covered by one of the listed insurance companies and do not possess the Railroad stamp or cab card, the Mexican vehicle should be prohibited from entering the U.S.
- U.S. Customs should weigh all trucks entering the U.S. If the trucks do not comply with U.S. weight restrictions access into the U.S. should be denied.
- All brokers or insurance agents providing U.S. insurance for Mexican vehicles, while in the U.S., should be responsible by law for assuring that the Mexican vehicle in question meets the U.S. vehicle laws.

TEXAS DEPARTMENT OF PUBLIC SAFETY

Date: July 27, 1993

City: El Paso

Name: Robert Newman, Texas State trooper, Chief

Major Concerns:

- U.S. vehicles that no longer comply with U.S. regulation can be taken and registered in Mexico. With that, they are able to return to the U.S. disregarding the law.
- Any individual who can not obtain an U.S. driver license can get a Mexican license, and drive on U.S. roads.
- The Texas Department of Public Safety is understaffed. More support is needed from the state and central government.
- Law enforcement officers encounter frequent obstacles of jurisdictional ambiguity.

Suggestions:

- There is a need to share driver information between the U.S. and Mexico.

APPENDIX B. TRAFFIC VOLUMES AND ACCIDENTS OF SELECTED HIGHWAY SECTIONS OF TEXAS

Appendix B contains mainly three sets of information for twelve selected Texas highways located along the border region with Mexico. This information includes: (1) a chart with the annual average daily traffic, AADT's, and the number of accidents occurring during the years of 1984 through 1991; (2) a plot of the AADT's for the years 1984 to 2010; and (3) a detailed map locating the road.

Figures B.1 through B.12 have in the upper left corner, the traffic and accident data. The chart includes the historic AADT's and the predicted AADT's. For the years 2000 and 2010 the first forecast AADT was obtained from the "LRMA" method, while the second value was obtained from the "SPAG" method, as explained in Chapter 8. The historic accident records and the accident predictions are also included in this chart. The number of accidents were forecast by using Eq. 8.2 (Chapter 8).

In addition, these twelve figures contain in their right upper corner, the geographical location of the road sections studied. These maps were obtained from the Texas DOT district maps. To locate any of these road sections, the beginning and ending mile points are given in Table 8.1.

Finally, the lower corner of these figures contains the plot of the AADT data. These plots were constructed using the AADT data and their corresponding year included in the chart (upper left corner).

Some discrepancies were noticed during the use of the accident potential model (Eq. 8.2). For instance, for sections #3 (US-62) and #4 (Spur 239), it was estimated that fewer traffic accidents may occur for the years 2000 and 2010. Several reasons account for predicting low numbers of accidents. One is that the model was developed using all roadway's data, which gave a gross macroscopic model. Other reasons are that the road types and effects of road improvements are important factors, which this preliminary model (Eq. 8.2) disregards.

Nevertheless, with further research and with detailed analyses, it is believed that better and more effective models can be formulated.

Figure B.1

#1 IH-10

Control Section 2121 02

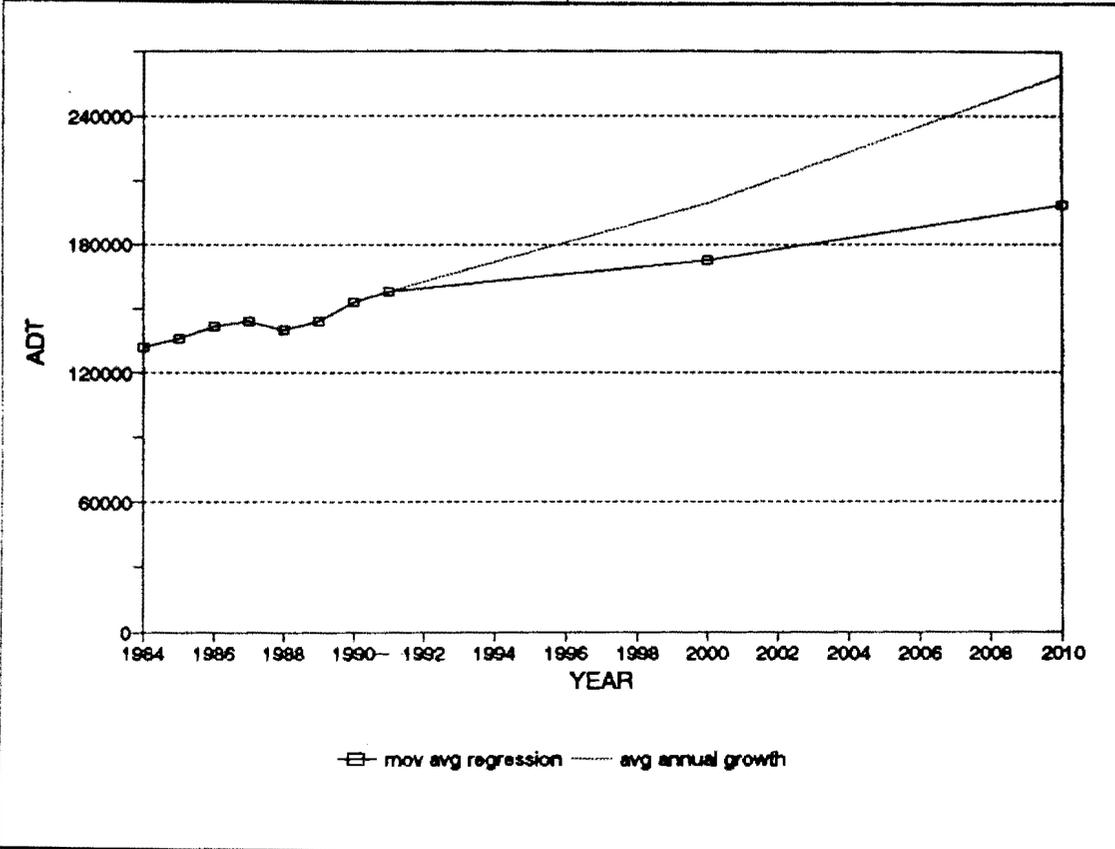
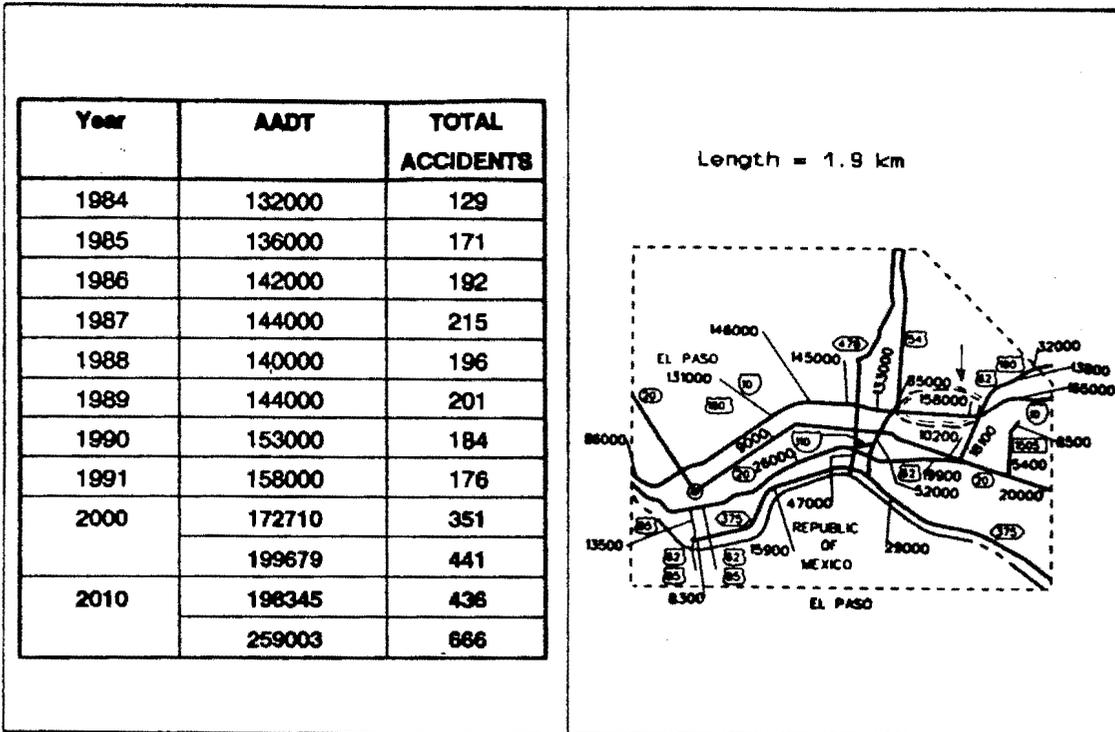


Figure B.2

#2 IH-10

Control Section 2121 06

0002 05

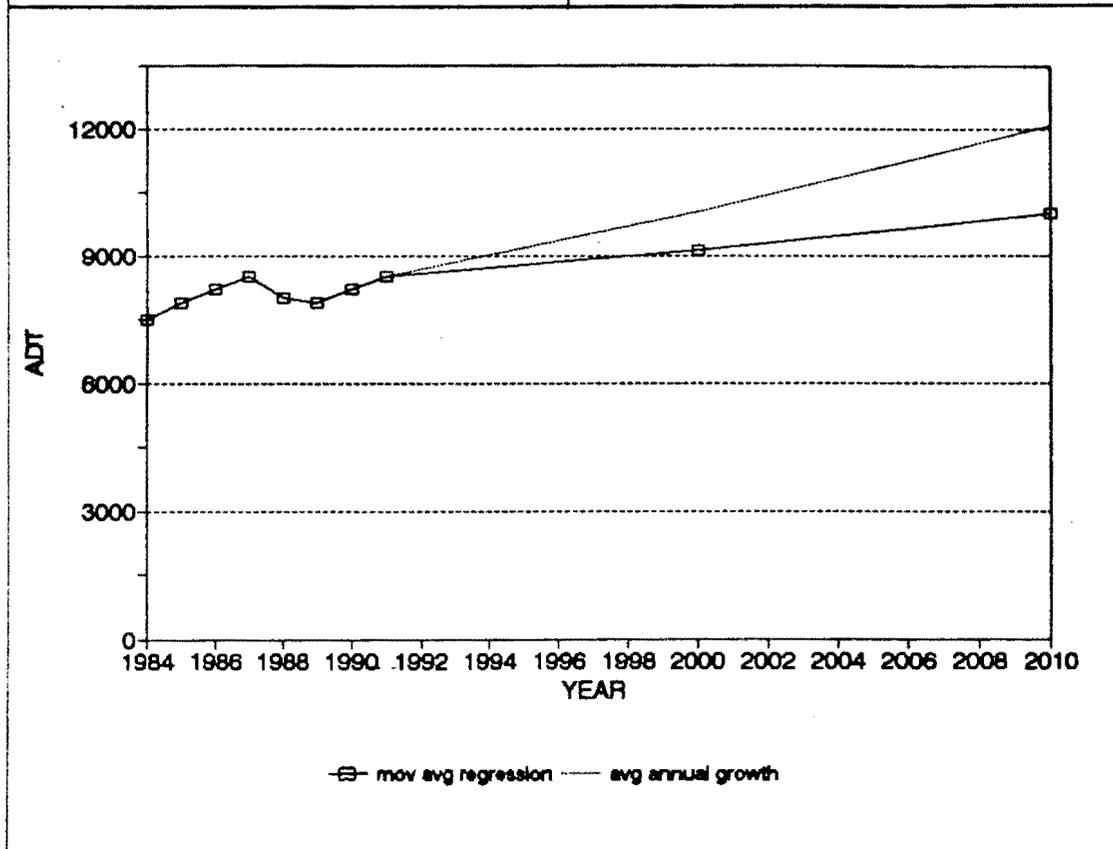
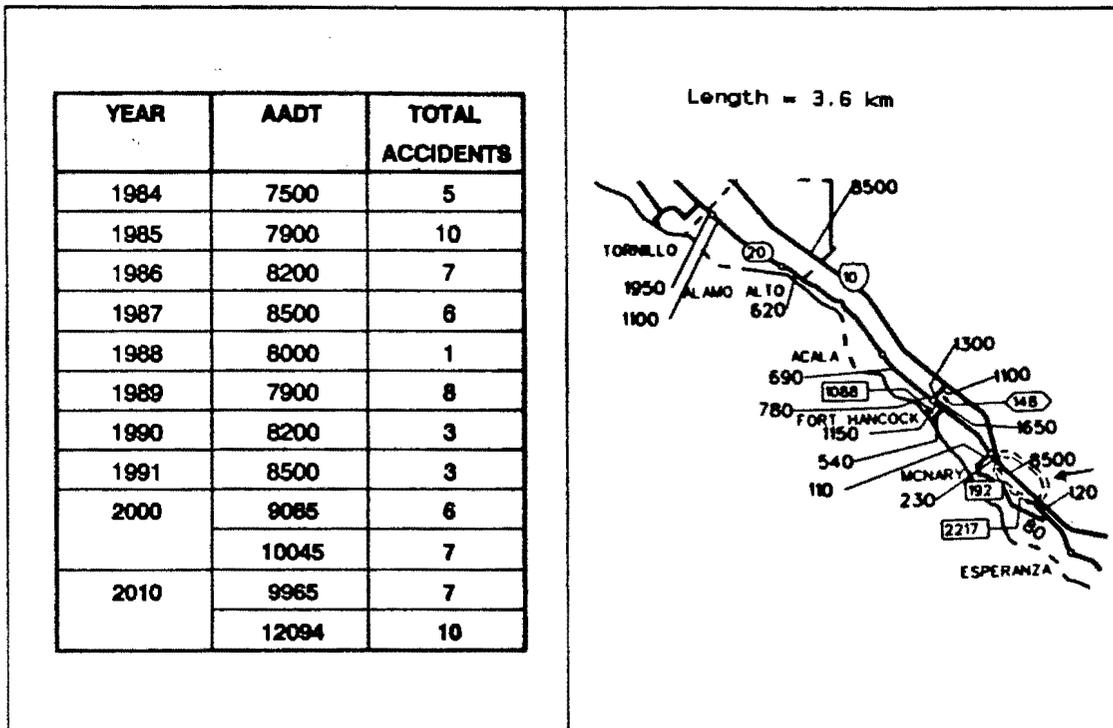


Figure B.3

#3 US-62

Control Section 0374 02

YEAR	AADT	TOTAL ACCIDENTS
1984	26000	304
1985	27000	331
1986	29000	387
1987	28000	430
1988	34000	474
1989	36000	480
1990	26000	344
1991	26000	364
2000	40091	166
	33900	128
2010	48881	228
	41924	179

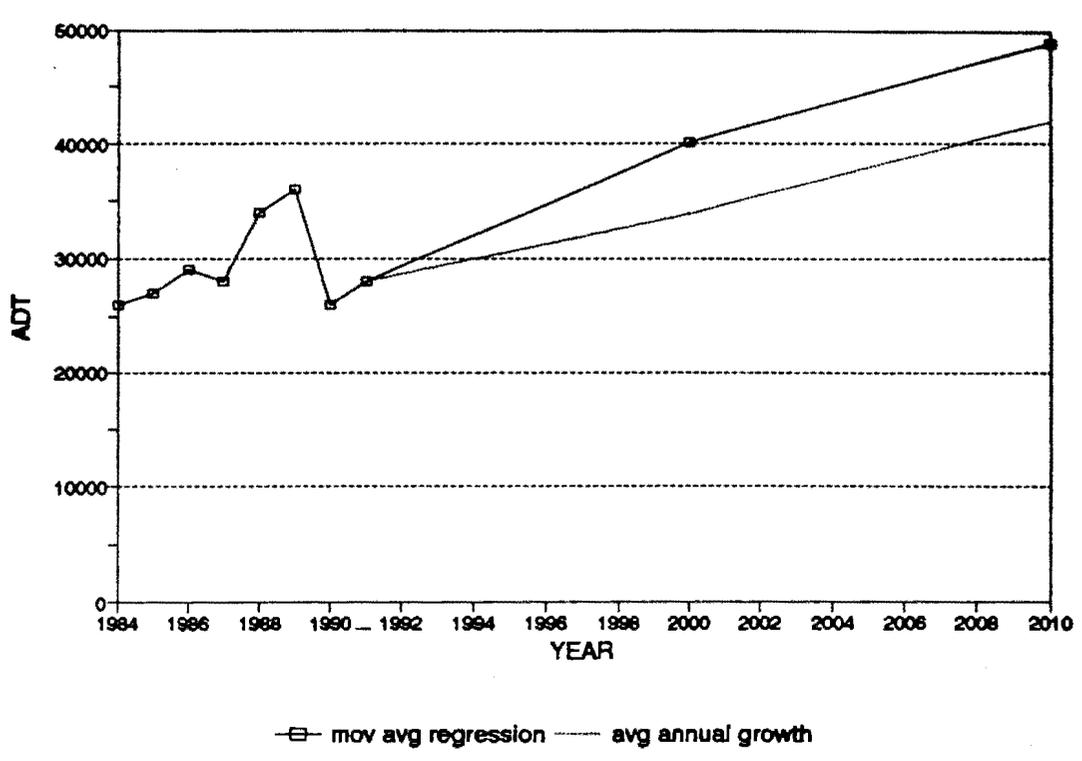
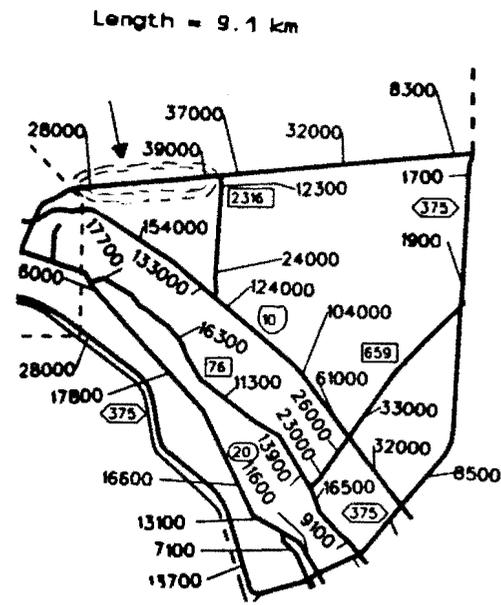


Figure B.4

#4 SPUR 239

Control Section

0161 01

0161 03

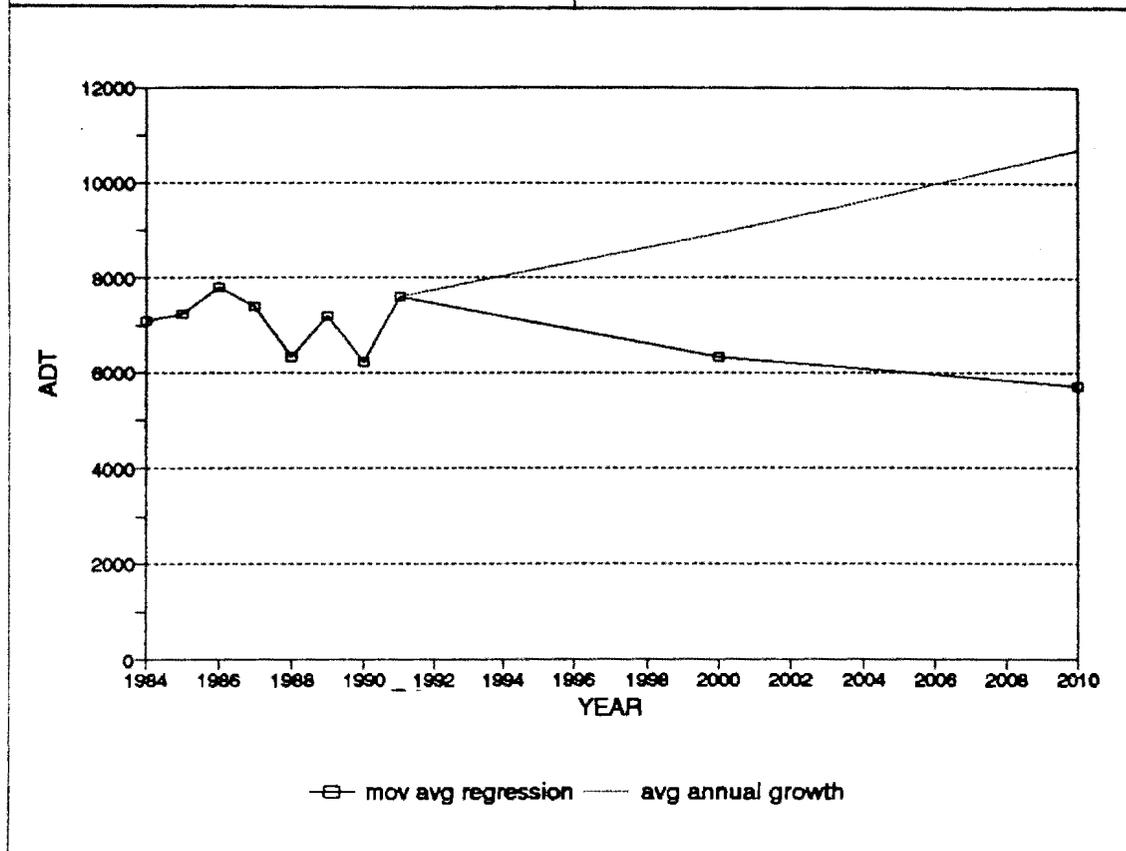
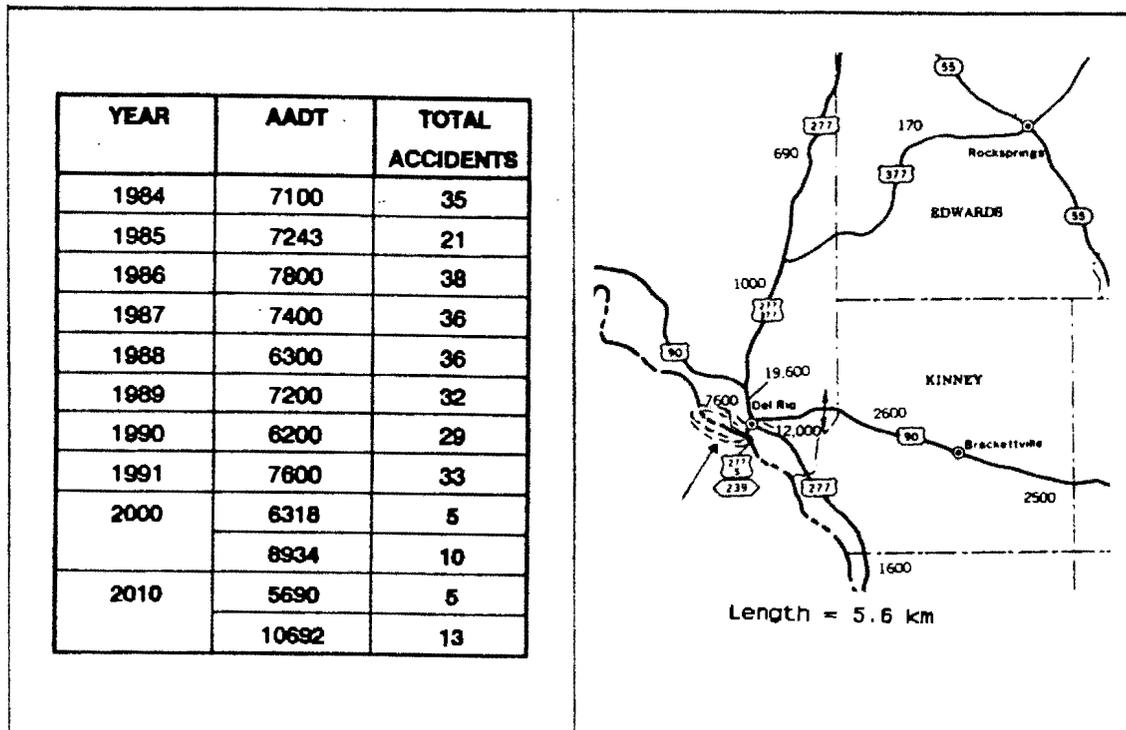


Figure B.5

#5 US-90

Control Section 0023 01

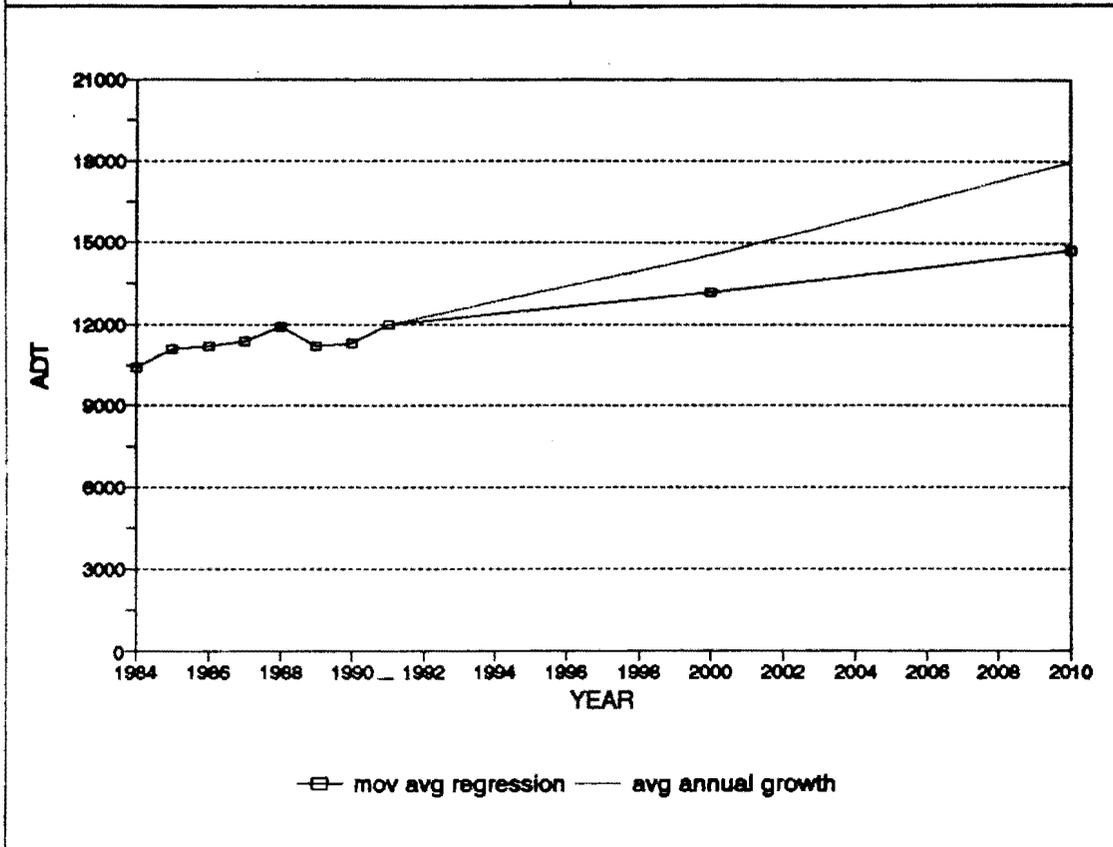
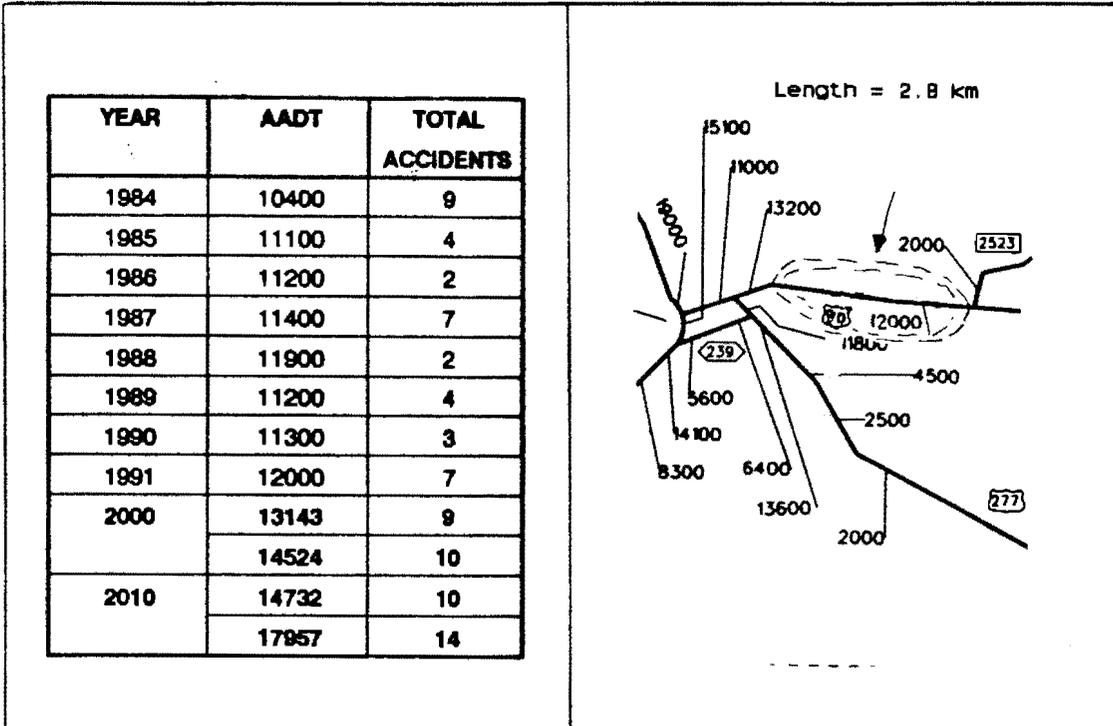


Figure B.6

#6 US-57

Control Section 0276 01
0276 02

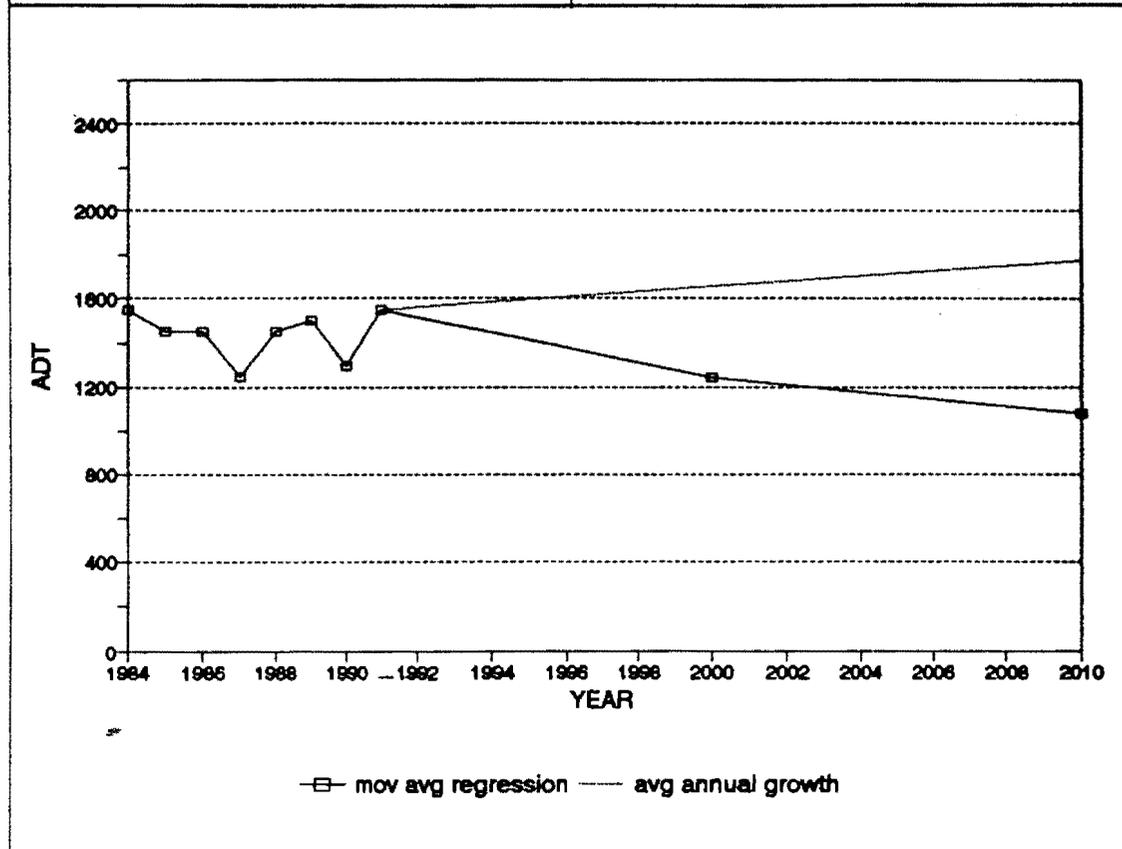
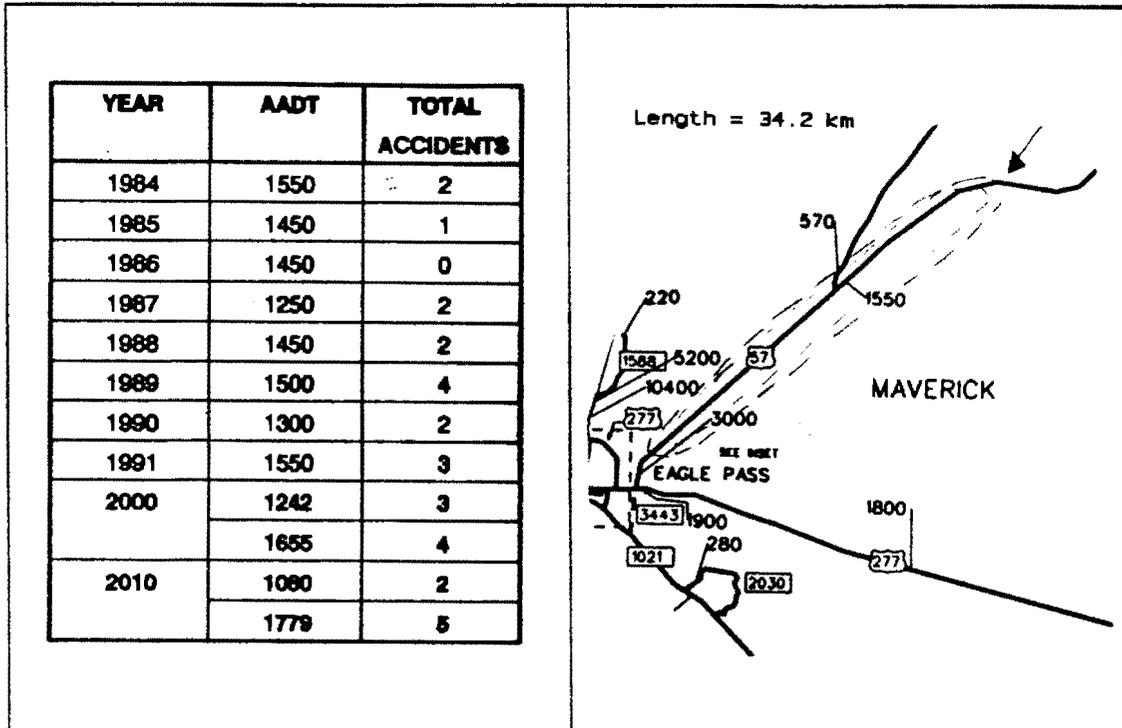


Figure B.7

#7 IH-35

Control Section

0018 05

0018 06

YEAR	AADT	TOTAL ACCIDENTS
1984	10600	6
1985	11520	10
1986	13300	12
1987	13800	16
1988	8800	17
1989	12700	15
1990	12400	12
1991	13800	22
2000	14284	77
	24149	177
2010	16277	95
	44970	473

Length = 21.6 km

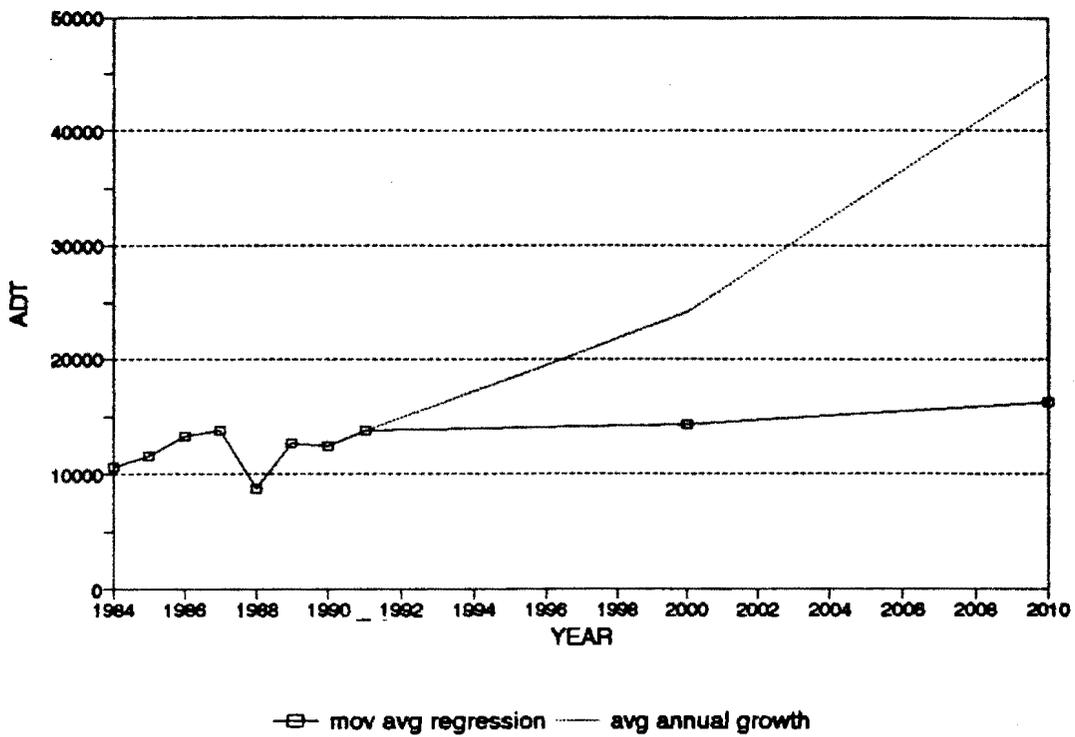
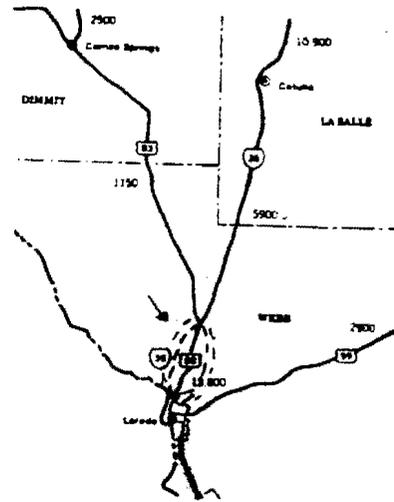


Figure B.8

#8 IH-35

Control Section 0018 06

Year	AADT	TOTAL ACCIDENTS
1984	40000	220
1985	38557	351
1986	38000	328
1987	41000	284
1988	45000	316
1989	49000	366
1990	57000	250
1991	54000	331
2000	68593	381
	81292	498
2010	88735	572
	128068	1023

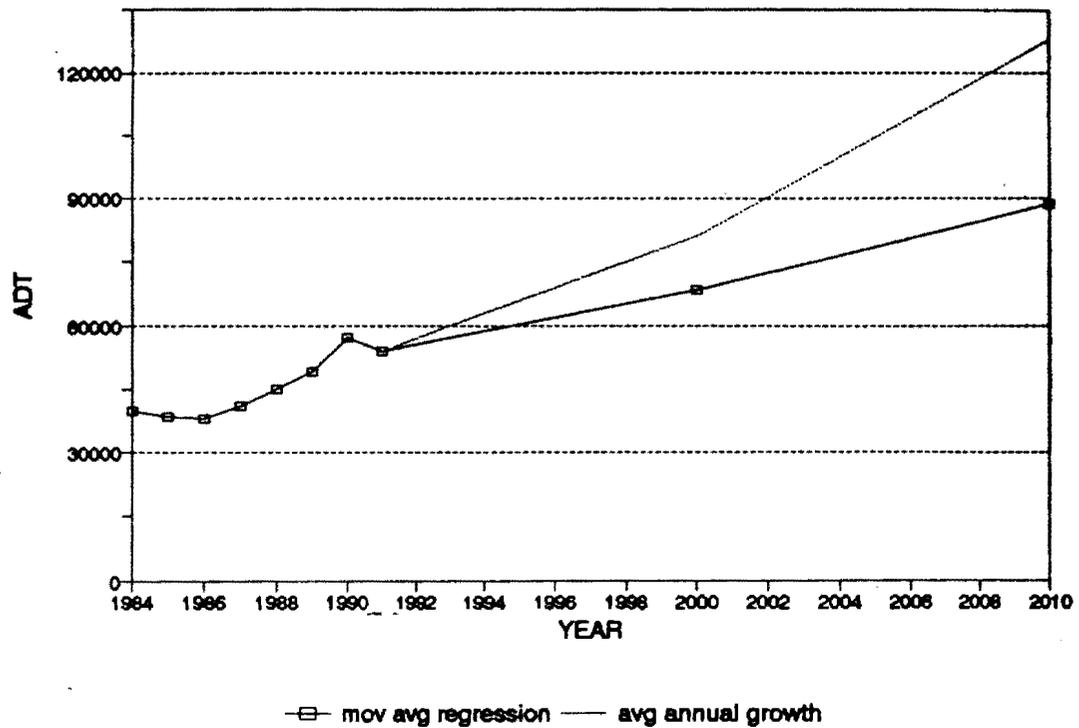
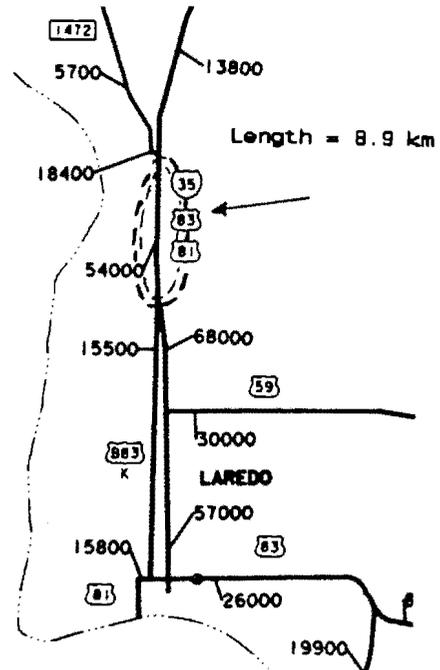


Figure B.9

#9 US-59

Control Section 0542 02

YEAR	AADT	TOTAL ACCIDENTS
1984	2100	4
1985	2098	8
1986	2300	4
1987	2200	3
1988	2000	5
1989	2500	6
1990	2000	5
1991	2900	3
2000	2657	5
	5148	15
2010	3023	6
	9741	40

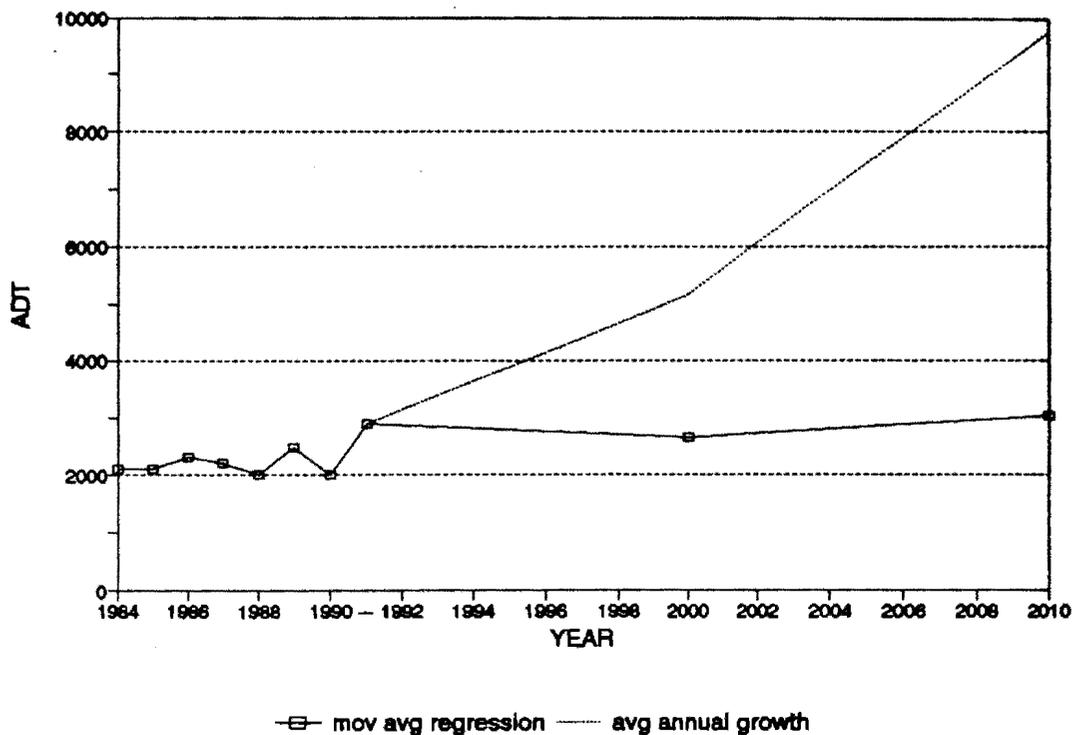
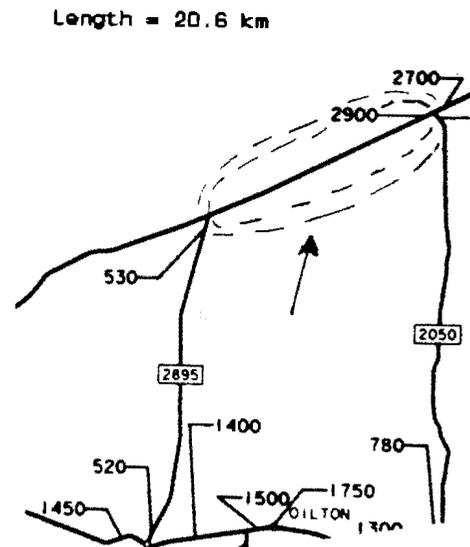


Figure B.10

#10 US-83

Control Section 0039 06

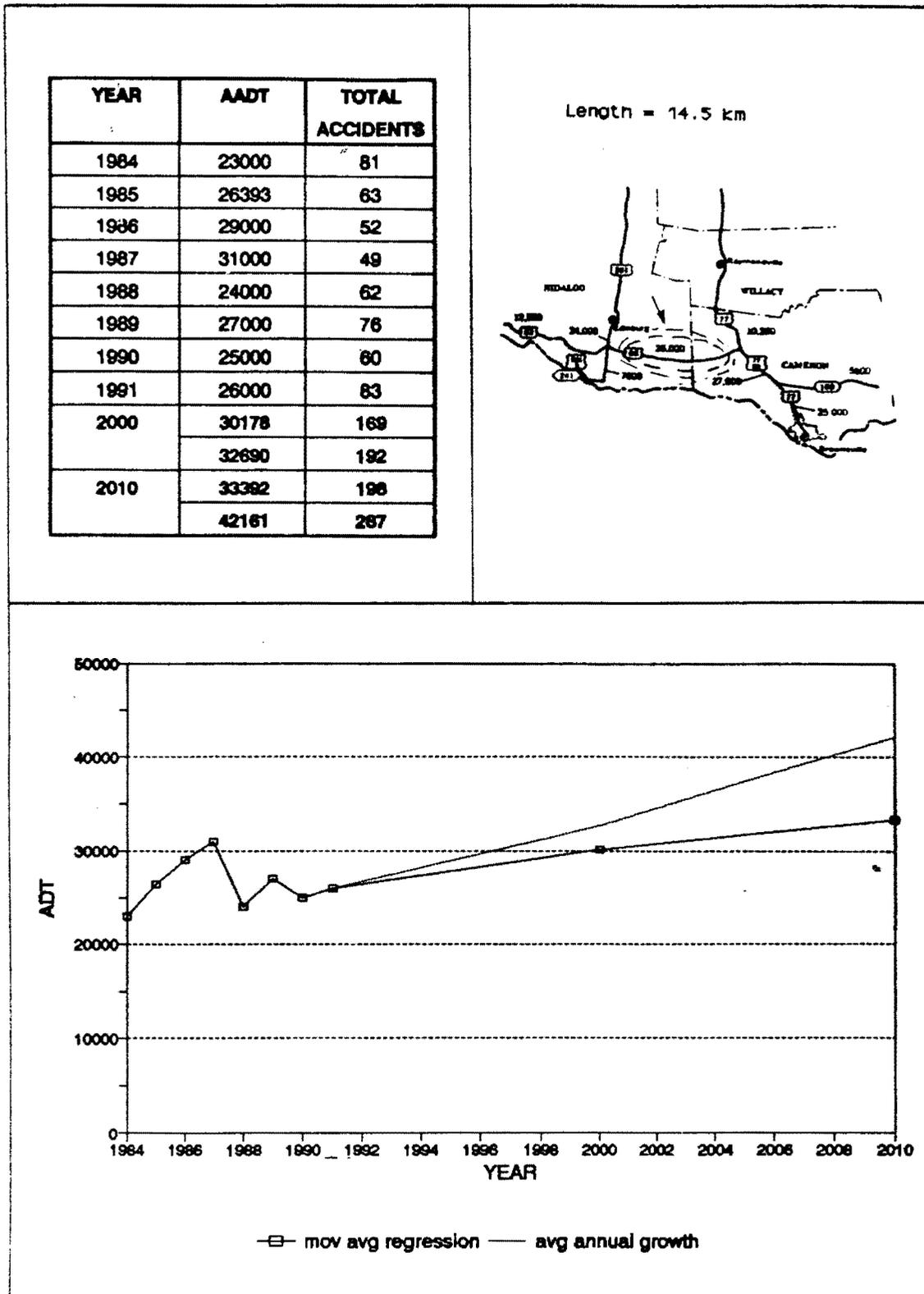


Figure B.11

#11 US-77

Control Section 0039 08

0039 09

YEAR	AADT	TOTAL ACCIDENTS
1984	17200	30
1985	17829	41
1986	18000	28
1987	20000	49
1988	22000	46
1989	23000	43
1990	24000	42
1991	25000	20
2000	33112	61
	40619	84
2010	43634	94
	69653	197

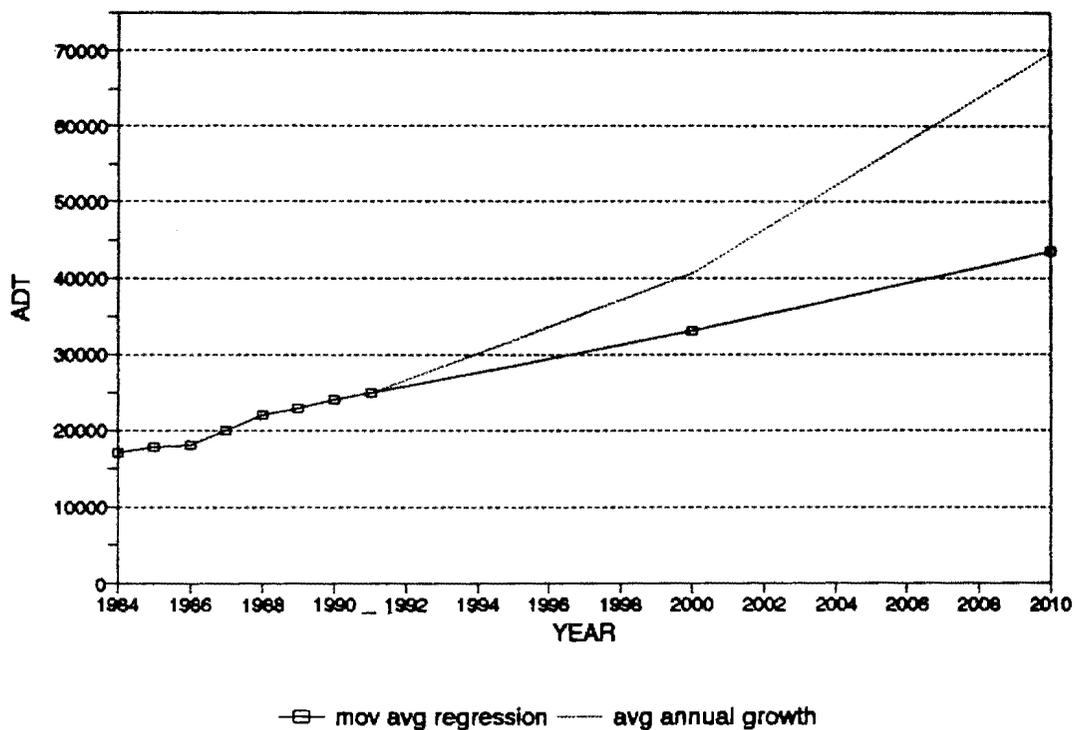
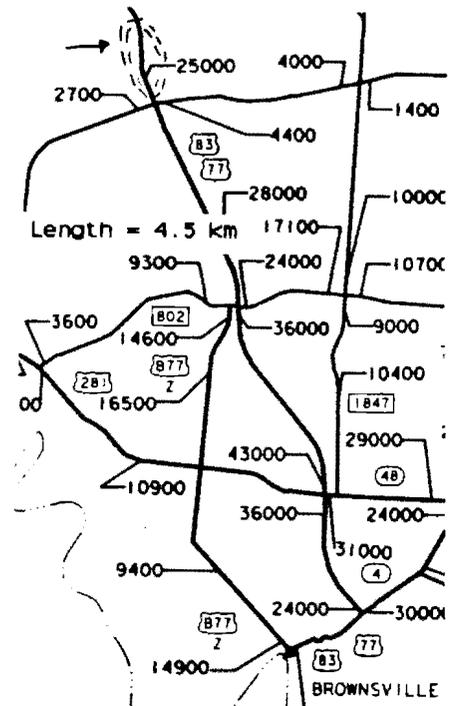
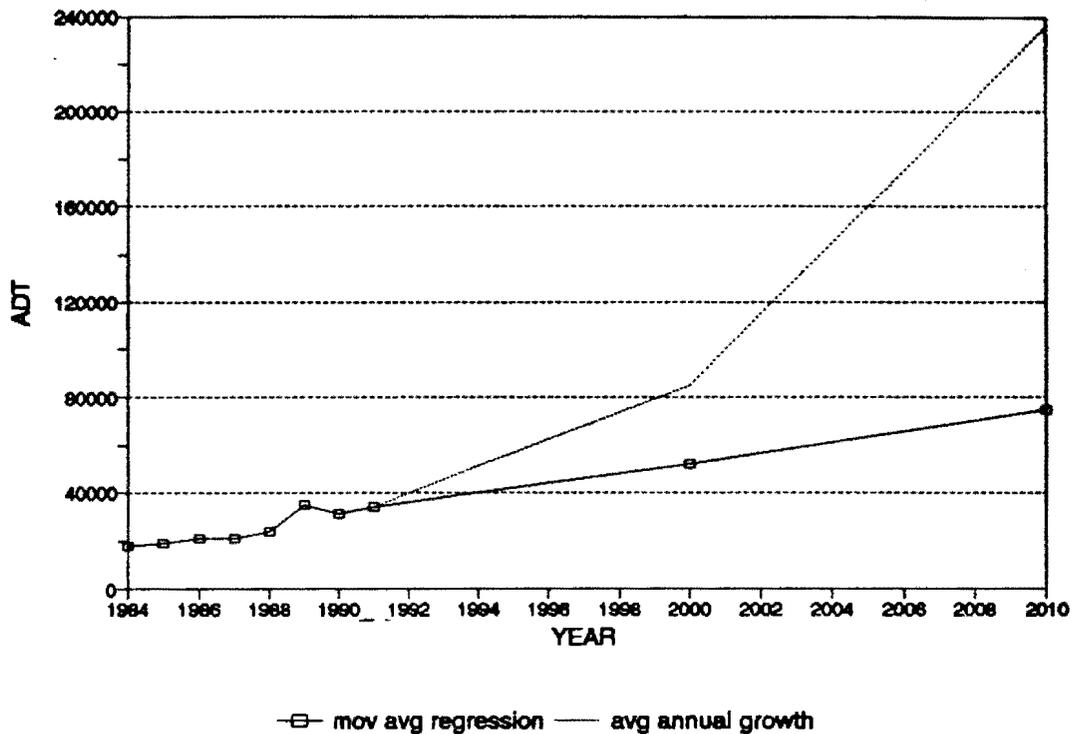
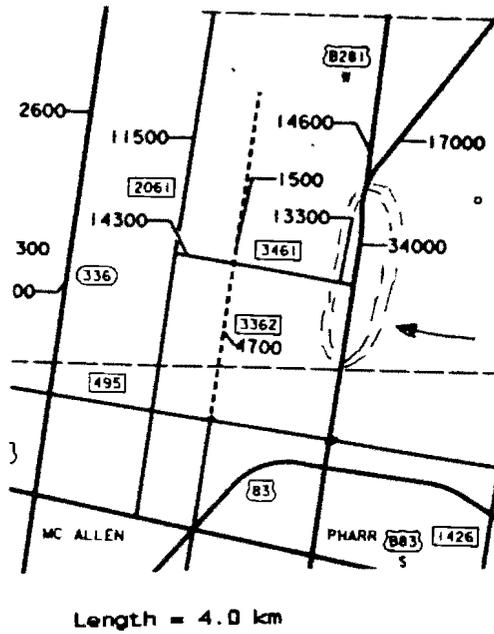


Figure B.12

#12 US-281

Control Section 0255 08

Year	AADT	TOTAL ACCIDENTS
1984	17900	18
1985	18841	7
1986	21000	36
1987	21000	41
1988	24000	43
1989	35000	52
1990	31000	55
1991	34000	63
2000	51772	110
	85062	240
2010	74411	195
	235637	1207



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