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**The Impact of the Change in Speed Limits on Texas Highways:  
A Nine-Month Evaluation**

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## **DISCLAIMER**

The opinions and conclusions expressed in this document are those of the authors and do not necessarily represent those of the State of Texas, the Texas Department of Transportation or any political subdivision of the state or federal government.

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## EXECUTIVE SUMMARY- FEBRUARY 1997

This report documents a preliminary evaluation of the impact of the change in speed limits on Texas highways subsequent to the repeal of the National Maximum Speed Limit (NMSL). The evaluation is still at an early stage because:

- changes in speed limits were phased-in over a period from December 8, 1995 through June 1996.
- there is a lag between the occurrence of a motor vehicle crash and its inclusion in the state-wide crash data files.

As a result of the speed limit changes there are now approximately 47,400 miles of highway in Texas with 70 mph speed limits, constituting 62 percent of the total roadway mileage in the state highway system. About 2700 of the 3300 miles of interstate highway now have 70 mph speed limits. About 23,700 miles of state and US designated highways and 21,000 miles of farm to market roads have 70 mph speed limits.

The number of crashes and injuries on the Texas state highway system in January through September 1996 is greater than the number in the same nine month period of 1995. The rate of those crashes and injuries expressed in frequency per 100 million vehicle miles traveled (mvmt) is also higher in 1996 than 1995. Determination of the extent to which raising the speed limits on Texas highways may have contributed to these increases, however, requires more than a simple comparison of 1996 and 1995 crashes and injuries. Evaluation of the impact of the higher speed limits requires analysis of:

- vehicle speeds
- the incidence and severity of motor vehicle crashes and injuries on the specific road segments where the speed limit has been raised.
- consideration of factors other than speed limit changes that may influence crash experience.

This study compares vehicle speed and crash data for January through September, 1996 with equivalent periods in the previous five years (1991-1995). The analysis concentrates on the impact of changes in posted speed limits on interstate highways. Preliminary comparisons are also made to evaluate the effect of the repeal of the NMSL on the entire state highway system, including those roadways on which the speed limit has not changed or where speed limit changes have been in effect for only a short time. Due to the short and varying amount of time that speed limit changes have been in effect on many of these roadways, definitive statements about the impact of speed limit changes on the state system as a whole cannot yet be made.

The primary measures of crash experience used in this analysis are serious crash frequencies and rates. Serious crashes (KAB) are defined as those in which at least one person was killed (K-level crashes), suffered an incapacitating injury (A-level) or suffered a non-incapacitating injury (B-level).

The findings presented below are a summary of the principal results of the evaluation of the impact of speed limit changes on interstate highways. Additional background, details of the analysis and analysis results are provided in the body of this report.

## **RURAL<sup>1</sup> INTERSTATES WHERE THE SPEED LIMIT WAS RAISED TO 70 MPH**

**Vehicle Speeds.** As expected, given that speed limits were raised, statistically significant<sup>2</sup> increases in average speeds and other speed parameters were observed during the first nine months of 1996 based on analysis of 24 hour speed measurements made by TxDOT at selected locations on rural interstates where the speed limit was raised to 70 mph. Comparison of the period from January through September 1995 with the same nine months of 1996 indicates that:

- Average vehicle speed increased from 64.0 mph to 66.0 mph.
- 85<sup>th</sup> percentile speed increased from 72.3 mph to 74.0 mph.
- Vehicles exceeding 70 mph increased from 16.3 percent to 27.2 percent.

Similar, but smaller, increases were observed at these sites during the same time periods from 1994 to 1995, before the speed limit was increased.

**Crashes and Crash Rates.** Although serious (KAB) crashes and serious crash rates (see Figure 1) went up in the first nine months of 1996, the increases were not significant when compared to equivalent time periods in the preceding five years (1991-1995). Comparison of the period from January through September 1995 with the same nine months of 1996 indicates that the:

- Average number of serious crashes per month increased from 162.8 to 176.1.
- Serious crashes per 100 mvmt increased from 13.5 to 14.2.

The number and rate of fatal crashes did not change significantly in the period following the increase in the speed limit. At the present time, there is not evidence to suggest that the increases observed in serious crashes cannot be accounted for by increases in travel volumes or other normal fluctuations in crash experience. There is, however, a significant increase in both the number and rate of possible injury crashes (C-level). There is also a significant increase in the number of C-level injuries but not in injury rate. An examination of the profile of crashes on rural interstates where the speed limit was raised indicates no significant effect of vehicle type, driver age, restraint use, or alcohol or unsafe speed as contributing factors. There was a significant increase in the number of daytime crashes but not nighttime crashes.

## **URBAN INTERSTATES WHERE THE SPEED LIMIT WAS RAISED TO 70 MPH**

**Vehicle Speeds.** Significant increases in all speed parameters were observed at urban survey sites

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<sup>1</sup>Rural interstates are defined as those interstate highways in areas with populations of less than 5000. Urban interstates are those in areas with populations of 5000 or more.

<sup>2</sup>When the term "significant" is used in this report in relation to comparisons being discussed, it means that a statistically significant difference ( $p < .05$ ) exists.

where the speed limit was raised to 70 mph. Comparison of the period from January through September 1995 with the same nine months of 1996 indicates that:

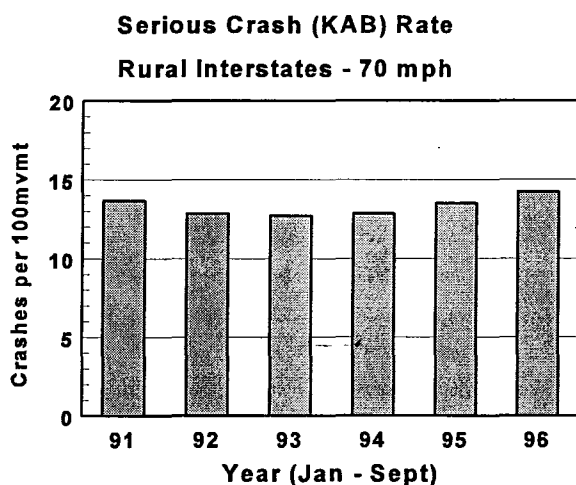
- Average vehicle speed increased from 57.9 mph to 60.6 mph.
- 85<sup>th</sup> percentile speed increased from 64.2 mph to 67.8 mph.
- Vehicles exceeding 70 mph increased from 2.5 percent to 7.5 percent.

Speeds on urban 70 mph interstates are generally lower than those on rural interstates. Higher traffic densities and large numbers of entering and exiting vehicles likely contribute to the slower speeds on the urban roadways.

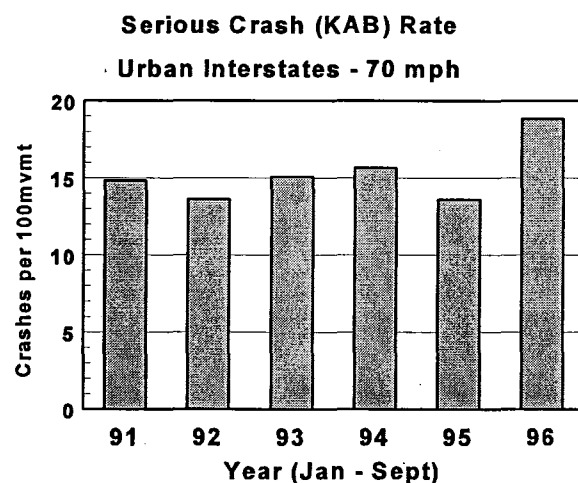
**Crashes and Crash Rates.** Significant increases in average monthly serious crashes and serious crash rates on urban interstates where the speed limit was raised to 70 mph were observed in 1996, compared to all analysis periods before the speed limit change (See Figure 2). Comparison of the period from January through September 1995 with the same nine months of 1996 indicates that the:

- Average number of serious crashes per month increased from 35.6 to 51.5 (44.7 percent).
- Serious crashes per 100 mvmt increased from 13.6 to 18.8 (38.5 percent).

There were also significant increases in B and C-level crashes and crash rates and in the number and rate of serious injuries. The number of fatal crashes and the fatal crash rate did not change significantly following the increase in the speed limit. Examination of the profile of these crashes indicates proportionally higher increases in passenger vehicle crashes than crashes involving trucks and greater increases in daylight crashes than in nighttime crashes. There was a significant increase in the number of crashes attributed to driving at unsafe speeds but not in the number of crashes in which alcohol was a contributing factor.



**Figure 1** Serious crashes (KAB) per 100 mvmt on rural interstates where the speed limit was raised to 70 mph.



**Figure 2** Serious crashes (KAB) per 100 mvmt on urban interstates where the speed limit was raised to 70 mph.

## CONCLUSIONS

Based on the results of the analyses conducted thus far, this preliminary evaluation of the impact of raising speed limits on Texas interstate highways strongly suggests:

1. Speeds on both rural and urban interstate highways where the speed limit is now 70 mph have increased following the change in speed limit.
2. On rural interstates where the speed limit was raised to 70 mph, there is not evidence of an increase in serious crashes or crash rates that can be attributed to the increased speeds or speed limits.
3. On urban interstates where the speed limit was raised to 70 mph, both the frequency and rate of serious crashes and injuries have increased following the increased speed limit. The weight of evidence suggests that these increases are associated with the higher speed limit.

The observed increase in serious crashes and crash rates on urban interstates where the speed limit was raised may be a transitory response to the change in speed limit. It is recommended that crash and speed data continue to be monitored and evaluated on interstate highways where the speed limit has been raised to 70 mph.

Crashes and speeds on State and US highways and FM roadways where the speed limit has been raised to 70 mph should be evaluated when sufficient time has elapsed for such an evaluation to be meaningful.

## TABLE OF CONTENTS

|                                                                               | Page |
|-------------------------------------------------------------------------------|------|
| <b>EXECUTIVE SUMMARY</b> .....                                                | ii   |
| <b>List of Tables</b> .....                                                   | vii  |
| <b>List of Figures</b> .....                                                  | ix   |
| <b>INTRODUCTION</b> .....                                                     | 1    |
| Purpose and Objectives of the Evaluation .....                                | 1    |
| Background .....                                                              | 1    |
| <b>METHOD OF ANALYSIS</b> .....                                               | 5    |
| Data Sources, Assumptions and Limitations .....                               | 5    |
| Evaluation Design and Analysis Approach .....                                 | 7    |
| <b>RESULTS OF THE ANALYSES</b> .....                                          | 10   |
| Vehicle Speeds .....                                                          | 10   |
| Crashes and Injuries .....                                                    | 14   |
| <b>CONCLUSIONS AND RECOMMENDATIONS</b> .....                                  | 25   |
| <b>APPENDIX A</b>                                                             |      |
| Locations of TxDOT permanent speed monitoring and Weigh-in-Motion sites ..... | A-1  |
| <b>APPENDIX B</b>                                                             |      |
| Summary tables of crash and injury data used in the analyses .....            | B-1  |

## LIST OF TABLES

|                                                                                                                                                                     | Page |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Table 1. Speed limits established by law in Texas .....                                                                                                             | 2    |
| Table 2. Distribution of speed limits on the Texas highway system .....                                                                                             | 4    |
| Table 3. Summary speed statistics for all vehicles at TxDOT speed monitoring sites<br>on interstate highways where the speed limit was raised to 70 mph. ....       | 10   |
| Table 4. Summary speed statistics for all vehicles at TxDOT speed monitoring sites<br>on rural interstate highways where the speed limit was raised to 70 mph. .... | 11   |
| Table 5. Summary speed statistics for trucks at three TxDOT weigh-in-motion sites<br>on interstate highways. ....                                                   | 12   |
| Table 6. Summary speed statistics for all vehicles at TxDOT speed monitoring sites<br>on urban interstate highways where the speed limit was raised to 70 mph. .... | 13   |
| Table 7. Summary speed statistics for all vehicles at TxDOT speed monitoring sites<br>where the speed limit remained 55 mph. ....                                   | 13   |
| Table 8. Average monthly fatal (K) and serious (KAB) crash frequencies on<br>all interstate highways where speed limit was raised to 70 mph. ....                   | 17   |
| Table 9. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on<br>all interstate highways where speed limit was raised to 70 mph. ....                      | 17   |
| Table 10. Average monthly fatalities (K) and serious (KAB) injury frequencies on<br>all interstate highways where speed limit was raised to 70 mph. ....            | 18   |
| Table 11. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on<br>all interstate highways where speed limit was raised to 70 mph. ....                | 18   |
| Table 12. Average monthly fatal (K) and serious (KAB) crash frequencies on<br>all rural interstate highways where speed limit was raised to 70 mph. ....            | 19   |
| Table 13. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on<br>all rural interstate highways where speed limit was raised to 70 mph. ....               | 19   |
| Table 14. Average monthly fatalities (K) and serious (KAB) injury frequencies on<br>all rural interstate highways where speed limit was raised to 70 mph. ....      | 20   |
| Table 15. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on<br>all rural interstate highways where speed limit was raised to 70 mph. ....          | 20   |
| Table 16. Average monthly fatal (K) and serious (KAB) crash frequencies on<br>all urban interstate highways where speed limit was raised to 70 mph. ....            | 21   |
| Table 17. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on<br>all urban interstate highways where speed limit was raised to 70 mph. ....               | 21   |

**LIST OF TABLES (Cont'd)**

|           |                                                                                                                                                   |    |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table 18. | Average monthly fatalities (K) and serious (KAB) injury frequencies on all urban interstate highways where speed limit was raised to 70 mph. .... | 22 |
| Table 19  | Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all urban interstate highways where speed limit was raised to 70 mph. ....     | 22 |
| Table 20. | Average monthly fatal (K) and serious (KAB) crash frequencies on all state system highways. ....                                                  | 23 |
| Table 21. | Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on all state system highways. ....                                                     | 23 |
| Table 22. | Average monthly fatalities (K) and serious (KAB) injury frequencies on all state system highways. ....                                            | 24 |
| Table 23  | Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all state system highways. ....                                                | 24 |

## LIST OF FIGURES

|                                                                                                                     | <b>Page</b> |
|---------------------------------------------------------------------------------------------------------------------|-------------|
| Figure 1. Average monthly serious crashes (KAB) on all interstates where speed limit was raised to 70 mph. ....     | 17          |
| Figure 2. Serious crashes (KAB) per 100 mvmt on all interstates where speed limit was raised to 70 mph. ....        | 17          |
| Figure 3. Average monthly serious injuries (KAB) on all interstates where speed limit was raised to 70 mph. ....    | 18          |
| Figure 4. Serious injuries (KAB) per 100 mvmt on all interstates where speed limit was raised to 70 mph. ....       | 18          |
| Figure 5. Average monthly serious crashes (KAB) on rural interstates where speed limit was raised to 70 mph. ....   | 19          |
| Figure 6. Serious crashes (KAB) per 100 mvmt on rural interstates where speed limit was raised to 70 mph. ....      | 19          |
| Figure 7. Average monthly serious injuries (KAB) on rural interstates where speed limit was raised to 70 mph. ....  | 20          |
| Figure 8. Serious injuries (KAB) per 100 mvmt on rural interstates where speed limit was raised to 70 mph. ....     | 20          |
| Figure 9. Average monthly serious crashes (KAB) on urban interstates where speed limit was raised to 70 mph. ....   | 21          |
| Figure 10. Serious crashes (KAB) per 100 mvmt on urban interstates where speed limit was raised to 70 mph. ....     | 21          |
| Figure 11. Average monthly serious injuries (KAB) on urban interstates where speed limit was raised to 70 mph. .... | 22          |
| Figure 12. Serious injuries (KAB) per 100 mvmt on urban interstates where speed limit was raised to 70 mph. ....    | 22          |
| Figure 13. Average monthly serious crashes (KAB) on all state system highways .....                                 | 23          |
| Figure 14. Serious crashes (KAB) per 100 mvmt on all state system highways .....                                    | 23          |
| Figure 15. Average monthly serious injuries (KAB) on all state system highways. ....                                | 24          |
| Figure 16. Serious injuries (KAB) per 100 mvmt on all state system highways. ....                                   | 24          |

# **The Impact of the Change in Speed Limits on Texas Highways: A Nine-Month Evaluation**

## **INTRODUCTION**

### **Purpose and Objectives of the Evaluation**

The reintroduction of 70 MPH speed limits on Texas highways after 23 years of lower maximum speed limits provides the impetus for the present evaluation. A series of evaluations, of which this is the first, is being conducted to assist TxDOT in:

- addressing anticipated information requests from the Texas Legislature;
- developing data for the US Department of Transportation related to provisions in the National Highway System Designation Act that require the Secretary of Transportation, "...in cooperation with any state which raises any speed limit ..." to prepare and submit a study to Congress on the impact of the repeal of the National Maximum Speed Limit, and
- making informed policy decisions regarding speed limits and in allocating speed enforcement and public information and education resources to programs that address speed-related crash injuries and fatalities.

The overall objective of the evaluation program is to determine the nature and extent of any impacts of the increased speed limits on safety on Texas highways subsequent to the repeal of the NMSL. The preliminary evaluation reported here is limited in scope to:

- potential impacts seen on interstate highways where the speed limit has been raised
- an overview of state-wide crash experience before and after the repeal of the NMSL.

Several criteria must be met before any conclusions can be reached that suggest the increased speed limits have had a negative effect on safety. First, it must be demonstrated that vehicle speeds, not just speed limits, have changed on the highways of interest. Second, it must be also be demonstrated that there has been a related change in traffic crashes. Finally, it must be shown that the change in crash experience is greater than would be expected if speeds and speed limits had not changed.

### **Background**

The basic provisions of the law governing maximum vehicle speeds on Texas highways<sup>1</sup> have not changed since 1963. The law establishes the maximum speed limits for various types of vehicles. Speed limits vary by vehicle type, roadway, time of day and geographic location. These limits are described in Table 1.

As a consequence of the Arab Oil Embargo of 1973, the federal government initiated fuel conservation measures including a 55 mph maximum speed limit on all roadways. This National

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<sup>1</sup>VCS Art. 6701d. - Uniform Act Regulating Traffic on Highways, Article XIX. Speed Restrictions.

Table 1. Speed Limits Established by Law in Texas

| Location               | Road Type                                              | Vehicle Type                                                                                                                                                                                     | Speed Limit (mph) |       |
|------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|
|                        |                                                        |                                                                                                                                                                                                  | Day               | Night |
| Urban District*        | All but Alleys                                         | All                                                                                                                                                                                              | 30                | 30    |
|                        | Alleys                                                 | All                                                                                                                                                                                              | 15                | 15    |
| Outside Urban District | State or Federal Numbered Highways, including FM or RM | Passenger Cars, Light Trucks**, Motorcycles or Commercial Buses                                                                                                                                  | 70                | 65    |
|                        | All Other Highways                                     | Passenger Cars, Light Trucks, Motorcycles or Commercial Buses                                                                                                                                    | 60                | 55    |
|                        | Any Highway                                            | All Other Vehicles Not Otherwise Specified                                                                                                                                                       | 60                | 60    |
|                        | Any Highway                                            | Towing Vehicles (GVW > 4500 lbs. or over 32 ft.)                                                                                                                                                 | 45                | 45    |
|                        | Any Highway                                            | Any Truck (except light trucks), truck tractor, trailer or semitrailer or any vehicle towing a trailer, semitrailer, another motor vehicle or any house trailer (GVW < 4500 lbs. or less 32 ft.) | 60                | 55    |
|                        | Any Highway                                            | School Bus                                                                                                                                                                                       | 50                | 50    |

\* "Urban District" means the territory contiguous to and including any highway or street which is built up with structures devoted to business, industry or dwelling houses, situated at intervals of less than one hundred (100) feet for a distance of a quarter ( $\frac{1}{4}$ ) of a mile or more on either side.

\*\* Light truck means a truck with a carrying capacity less than 2000 pounds.

Source: VCS Article 6701d - Uniform Act Regulating Traffic on Highways, Article XIX. Speed Restrictions.

Maximum Speed Limit (NMSL) was adopted as an emergency measure in Texas by a minute order of the State Highway Commission, now the Texas Transportation Commission. This measure did not alter the 1963 state speed law, rather it established a state-wide temporary speed zone of 55 mph.

In May 1987, the state re-zoned the speed limits on rural interstate highways to 65 mph in response to federal legislation that authorized such a change. In 1989, additional four lane divided highways were permitted by federal law to be raised to 65 mph. The maximum speed limits for trucks (except light trucks) was set at 60 mph daytime and 55 mph at night, in compliance with the Texas speed law.

On November 28, 1995, the President signed The National Highway System Designation Act of 1995 (PL 104-59). Included in that act is a provision that repealed Section 154 of Title 23 of the United States Code, National Maximum Speed Limit. On the effective date of the repeal, December 8, 1995, the Texas Transportation Commission's authority to set temporary speed limits of 55 and 65 mph expired and the 1963 Texas speed limit law went back into effect. The 1963 law, which had been superseded by federal requirements since 1974, requires the Texas Department of Transportation (TxDOT) to post 70 mph daytime and 65 mph night speed limits for passenger vehicles on all state roadways outside city limits unless engineering and traffic studies demonstrate that lower speed limits are warranted. Truck speed limits on rural roadways are set at 60 mph during daylight hours and 55 mph at night.

Beginning in late summer of 1995 and continuing through mid June 1996, TxDOT conducted studies on the state highway system to identify those road segments that should be posted at speed limits below the maximum provided by state law. Roadways with speed limits lower than the maximum were identified and approved by the Texas Transportation Commission in a series of minute orders addressing:

- interstate and other freeway and four-lane divided highways ( November 30, 1995),
- undivided highways with four or more lanes (December 21, 1995),
- all other state and US highways (January 25, 1996),
- farm-to-market roadways (June 18, 1996).

As a result of the changes in speed limits:

- more than three-fourths of the state highway system roadway mileage now have speed limits higher than 55 mph.
- the 70 mph maximum speed limit is now in effect on about 62% of the state system highway mileage.

Highways with 70 mph include more than:

- 80% of interstate, US, and state highway mileage
- 50% of the farm-to-market system.

The approximate distribution of speed limits by miles of highway for each highway designation is shown in Table 2.

**Table 2. Distribution of speed limits on the Texas highway system.**

| Highway Designation | Road Mileage By Speed Limit |        |        |        |        |        |
|---------------------|-----------------------------|--------|--------|--------|--------|--------|
|                     | <55 mph                     | 55 mph | 60 mph | 65 mph | 70 mph | Total  |
| Interstate          |                             | 100    | 300    | 200    | 2,700  | 3,300  |
| US Highways         | 300                         | 600    | 400    | 600    | 10,300 | 12,200 |
| State Highways      | 300                         | 900    | 700    | 800    | 13,400 | 16,100 |
| FM Roads            | 1,300                       | 9,600  | 6,900  | 2,000  | 21,000 | 40,800 |
| Frontage Roads      | 400                         | 4,100  | 0      | 0      | 0      | 4,500  |
| Total State System  | 2,300                       | 15,300 | 8,300  | 3,600  | 47,400 | 76,900 |

Source: TxDOT, 1997

## METHOD OF ANALYSIS

Only nine months of crash data are available from the period after the repeal of the NMSL, therefore, the present analysis is limited to evaluation of impacts of the higher speed limits on speeds and crashes over the period from January through September, 1996.

### Data Sources, Assumptions and Limitations

Three types of archived and current data have been developed and analyzed in this evaluation to provide information with regard to:

- vehicle speeds
- the frequency of highway crashes and injuries
- crash and injury rates.

The components of these categories, how they were used in the analyses, and the major assumptions and limitations of the data are described in the sections that follow.

Speed zones in which the speed limit was set lower than the maximum mandated by state law were effective on specific dates based on the issuance of minute orders by the Texas Transportation Commission. All highway classifications were not subject to Commission action at the same time. As a result, the only group of highways for which there are nine months of experience after the change in speed limits are interstate highways and other freeways and four-lane divided roadways. Potential changes in the distribution of travel speeds resulting from the change in speed limits may not correspond with either the official adoption of new speed limits or the actual posting of speed limit signs since changes in the driving behavior of the public may have anticipated or lagged behind the posting of the new signs.

For the nine month analysis presented here, the only highway type for which detailed analyses by specific speed limits are provided is interstate highways. The other freeways and four lane divided highways addressed by the Transportation Commission's November and December 1995 minute orders are not included in the analysis because specification of the locations of speeds zones and specific speed limits for these roads were not available when the analysis was initiated. A limited analysis of the state highway system as a whole, including those roadways on which the speed limit has not changed or where speed limit changes have been in effect for only a portion of the nine-month analysis period is also included.

### Vehicle Speeds

The primary source of vehicle speeds for the analysis is the 40 permanent speed monitoring sites operated by TxDOT. The sites from which speed data were used for this analysis are listed in Appendix A. The speed data used are limited to that which has been consistently collected during both the before and after speed limit change periods evaluated. The best available data are from the automated counters at the permanent sites across the state. These sites have been in use with

consistent data formats since at least 1989. The speed monitoring sites provide a sample of speeds on major roadways collected each quarter. Limited data are available on non-major roadways. Although the samples are not biased for those classes of roads they represent, they do not reflect the speeds of all classes of roadways. Further, since the speeds are collected in 5 mph increments, statistics for grouped data generally must be used. Because of this grouping, the average speeds and the measures of speed variability among vehicles are necessarily estimates that provide good relative comparisons of speeds at different time periods but should not be considered precise indications of actual speeds. The speeds measured at the permanent monitoring sites are collected over 24 hour periods and have not been grouped by time of day for this analysis. Therefore, at sites where the speed limit is nominally 70 mph, the speed samples will include nighttime speeds of passenger vehicles for which the speed limit is 65 mph. Truck speed limits at the "70 mph" sites are 60 mph during the day and 55 mph at night.

Because data from the permanent speed monitoring sites are not classified by vehicle type, speed data from these sites provide estimates for all vehicles in the traffic stream without distinctions between passenger vehicles and trucks.

Although trucks constitute a relatively small proportion of the vehicle mix and of the vehicles involved in crashes, the impact of their size and their influence on the movement of goods and thus on the Texas economy has raised interest in truck related issues to a high level. Therefore, an estimate of truck speeds is provided based on raw data from a limited number of weigh-in-motion (WIM) sites operated by TxDOT. These sites are used to provide truck weight data for TxDOT planning purposes without requiring trucks to pull off the road into weigh stations. The automated equipment used for this purpose classifies vehicles by type and also measures vehicle speeds. Though very limited, the WIM sites provide the best estimates of truck speeds available for this evaluation. Truck speeds derived from the WIM data sets specifically are not a random sample of the speeds of trucks on all Texas highways. They do, however, provide a reasonable estimate of any gross differences in truck speeds among different time periods. All three of the WIM sites from which truck speeds are estimated for this report are on interstate highways. Locations of these sites are shown in Appendix A.

For the purposes of this report, "truck" includes all vehicle classifications that are subject to a maximum speed limit of 60 mph as defined in the Texas speed law, that is, any truck (except light trucks with a carrying capacity of 2000 pounds or less), truck tractor, trailer or semitrailer or any vehicle towing a trailer or semitrailer.

Summaries of vehicle speeds from both the permanent speed measurement sites and the WIM sites from periods before and after the repeal of the NMSL are provided in the results section. For the traffic stream as a whole, speed parameters for the period before the repeal of the NMSL are based on speed samples from January through September of each year from 1991-1995. Speeds in the period after the change in speed limits are based on samples collected from January through September, 1996. Speed data for trucks are available only from 1994 through 1996.

## **Frequency and Rates of Crashes and Injuries**

Crash and injury data used in the analyses were obtained from the Texas Department of Public Safety (DPS) Accident File. Crash data are not officially "certified" until several months after the end of each calendar year. Therefore, certified data for 1996 were not available for this preliminary evaluation. It is unlikely that the use of uncertified data for 1996 will have any effect on the results of the analyses because the difference between certified and uncertified crash data has been, historically, very small.

Crash rates (crashes per 100 million vehicle miles traveled) used in the analyses are based on annual average daily traffic estimates for individual road segments multiplied by the road segment length. Estimates of 1996 traffic volumes provided by TxDOT are based on preliminary analysis of actual 1996 data along with historical trends. These are not the final traffic volume estimates for 1996, but they should provide a very close approximation.

Crashes in the DPS Accident File are classified as K, A, B or C crashes, so named to correspond to the most severe level of injury resulting from the crash. K-level crashes are those in which at least one person was killed, i.e., the crash resulted in one or more fatalities. Less severe, but still serious crashes are also defined by the highest level of injury associated with the crash, where A = incapacitating injury and B = non-incapacitating injury. C-level crashes are those in which the most severe injury incurred was a "possible injury."

Crashes in which no injury was reported, i.e., property damage only (PDO) crashes, were not included in this evaluation. Exclusion of PDOs was necessary because, due to changes in reporting thresholds for these crashes in many jurisdictions and a change in the computerized crash record system in July 1995, there is not a consistent count of PDOs over all of the analysis periods.

The crashes analyzed for this report include only those that occurred on the main travel lanes of the highways in question. Crashes on frontage roads, exit and entry ramps, and detours are not included. There are two reasons for this limitation. First, the speed limits of interest apply to the main lanes, not necessarily the other road parts. Second, traffic volumes used for establishing crash rates are available in the detail required for the analysis only for the main travel lanes. An exception to the main lane only reporting is made for the frequency of crashes on the state highway system as a whole. Because the analysis at this level does not make distinctions among highway types or specific speed limits, crashes on all road parts are included. Crash rates for all state system highways are based on main lanes only.

## **Evaluation Design and Analysis Approach**

The primary focus of the evaluation is on those portions of the Interstate Highway System in Texas that now have 70 mph speed limits. This includes about 2700 miles of the 3300 miles of interstate highway in the state. For the most part, the evaluation is restricted to evaluation of the impact of a 5 mph increase in the speed limit on rural interstates and a 5-15 mph increase on urban interstates.

In addition to evaluating speed limit specific crash experience on interstate highways, a limited evaluation of crashes on the state highway system as a whole is also provided. Because speed limits on many of the roadways in the state system changed at different times throughout 1996, the "state-wide" analysis does not address specific speed limit changes. Even though the speed limit may or may not have changed on specific parts of the system, it compares vehicle speeds and crashes on the entire system in the nine months following the repeal of the NMSL with nine month periods in the five years preceding the repeal.

State law mandated that the speed limit was increased on all roadways except those that were deemed unsuitable for increases under TxDOT speed zoning procedures. Therefore, there are no control or comparison groups that can be used to make concurrent comparisons of crash experience among equivalent roadways with and without speed limit changes. As a result, the roadways that experienced changes in speed limits served as their own controls in a before and after speed limit change analysis.

Because the use of a single year of data from before the speed limit changes would not provide any way to account for the trends in crashes prior to the change in speed limits, five years of data from before the repeal of the NMSL, blocked into periods with equivalent months, were used. The basic units of analysis are months within multiple time period blocks. The first nine months of each of the comparison years were used.

Monthly crash and injury frequency and rate data were subjected to a series of Analyses of Variance (ANOVAs) using the General Linear Model (GLM) procedures in the SAS statistical system. The GLM procedure provides for statistical testing of any differences among years (1991-1996) and of differences from month to month over all six years. Of interest here are any differences in the crash and injury measures among years, especially between 1996 and all of the years prior to the speed limit change.

Analysis models for crashes and injuries (both frequencies and rates) were computed for:

- Interstate highways where the speed limit was raised to 70 mph.
- Interstate highways in rural and urban areas
- All state system highways

For 70 mph interstate highways where statistically significant changes in 1996 crash experience were observed, crash profile variables were examined to determine their contribution to the changes observed. Crash profile variables include:

- Vehicle type (passenger vehicles and trucks)
- Light Condition (day and night)
- Driver age group (24 and under/over 24 and 38 and under/over 38)
- Speed related crashes (speed unsafe for conditions and exceeding the speed limit)
- Alcohol related crashes
- Number of vehicles involved (single and multiple vehicle crashes)
- Driver restraint use

Although differences between crash frequencies and rates for 1995 and 1996 are reported with the results of the analyses, the purpose of the analyses conducted for this evaluation is not to evaluate the statistical significance of differences between these two years. Because the crashes included in the Texas accident files constitute the entire population of Texas crashes, inferential statistics are not necessary to make such comparisons. The purpose of the statistical analyses is to provide information that will assist in determining if the magnitude of differences observed between the period following the speed limit change and the five analysis periods preceding the change in speed limits are consistent with differences among other years when no changes in speed limits intervened or if the best explanation for any observed differences lies in the increased speed limit.

## RESULTS OF THE ANALYSES

### VEHICLE SPEEDS

Speed surveys are routinely conducted by TxDOT at 40 automated, permanent speed monitoring locations. The surveys include measurements from both day and night time periods but do not classify vehicles by type. At locations that now have a 70 mph speed limit, each sample may include trucks for which the daytime speed limit is 60 mph. Speeds from nighttime periods when the speed limit is 65 mph for passenger vehicles and 55 mph for trucks are also included. Large discrepancies in the number of vehicles for which speeds are available in different years are evident in the tables that follow. This is due to differences in the number of days on which vehicle counts were made; nearly twice as many sample days were available in 1995 and 1996 than in the previous years. The locations of all survey sites from which speed data were used are listed in Appendix A.

#### INTERSTATES - 70 MPH

Included among the permanent sites at which speeds are sampled are two urban and eight rural interstate highway locations where the speed limit was raised to 70 mph. Summary statistics for the speed data collected at all 70 mph interstate locations during the first nine months of each year, from 1991 to 1996, are presented in Table 3.

**Table 3. Summary Speed Statistics for All Vehicles at TxDOT Speed Monitoring Sites on Interstate Highways Where the Speed Limit was Raised to 70 mph (First Nine Months of Each Year).**

| Year | No. of Vehicles | Mean Speed | Standard Deviation | 85 <sup>th</sup> Percentile | %>55 mph | %> 60 mph | %>65 mph | %>70 mph | %>75 mph | %>80 mph |
|------|-----------------|------------|--------------------|-----------------------------|----------|-----------|----------|----------|----------|----------|
| 1991 | 534,694         | 62.8       | 8.5                | 71.7                        | 80.6     | 60.5      | 37.6     | 21.2     | 8.8      | 3.2      |
| 1992 | 859,426         | 63.8       | 8.1                | 72.2                        | 86.4     | 67.4      | 40.8     | 22.8     | 9.3      | 3.3      |
| 1993 | 539,636         | 61.0       | 7.7                | 68.9                        | 77.1     | 55.0      | 27.8     | 11.8     | 3.4      | 1.0      |
| 1994 | 299,577         | 61.0       | 8.5                | 69.8                        | 75.3     | 54.3      | 30.2     | 14.4     | 4.3      | 1.2      |
| 1995 | 1,769,841       | 63.3       | 8.1                | 71.7                        | 86.0     | 67.7      | 39.4     | 14.8     | 4.8      | 1.6      |
| 1996 | 1,277,495       | 65.0       | 7.9                | 73.2                        | 87.9     | 72.8      | 49.9     | 23.5     | 6.9      | 1.9      |

Vehicle speeds have fluctuated at these sites over the six year period examined, whether or not the speed limit changed. For the purposes of this evaluation, the most pertinent comparisons among vehicle speeds are between 1996 and 1995. The results of statistical comparisons between the data

for the first nine months of 1996 and the equivalent time period in 1995 indicate significant<sup>1</sup> increases in all speed parameters except the standard deviation. These increases are not surprising given that the speed limit was raised. The increase in the percent of vehicles traveling more than 70 mph is of particular interest. The standard deviation, which provides an estimate of the variability among speeds, is thought to be related to crash frequency: the higher the standard deviation, the greater the crash frequency. As can be seen in the table, the standard deviation decreased a significant, but very small amount.

**Rural Interstates - 70 mph.** Summary statistics for the speed data collected at rural interstate locations during the first nine months of each year, from 1991 to 1996, are presented in Table 4.

**Table 4. Summary Speed Statistics for All Vehicles at TxDOT Speed Monitoring Sites on Rural Interstate Highways Where the Speed Limit was Raised to 70 mph (First Nine Months of Each Year).**

| Year | No. of Vehicles | Mean Speed | Standard Deviation | 85 <sup>th</sup> Percentile | %>55 mph | %> 60 mph | %>65 mph | %>70 mph | %>75 mph | %>80 mph |
|------|-----------------|------------|--------------------|-----------------------------|----------|-----------|----------|----------|----------|----------|
| 1991 | 442,096         | 63.7       | 8.6                | 72.7                        | 83.7     | 66.3      | 42.9     | 24.6     | 10.3     | 3.8      |
| 1992 | 848,168         | 63.9       | 8.0                | 72.2                        | 86.8     | 68.0      | 41.3     | 23.1     | 9.4      | 3.4      |
| 1993 | 487,246         | 61.2       | 7.7                | 69.2                        | 78.2     | 57.0      | 28.9     | 12.2     | 3.4      | 1.0      |
| 1994 | 213,385         | 62.6       | 8.1                | 71.0                        | 83.3     | 66.0      | 38.3     | 18.1     | 4.9      | 1.1      |
| 1995 | 1,575,740       | 64.0       | 8.0                | 72.3                        | 88.7     | 72.5      | 43.1     | 16.3     | 5.3      | 1.8      |
| 1996 | 1,040,236       | 66.0       | 7.7                | 74.0                        | 90.5     | 78.6      | 56.0     | 27.2     | 8.0      | 2.2      |

As was the case for speeds on all 70 mph interstates, the results of statistical comparisons between the data for the first nine months of 1996 and the equivalent time period in 1995 indicate significant increases in all speed parameters except the standard deviation. Again, this is not surprising given the increase in the speed limit. An increasing trend in mean speeds is seen on these roadways since 1993, however, the magnitude of increase from 1995 to 1996 is larger than previously observed. The standard deviation of speeds on rural interstates decreased a small, but significant, amount between 1995 and 1996.

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<sup>1</sup>When the term "significant" is used in this report in relation to comparisons being discussed, it means that a statistically significant difference ( $p < .05$ ) exists. Note that very small differences, such as the change in standard deviation from 8.1 to 7.9, may be statistically significant when the sample sizes are very large as is the case here. In other cases, where sample sizes are small, large numerical differences may not be statistically significant. The importance of differences that are statistically significant must be judged based on knowledge of the subject.

**Truck Speeds.** The speed limits for trucks<sup>1</sup> on interstate highways did not change with the change in the speed law in 1995. It has been 60 mph during the day and 55 mph at night since 1987. The speed limit for trucks on non-interstate roadways may be 60/55 mph or less.

Speed data for trucks were taken from three weigh-in-motion (WIM) sites located on rural interstate highways. Site locations are provided in Appendix A. Data are collected for trucks and other vehicles at these sites throughout the year. Summary statistics for truck speeds are presented in Table 5 for the years from 1994 to 1996.

**Table 5. Summary Speed Statistics for Trucks at Three TxDOT Weigh-in-Motion Sites on Interstate Highways.**

| Year | No. of Vehicles | Mean Speed | Standard Deviation | 85 <sup>th</sup> Percentile | %>55 mph | %>60 mph | %>65 mph | %>70 mph |
|------|-----------------|------------|--------------------|-----------------------------|----------|----------|----------|----------|
| 1994 | 379,767         | 62.8       | 6.1                | 68.9                        | 90.8     | 66.4     | 30.3     | 8.3      |
| 1995 | 567,873         | 64.6       | 7.5                | 72.1                        | 92.4     | 71.9     | 40.5     | 15.8     |
| 1996 | 390,561         | 63.0       | 6.8                | 69.8                        | 90.6     | 65.4     | 31.4     | 9.8      |

The results of statistical tests performed on these data indicate that mean speeds increased in 1995 and decreased in 1996. The same pattern of results were observed in the percentage of trucks exceeding each speed value and the estimated 85 percentile speeds.

Since the speed limit for trucks did not change on these interstates, finding that speeds did not increase from 1995 to 1996 is not entirely unexpected. It is not clear, however, how to account for the observed decrease in speeds.

**Urban Interstates - 70 mph.** Speed samples from the TxDOT speed monitoring sites were also available for some urban interstate locations where the speed limit has been raised to 70 mph. As on the rural interstates, these samples include day and nighttime measures of speeds for both passenger vehicles and trucks. The summary speed data for the first nine months of each year from 1991 to 1996 are presented in Table 6.

Analyses comparing the 1996 urban sample with that of 1995 indicate that all speed parameters increased significantly on urban interstates where the speed limit was raised to 70 mph. In general, mean speeds and other speed parameters on these roads are less than those observed on rural interstates where the speed limit was raised. This is likely due to higher traffic volumes and a higher percentage of entering and exiting traffic.

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<sup>1</sup>All references to trucks, large trucks or heavy trucks in this report mean those vehicles subject to a maximum daytime speed limit of 60 mph and a 55 mph speed limit at night as defined in the Texas speed law (see Table 1). This includes any truck (except those with a carrying capacity less than 2000 pounds), truck tractor, trailer or semitrailer or any vehicle towing a trailer or semitrailer.

**Table 6. Summary Speed Statistics for All Vehicles at TxDOT Speed Monitoring Sites on Urban Interstate Highways Where the Speed Limit was Raised to 70 mph (First Nine Months of Each Year).**

| Year | No. of Vehicles | Mean Speed | Standard Deviation | 85 <sup>th</sup> Percentile | %>55 mph | %> 60 mph | %>65 mph | %>70 mph | %>75 mph | %>80 mph |
|------|-----------------|------------|--------------------|-----------------------------|----------|-----------|----------|----------|----------|----------|
| 1991 | 92,598          | 58.3       | 6.6                | 65.2                        | 65.9     | 33.1      | 12.3     | 5.2      | 1.8      | 0.6      |
| 1992 | 11,258          | 56.4       | 6.6                | 63.2                        | 52.7     | 21.7      | 7.1      | 3.2      | 1.2      | 0.5      |
| 1993 | 52,390          | 59.0       | 7.4                | 66.7                        | 66.6     | 36.6      | 17.1     | 8.5      | 3.4      | 1.3      |
| 1994 | 86,192          | 56.9       | 8.0                | 65.2                        | 55.7     | 25.1      | 10.0     | 5.4      | 2.9      | 1.6      |
| 1995 | 194,101         | 57.9       | 6.1                | 64.2                        | 63.7     | 28.9      | 9.5      | 2.5      | 0.8      | 0.4      |
| 1996 | 237,259         | 60.6       | 6.9                | 67.8                        | 76.7     | 47.5      | 23.0     | 7.5      | 1.9      | 0.6      |

## ALL STATE SYSTEM ROADWAYS

Speed survey data were available from a few roadway locations where the speed limit did not change. These data were available from one site on an urban interstate highway, one state highway site, and four sites on FM highways. On these roads, the speed limit remained 55 mph for all vehicles during both day and night. Data for the first nine months of the available years are presented in Table 7.

**Table 7. Summary Speed Statistics for All Vehicles at TxDOT Speed Monitoring Sites Where the Speed Limit Remained 55 mph (First Nine Months of Each Year).**

| Year | N       | Mean | S.D. | 85 <sup>th</sup> % | %>55 | %>60 | %>65 | %>70 | %>75 | %>80 |
|------|---------|------|------|--------------------|------|------|------|------|------|------|
| 1991 | 38,269  | 53.4 | 9.2  | 62.9               | 39.6 | 17.9 | 6.8  | 3.4  | 1.5  | 0.8  |
| 1992 | 38,963  | 54.1 | 8.9  | 63.3               | 43.2 | 19.7 | 7.4  | 3.6  | 1.6  | 0.6  |
| 1993 | 73,925  | 56.1 | 8.5  | 65.0               | 54.7 | 29.4 | 11.2 | 4.2  | 1.4  | 0.5  |
| 1994 | 225,694 | 56.9 | 7.0  | 64.2               | 78.9 | 50.5 | 20.9 | 5.8  | 1.6  | 0.6  |
| 1995 | 500,451 | 60.4 | 7.0  | 67.6               | 79.6 | 48.2 | 19.5 | 5.3  | 1.8  | 0.8  |
| 1996 | 630,028 | 62.2 | 7.8  | 70.3               | 83.8 | 61.3 | 32.3 | 10.5 | 3.2  | 1.0  |

As can be seen in this table, mean speeds, 85<sup>th</sup> percentile speed and the percentage of motorists exceeding the speed limit increased significantly in 1996 when compared with 1995. The standard deviation also increased. As would be expected, mean speeds on these roadways are lower than those on rural interstate highways where the speed limit is 70 mph.

## CRASHES AND INJURIES

The primary focus of the analyses of crashes and injuries is on the frequency and rate of fatal (K) and serious (KAB) crashes and injuries. Tables<sup>1</sup> in this section provide data and analysis results for:

- Average number of fatal (K) and serious (KAB) crashes per month in each analysis period,
- Fatal and serious crash rates (number per 100 mvmt),
- Average number of fatalities (K) and serious (KAB) injuries per month in each analysis period,
- Fatality and serious injury rates (number per 100 mvmt) .

The number and rates of serious crashes and injuries are also depicted graphically. Additional data tables for frequencies and rates of all severity levels of crashes and injuries are provided in Appendix B. The appendix also includes tabled summaries of the analyses of crash frequencies that were used to examine crash profiles. These include vehicle type, light condition, the contributing factors of speed and alcohol, driver age, the number of vehicles involved and driver restraint use.

As was the case for the presentation of vehicle speed data, the crash and injury results are provided by highway type and speed limit.

### ALL INTERSTATES - 70 MPH

Speed limits were raised from 65 mph to 70 mph on approximately 2700 of the 3300 miles of interstate highways in Texas. As shown in Table 8 and Figure 1, the number of serious crashes (KAB) on these roadways increased significantly<sup>2</sup> in the period after the speed limit increase (January - September 1996) when compared to the same nine-month period in each of the analysis periods prior to the speed limit changes (1991- 1995). This increase in serious crashes results primarily from the increase in non-incapacitating (B) injury crashes. Differences in the number of fatal (K) and incapacitating (A) injury crashes are not significant. A significant increase in the frequency of possible (C) injury crashes was observed.

When the number of crashes are adjusted to account for vehicle miles traveled on interstate highways, that is, when we consider crash rates expressed as crashes per 100 million vehicle miles traveled, no significant increases are observed in fatal or serious crash rates (Table 9, Figure 2). The crash rates for non-incapacitating and possible injury crashes are significantly higher in the period following the increase in speed limit to 70 mph.

Tables 10 and 11 and Figures 3 and 4 summarize the results of the analyses of serious injuries and serious injury rates on interstate highways where the speed limit was increased to 70 mph. The

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<sup>1</sup>All tables and figures in this section are grouped together at the end of the section, beginning on page 17.

<sup>2</sup>The use of "significant" or "significantly" in relation to the comparisons being discussed means that a statistically significant difference ( $p < .05$ ) was observed.

frequency and rate of serious injuries did not increase significantly in the period after the speed limit was raised. Fatal crash rates and frequencies also did not change significantly. A significant increase in C-level injuries and injury rates was observed.

### **RURAL INTERSTATES - 70 MPH**

Because traffic density, speeds, and driver behavior are different in rural and urban areas, the impact of speed limit changes may also differ between these areas. For the purposes of this analysis, rural interstates are defined as those interstate highways in areas with populations of less than 5000.

On rural interstate highways where the speed limit was raised to 70 mph, no significant differences in any category of serious crashes (K, A, and B), injuries or the associated crash and injury rates were observed in the post speed limit change period of 1996 compared to equivalent periods in the preceding 5 years. These results are shown in Tables 12-15 and Figures 5-8. A significant increase in the number of serious crashes occurring during daylight hours was observed, while nighttime crashes did not increase. Because we do not have traffic volume data for day and night hours separately, crash rates for day and night crashes cannot be tested independently. The number and rate of C-level (possible injury) crashes are significantly higher on these roadways in the period after the increase in speed limits than in any of the periods before the speed limit increase. C-level injuries also increased significantly, but the increase in the rate of these injuries was not significantly greater than in all of the preceding years.

### **URBAN INTERSTATES - 70 MPH**

The frequency and rate of fatal crashes and fatalities are not significantly different in the nine month period following the speed limit change (1996) than in the before change periods. Significant increases in the number of serious crashes (Table 16, Figure 9) and serious injuries (Table 18, Figure 11) are observed in the post speed limit change period compared to all comparison periods. Increases in both serious crash and serious injury rates are also significant (Tables 17 and 19, Figures 10 and 12).

Examination of the crash profiles on urban interstates reveals that serious crashes increased both for crashes involving only passenger vehicles and crashes in which trucks were involved. Proportionally, the increase in passenger vehicle crashes is greater than that for crashes involving trucks. Crashes increased significantly for all of the driver age groups examined. Daytime crashes increased significantly, while nighttime crashes did not. Crashes in which only a single vehicle was involved increased a significant amount, multiple vehicle crashes did not. A significant increase in the number of crashes in which speed unsafe for conditions was cited as a contributing factor is observed. No change in alcohol-related crashes is seen. The percentage of crash-involved drivers who were restrained is not significantly different in the period following the increase in the speed limit on these roadways.

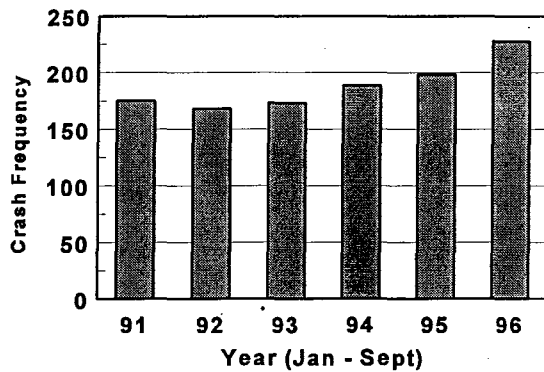
## **ALL STATE SYSTEM HIGHWAYS**

The number of fatal crashes and the total number of fatalities on all state system highways are significantly greater in 1996 than in any of the comparison periods. Serious (KAB) crashes and serious injuries also are significantly higher in 1996, as shown in Tables 20 and 22 and Figures 13 and 15. However, fatal and serious crash rates did not increase significantly in the nine month period following the repeal of the NMSL compared to the equivalent periods in all comparison years (Tables 21 and 23, Figures 14 and 16). Fatality and serious injury rates also did not increase significantly.

## Fatal and Serious Crashes on All Interstates - 70 mph

**Average Monthly Serious Crashes (KAB)**

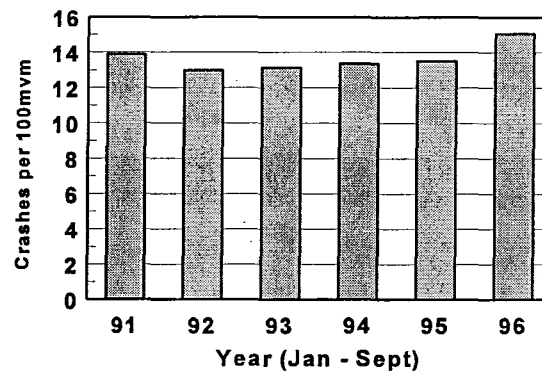
All Interstates - 70 mph



**Figure 1** Average monthly serious crashes (KAB) on all interstates where speed limit was raised to 70 mph.

**Serious Crash (KAB) Rate**

All Interstates - 70 mph



**Figure 2** Serious crashes (KAB) per 100 mvmt on all interstates where speed limit was raised to 70 mph.

**Table 8. Average monthly fatal (K) and serious (KAB) crash frequencies on all interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 14.3           | 14.0           | 16.0           | 19.2           | 18.0           | 18.8           |
| KAB | 175.2          | 168.4          | 173.2          | 188.9          | 198.3          | 227.6*         |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 9. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on all interstate highways where speed limit was raised to 70 mph.**

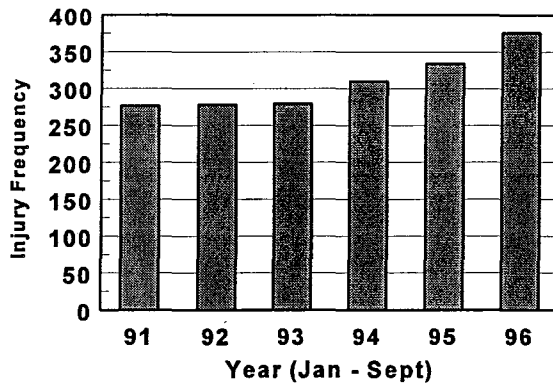
|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.14           | 1.07           | 1.22           | 1.36           | 1.23           | 1.23           |
| KAB | 13.88          | 12.99          | 13.14          | 13.37          | 13.52          | 15.06          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Fatalities and Serious Injuries on All Interstates - 70 mph

**Average Monthly Serious Injuries (KAB)**

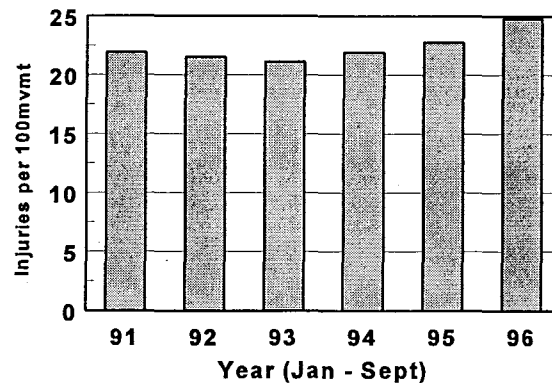
All Interstates - 70 mph



**Figure 3** Average monthly serious injuries (KAB) on all interstates where speed limit was raised to 70 mph.

**Serious Injury (KAB) Rate**

All Interstates - 70 mph



**Figure 4** Serious injuries (KAB) per 100 mvmt on all interstates where speed limit was raised to 70 mph.

**Table 10. Average monthly fatalities (K) and serious (KAB) injury frequencies on all interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 17.0           | 18.4           | 18.2           | 25.1           | 22.0           | 23.4           |
| KAB | 276.4          | 278.3          | 279.4          | 310.2          | 334.2          | 375.9          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 11. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all interstate highways where speed limit was raised to 70 mph.**

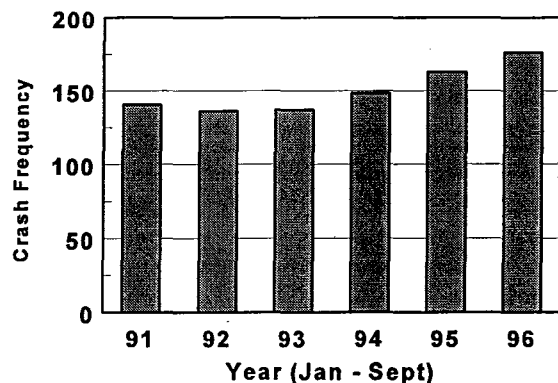
|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.36           | 1.41           | 1.39           | 1.78           | 1.50           | 1.54           |
| KAB | 21.91          | 21.53          | 21.13          | 21.92          | 22.76          | 24.79          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Fatal and Serious Crashes on Rural<sup>1</sup> Interstates - 70 mph

**Average Monthly Serious Crashes (KAB)**

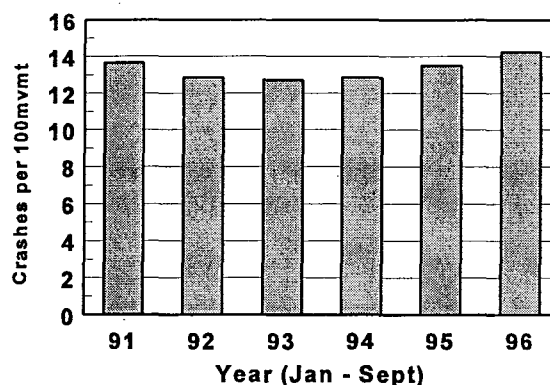
Rural Interstates - 70 mph



**Figure 5** Average monthly serious crashes (KAB) on rural interstates where speed limit was raised to 70 mph.

**Serious Crash (KAB) Rate**

Rural Interstates - 70 mph



**Figure 6** Serious crashes (KAB) per 100 mvmt on rural interstates where speed limit was raised to 70 mph.

**Table 12. Average monthly fatal (K) and serious (KAB) crash frequencies on all rural interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 12.1           | 11.6           | 13.3           | 15.3           | 15.9           | 15.9           |
| KAB | 140.7          | 136.2          | 137.1          | 148.6          | 162.8          | 176.1          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 13. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on all rural interstate highways where speed limit was raised to 70 mph.**

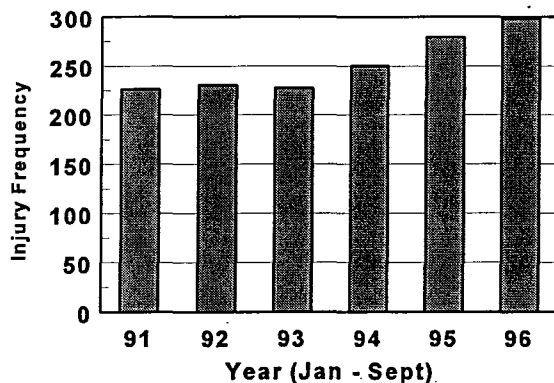
|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.19           | 1.08           | 1.24           | 1.32           | 1.32           | 1.27           |
| KAB | 13.67          | 12.36          | 12.71          | 12.86          | 13.51          | 14.23          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>Rural interstates are defined as those interstate highways in areas with populations of less than 5,000.

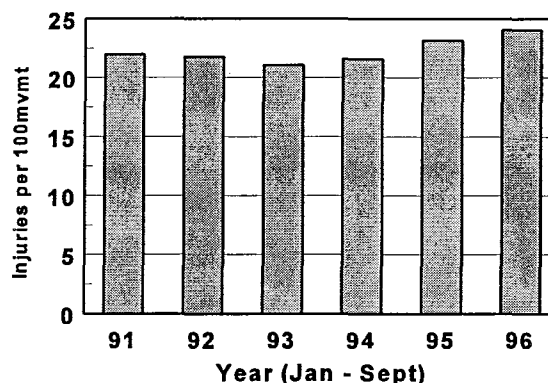
## Fatalities and Serious Injuries on Rural<sup>1</sup> Interstates - 70 mph

**Average Monthly Serious Injuries (KAB)**  
Rural Interstates - 70 mph



**Figure 7** Average monthly serious injuries (KAB) on rural interstates where speed limit was raised to 70 mph.

**Serious Injury (KAB) Rate**  
Rural Interstates - 70 mph



**Figure 8** Serious injuries (KAB) per 100 mvmt on rural interstates where speed limit was raised to 70 mph.

**Table 14. Average monthly fatalities (K) and serious (KAB) injury frequencies on all rural interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 14.7           | 15.9           | 15.2           | 20.9           | 19.6           | 19.9           |
| KAB | 226.4          | 230.4          | 227.8          | 250.2          | 279.2          | 298.0          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 15. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all rural interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.43           | 1.48           | 1.42           | 1.80           | 1.62           | 1.59           |
| KAB | 21.98          | 21.78          | 21.06          | 21.60          | 23.15          | 24.04          |

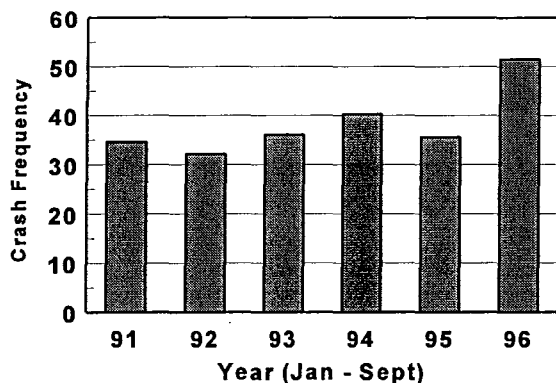
\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>Rural interstates are defined as those interstate highways in areas with populations of less than 5,000.

## Fatal and Serious Crashes on Urban<sup>1</sup> Interstates - 70 mph

**Average Monthly Serious Crashes (KAB)**

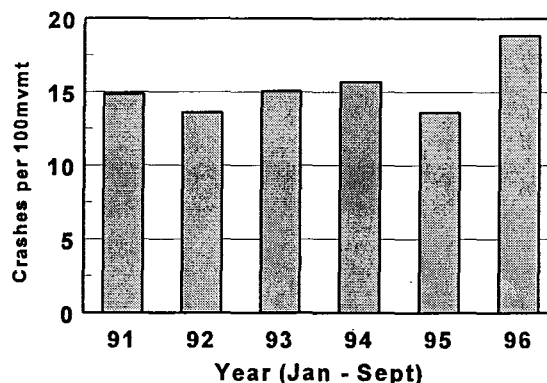
Urban Interstates - 70 mph



**Figure 9** Average monthly serious crashes (KAB) on urban interstates where speed limit was raised to 70 mph.

**Serious Crash (KAB) Rate**

Urban Interstates - 70 mph



**Figure 10** Serious crashes (KAB) per 100 mvmt on urban interstates where speed limit was raised to 70 mph.

**Table 16. Average monthly fatal (K) and serious (KAB) crash frequencies on all urban interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 2.2            | 2.4            | 2.7            | 3.9            | 2.1            | 2.9            |
| KAB | 34.6           | 32.2           | 36.1           | 40.3           | 35.6           | 51.5*          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 17. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on all urban interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 0.95           | 1.00           | 1.11           | 1.53           | 0.81           | 1.07           |
| KAB | 14.84          | 13.61          | 15.07          | 15.67          | 13.60          | 18.84*         |

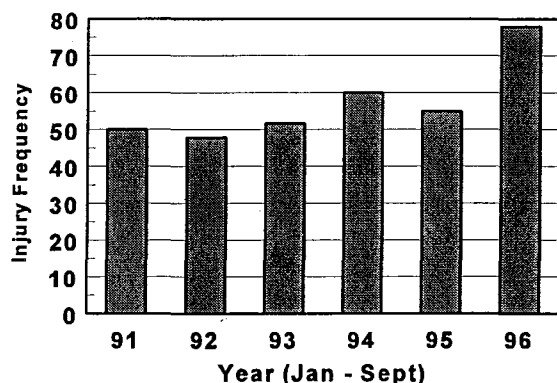
\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>Urban interstates are defined as those interstate highways in areas with populations of 5,000 or more.

## Fatalities and Serious Injuries on Urban<sup>1</sup> Interstates - 70 mph

**Average Monthly Serious Injuries (KAB)**

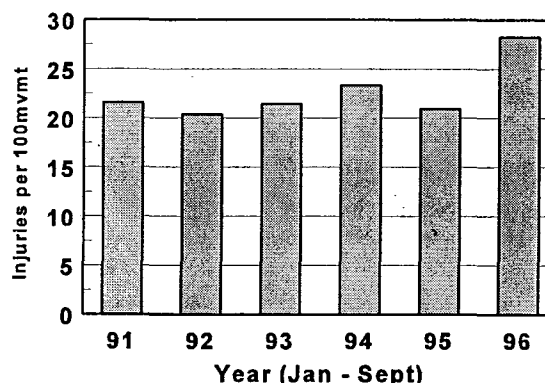
Urban Interstates - 70 mph



**Figure 11** Average monthly serious injuries (KAB) on urban interstates where speed limit was raised to 70 mph.

**Serious Injury (KAB) Rate**

Urban Interstates - 70 mph



**Figure 12** Serious injuries (KAB) per 100 mvmt on urban interstates where speed limit was raised to 70 mph.

**Table 18. Average monthly fatalities (K) and serious (KAB) injury frequencies on all urban interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 2.3            | 2.6            | 3.0            | 4.2            | 2.4            | 3.6            |
| KAB | 50.0           | 47.9           | 51.7           | 60.0           | 55.0           | 77.9*          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 19. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all urban interstate highways where speed limit was raised to 70 mph.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.00           | 1.05           | 1.24           | 1.66           | 0.94           | 1.31           |
| KAB | 21.58          | 20.39          | 21.46          | 23.37          | 20.94          | 28.23*         |

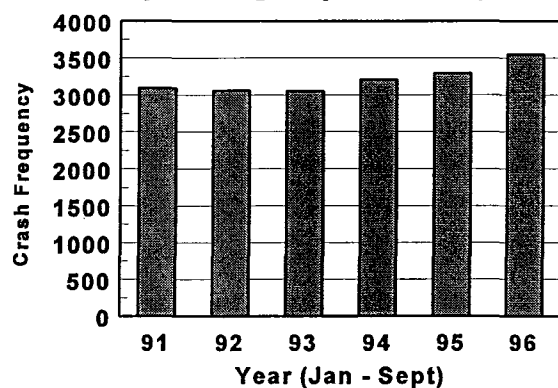
\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>Urban interstates are defined as those interstate highways in areas with populations of 5,000 or more.

## Fatal and Serious Crashes on All State System Highways

**Average Monthly Serious Crashes (KAB)**

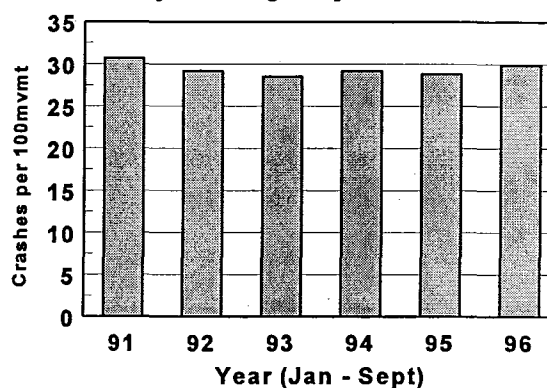
All State System Highways - all road parts



**Figure 13** Average monthly serious crashes (KAB) on all state system highways.

**Serious Crash (KAB) Rate**

All State System Highways - main lanes



**Figure 14** Serious crashes (KAB) per 100 mvmt on all state system highways.

**Table 20. Average monthly fatal (K) and serious (KAB) crash frequencies on all state system highways.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 155.1          | 158.0          | 157.3          | 164.1          | 164.7          | 185.9*         |
| KAB | 3095.0         | 3060.5         | 3054.8         | 3212.1         | 3298.3         | 3549.3*        |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

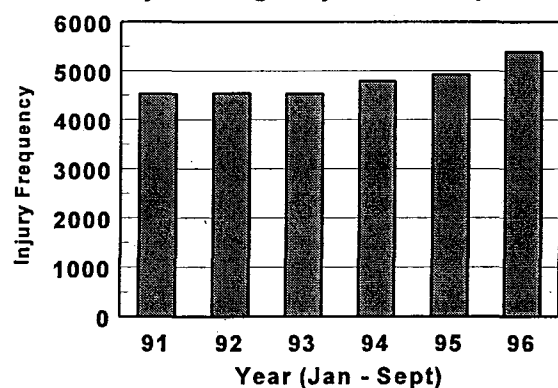
**Table 21. Fatal (K) and serious (KAB) crash rates (crashes/100 mvmt) on all state system highways.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 1.62           | 1.59           | 1.59           | 1.58           | 1.54           | 1.66           |
| KAB | 30.70          | 29.19          | 28.52          | 29.19          | 28.85          | 29.90          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

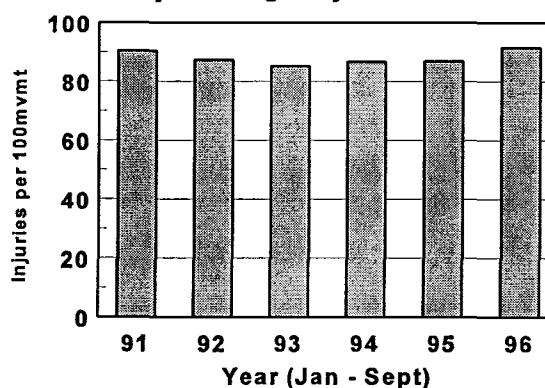
## Fatalities and Serious Injuries on All State System Highways

**Average Monthly Serious Injuries (KAB)**  
All State System Highways - all road parts



**Figure 15** Average monthly serious injuries (KAB) on all state system highways.

**Serious Injury (KAB) Rate**  
All State System Highways - main lanes



**Figure 16** Serious injuries (KAB) per 100 mvmt on all state system highways.

**Table 22. Average monthly fatalities (K) and serious (KAB) injury frequencies on all state system highways.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 179.9          | 182.9          | 179.7          | 196.1          | 191.1          | 217.3*         |
| KAB | 4524.8         | 4540.4         | 4534.4         | 4789.9         | 4930.1         | 5390.3*        |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table 23. Fatality (K) and serious (KAB) injury rates (injuries/100 mvmt) on all state system highways.**

|     | Jan-Sept<br>91 | Jan-Sept<br>92 | Jan-Sept<br>93 | Jan-Sept<br>94 | Jan-Sept<br>95 | Jan-Sept<br>96 |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|
| K   | 3.78           | 3.72           | 3.63           | 3.80           | 3.59           | 3.91           |
| KAB | 90.42          | 87.34          | 85.19          | 86.74          | 86.91          | 91.64          |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## CONCLUSIONS and RECOMMENDATIONS

Based on the results of the analyses conducted thus far, this preliminary evaluation of the impact of raising speed limits on Texas interstate highways strongly suggests:

1. Speeds on both rural and urban interstate highways where the speed limit is now 70 mph have increased following the change in speed limit.
2. On rural interstates where the speed limit was raised to 70 mph, there is not evidence of an increase in serious (KAB) crashes or crash rates that can be attributed to the increased speeds or speed limits.
3. On urban interstates where the speed limit was raised to 70 mph, both the frequency and rate of serious (KAB) crashes and injuries have increased following the increased speed limit. The weight of evidence suggests that these increases are associated with the higher speed limit.

The observed increase in serious crashes and crash rates on urban interstates where the speed limit was raised may be a transitory response to the change in speed limit. It is recommended that crash and speed data continue to be monitored and evaluated on interstate highways where the speed limit has been raised to 70 mph.

It is also recommended that crash and speed data for state and US highways and FM roadways where the speed limit has been raised to 70 mph be monitored and evaluated when sufficient time has elapsed for such an evaluation to be meaningful.

All further evaluations should give particular attention to determining if there may be crashes where specific driver characteristics, vehicle types, geographic locations or other factors may be over represented on roads where the speed limit has been increased.

## APPENDIX A

### Locations of TxDOT permanent speed monitoring and Weigh-in-Motion sites

Table A-1. Permanent TxDOT speed monitoring sites used for speed estimates.

Table A-2. TxDOT weigh-in-motion sites used for truck speed estimates.

**Table A-1. Permanent TxDOT Speed Monitoring Sites Used for Speed Estimates**

| Site No. | Highway | Speed Limit | Rural or Urban | County    |
|----------|---------|-------------|----------------|-----------|
| 601      | IH-27   | 70          | Urban          | Lubbock   |
| 603      | IH-10   | 70          | Rural          | Kerr      |
| 619      | IH-10   | 70          | Rural          | El Paso   |
| 630      | FM 74   | 55          | Rural          | Cass      |
| 632      | FM-716  | 55          | Rural          | Duval     |
| 644      | FM 1661 | 55          | Rural          | Jones     |
| 703      | IH-35   | 70          | Rural          | Johnson   |
| 704      | IH-410  | 70          | Urban          | Bexar     |
| 733      | IH-30   | 70          | Rural          | Titus     |
| 734      | IH-10   | 70          | Rural          | Guadalupe |
| 735      | IH-27   | 70          | Rural          | Randall   |
| 738      | IH-10   | 70          | Rural          | Reeves    |
| 740      | IH-45   | 70          | Rural          | Madison   |
| 742      | SH-205  | 55          | Rural          | Rockwell  |
| 784      | FM 2857 | 55          | Rural          | Gray      |
| 796      | IH-45   | 55          | Urban          | Galveston |

**Table A-2. TxDOT Weigh-in-Motion Sites Used for Truck Speed Estimates**

| Site No. | Highway | Speed Limit | Rural or Urban | County    |
|----------|---------|-------------|----------------|-----------|
| 502      | IH-10   | 70          | Rural          | Guadalupe |
| 510      | IH-10   | 70          | Rural          | El Paso   |
| 520      | IH-27   | 70          | Rural          | Randall   |

**APPENDIX B****Summary tables of crash and injury data used in the analyses****All Interstate Highways Where Speed Limit Was Raised to 70 Mph.**

- Table B-1 Average monthly crashes by severity on all interstate highways where speed limit was raised to 70 mph.
- Table B-2 Crash rates by severity on all interstates where speed limit was raised to 70 mph.
- Table B-3 Average monthly injuries by severity on all interstate highways where speed limit was raised to 70 mph.
- Table B-4 Injury rates by severity on all interstates where speed limit was raised to 70 mph.
- Table B-5. Average serious monthly crashes (KAB) by vehicle type on all interstate highways where speed limit was raised to 70 mph.
- Table B-6. Average serious monthly crashes (KAB) by contributing factor (speed) on all interstate highways where speed limit was raised to 70 mph.
- Table B-7. Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all interstate highways where speed limit was raised to 70 mph.
- Table B-8. Average serious monthly crashes (KAB) by age of driver on all interstate highways where speed limit was raised to 70 mph.
- Table B-9. Average serious monthly crashes (KAB) by age of driver on all interstate highways where speed limit was raised to 70 mph.
- Table B-10. Average serious monthly crashes (KAB) by light condition (day/night) on all interstate highways where speed limit was raised to 70 mph.
- Table B-11. Average serious monthly crashes (KAB) by number of vehicles involved on all interstate highways where speed limit was raised to 70 mph.

**Rural Interstate Highways Where Speed Limit Was Raised to 70 Mph.**

- Table B-12. Average monthly crashes by severity on all rural interstate highways where speed limit was raised to 70 mph.
- Table B-13. Crash rates by severity on all rural interstates where speed limit was raised to 70 mph.
- Table B-14. Average monthly injuries by severity on all rural interstate highways where speed limit was raised to 70 mph.

Table B-15. Average serious monthly crashes (KAB) by vehicle type on all rural interstate highways where speed limit was raised to 70 mph.

Table B-16. Injury rates by severity on all rural interstates where speed limit was raised to 70 mph.

Table B-17. Average serious monthly crashes (KAB) by contributing factor (speed) on all rural interstate highways where speed limit was raised to 70 mph.

Table B-18. Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all rural interstate highways where speed limit was raised to 70 mph.

Table B-19. Average serious monthly crashes (KAB) by age of driver on all rural interstate highways where speed limit was raised to 70 mph.

Table B-20. Average serious monthly crashes (KAB) by age of driver on all rural interstate highways where speed limit was raised to 70 mph.

Table B-21. Average serious monthly crashes (KAB) by light condition (day/night) on all rural interstate highways where speed limit was raised to 70 mph.

Table B-22. Average serious monthly crashes (KAB) by number of vehicles involved on all rural interstate highways where speed limit was raised to 70 mph.

Table B-23. Percent of drivers restrained in all recorded crashes (KABC) on all rural interstate highways where speed limit was raised to 70 mph.

### **Urban Interstate Highways Where Speed Limit Was Raised to 70 Mph**

Table B-24. Average monthly crashes by severity on all urban interstate highways where speed limit was raised to 70 mph.

Table B-25. Crash rates by severity on all urban interstates where speed limit was raised to 70 mph.

Table B-26. Average monthly injuries by severity on all urban interstate highways where speed limit was raised to 70 mph.

Table B-27. Injury rates by severity on all urban interstates where speed limit was raised to 70 mph.

Table B-28. Average serious monthly crashes (KAB) by vehicle type on all urban interstate highways where speed limit was raised to 70 mph.

Table B-29. Average serious monthly crashes (KAB) by contributing factor (speed) on all urban interstate highways where speed limit was raised to 70 mph.

Table B-30. Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all urban interstate highways where speed limit was raised to 70 mph.

Table B-31. Average serious monthly crashes (KAB) by age of driver on all urban interstate highways where speed limit was raised to 70 mph.

Table B-32. Average serious monthly crashes (KAB) by age of driver on all urban interstate highways where speed limit was raised to 70 mph.

Table B-33. Average serious monthly crashes (KAB) by light condition (day/night) on all urban interstate highways where speed limit was raised to 70 mph.

Table B-34. Average serious monthly crashes (KAB) by number of vehicles involved on all urban interstate highways where speed limit was raised to 70 mph.

Table B-35. Percent of drivers restrained in all recorded crashes (KABC) on all urban interstate highways where speed limit was raised to 70 mph.

### **All State System Highways**

Table B-36. Average monthly crashes by severity on all state system highways - all road parts.

Table B-37. Crash rates by severity on all state system highways - main lanes.

Table B-38. Average monthly injuries by severity on all state system highways - all road parts.

Table B-39. Injury rates by severity on all state system highways -main lanes.

Table B-40. Average monthly crashes by severity on all rural state system highways - all road parts.

Table B-41. Crash rates by severity on all rural state system highways - main lanes.

Table B-42. Average monthly injuries by severity on all rural state system highways - all road parts.

Table B-43. Injury rates by severity on all rural state system highways - main lanes.

Table B-44. Average monthly crashes by severity on all urban state system highways - all road parts.

Table B-45. Crash rates by severity on all urban state system highways - main lanes.

Table B-46. Average monthly injuries by severity on all urban state system highways - all road parts.

Table B-47. Injury rates by severity on all urban state system highways - main lanes.

### Crashes on All Interstates - 70 mph

**Table B-1. Average monthly crashes by severity on all interstate highways where speed limit was raised to 70 mph.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 14.3         | 14.0         | 16.0         | 19.2          | 18.0          | 18.8          |
| A              | 56.6         | 54.9         | 51.7         | 57.8          | 59.7          | 64.8          |
| B              | 104.3        | 99.6         | 105.6        | 111.9         | 120.7         | 144.0*        |
| C              | 125.6        | 122.2        | 139.9        | 161.0         | 160.7         | 204.4*        |
| KAB            | 175.2        | 168.4        | 173.2        | 188.9         | 198.3         | 227.6*        |
| KABC           | 300.8        | 290.7        | 313.1        | 349.9         | 359.0         | 432.0*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-2. Crash rates by severity on all interstates where speed limit was raised to 70 mph.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.14         | 1.07         | 1.22         | 1.36          | 1.23          | 1.23          |
| A                    | 4.46         | 4.25         | 3.90         | 4.09          | 4.06          | 4.28          |
| B                    | 8.28         | 7.68         | 8.02         | 7.91          | 8.24          | 9.55*         |
| C                    | 9.93         | 9.39         | 10.56        | 11.40         | 10.96         | 13.56*        |
| KAB                  | 13.88        | 12.99        | 13.14        | 13.37         | 13.52         | 15.06         |
| KABC                 | 23.81        | 22.39        | 23.70        | 24.77         | 24.48         | 28.63*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Injuries on All Interstates - 70 mph

**Table B-4. Average monthly injuries by severity on all interstate highways where speed limit was raised to 70 mph.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 17.0         | 18.4         | 18.2         | 25.1          | 22.0          | 23.4          |
| A               | 85.2         | 84.1         | 80.1         | 94.7          | 92.4          | 108.0         |
| B               | 174.2        | 175.8        | 181.1        | 190.4         | 219.8         | 244.4         |
| C               | 240.4        | 233.9        | 283.2        | 320.6         | 329.0         | 413.9*        |
| KAB             | 276.4        | 278.3        | 279.4        | 310.2         | 334.2         | 375.9         |
| KABC            | 516.9        | 512.2        | 562.7        | 630.8         | 663.2         | 789.8*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-3. Injury rates by severity on all interstates where speed limit was raised to 70 mph.**

| Injuries per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                     | 1.36         | 1.41         | 1.39         | 1.78          | 1.50          | 1.54          |
| A                     | 6.73         | 6.51         | 6.01         | 6.69          | 6.24          | 7.12          |
| B                     | 13.82        | 13.62        | 13.73        | 13.46         | 15.02         | 16.14         |
| C                     | 18.89        | 18.04        | 21.35        | 22.32         | 22.46         | 27.47*        |
| KAB                   | 21.91        | 21.53        | 21.13        | 21.92         | 22.76         | 24.79         |
| KABC                  | 40.80        | 39.57        | 42.48        | 44.24         | 45.22         | 52.26*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Crash Profile: All Interstates - 70 mph

#### Vehicle Type

**Table B-5. Average serious monthly crashes (KAB) by vehicle type on all interstate highways where speed limit was raised to 70 mph.**

| Vehicle Type | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Passenger    | 129.6        | 122.1        | 125.7        | 133.4         | 138.6         | 159.7*        |
| Truck        | 45.7         | 46.3         | 47.6         | 55.4          | 59.8          | 67.9          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

#### Contributing Factor - Speed

**Table B-6. Average serious monthly crashes (KAB) by contributing factor (speed) on all interstate highways where speed limit was raised to 70 mph.**

| Speed Factor | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Unsafe       | 58.7         | 49.4         | 59.9         | 60.6          | 67.9          | 81.3          |
| Over limit   | 17.4         | 16.9         | 14.4         | 17.8          | 18.0          | 15.3          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

#### Contributing Factor - Alcohol Related

**Table B-7. Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all interstate highways where speed limit was raised to 70 mph.**

| Alcohol Related | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Alcohol         | 33.6         | 33.4         | 31.9         | 33.4          | 29.8          | 30.6          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Driver Age****Table B-8. Average serious monthly crashes (KAB) by age of driver on all interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 24 & under | 64.8         | 64.2         | 62.8         | 70.0          | 71.2          | 78.1          |
| Over 24    | 110.4        | 104.2        | 110.4        | 118.9         | 127.1         | 149.4*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Driver Age****Table B-9. Average serious monthly crashes (KAB) by age of driver on all interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 38 & under | 131.8        | 125.0        | 129.7        | 139.8         | 145.2         | 164.9*        |
| Over 38    | 43.4         | 43.4         | 43.6         | 49.1          | 53.1          | 62.7          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Light Condition****Table B-10. Average serious monthly crashes (KAB) by light condition (day/night) on all interstate highways where speed limit was raised to 70 mph.**

| Light Condition | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Day             | 102.3        | 97.1         | 98.7         | 111.7         | 119.1         | 145.6*        |
| Night           | 72.9         | 71.3         | 74.6         | 77.2          | 79.2          | 82.0          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Vehicles Involved****Table B-11. Average serious monthly crashes (KAB) by number of vehicles involved on all interstate highways where speed limit was raised to 70 mph.**

| Vehicles<br>in Crash | Jan -Sept<br>91 | Jan -Sept<br>92 | Jan -Sept<br>93 | Jan - Sept<br>94 | Jan - Sept<br>95 | Jan - Sept<br>96 |
|----------------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Single               | 107.4           | 103.1           | 102.3           | 112.1            | 118.2            | 142.0*           |
| Multiple             | 67.8            | 65.3            | 70.9            | 76.8             | 80.1             | 85.6             |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Crashes on All Rural<sup>1</sup> Interstates - 70 mph

**Table B-12. Average monthly crashes by severity on all rural interstate highways where speed limit was raised to 70 mph.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 12.1         | 11.6         | 13.3         | 15.3          | 15.9          | 15.9          |
| A              | 46.4         | 46.1         | 42.2         | 47.9          | 50.2          | 51.1          |
| B              | 82.1         | 78.6         | 81.6         | 85.3          | 96.7          | 109.1         |
| C              | 85.8         | 84.0         | 90.1         | 101.7         | 103.9         | 129.7*        |
| KAB            | 140.7        | 136.2        | 137.1        | 148.6         | 162.8         | 176.1         |
| KABC           | 226.4        | 220.2        | 227.2        | 250.2         | 266.7         | 305.8*        |

\*indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-13. Crash rates by severity on all rural interstates where speed limit was raised to 70 mph.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.19         | 1.08         | 1.24         | 1.32          | 1.32          | 1.27          |
| A                    | 4.48         | 4.36         | 3.90         | 4.15          | 4.18          | 4.14          |
| B                    | 8.01         | 7.41         | 7.57         | 7.39          | 8.01          | 8.82          |
| C                    | 8.35         | 7.93         | 8.32         | 8.83          | 8.73          | 10.55*        |
| KAB                  | 13.67        | 12.86        | 12.71        | 12.86         | 13.51         | 14.23         |
| KABC                 | 22.02        | 20.79        | 21.03        | 21.69         | 22.24         | 24.78         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>"Rural" interstates are defined as those interstate highways in areas with population less than 5000.

### Injuries on All Rural<sup>1</sup> Interstates - 70 mph

**Table B-14. Average monthly injuries by severity on all rural interstate highways where speed limit was raised to 70 mph.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 14.7         | 15.9         | 15.2         | 20.9          | 19.6          | 19.9          |
| A               | 72.0         | 71.1         | 67.4         | 79.6          | 79.0          | 86.0          |
| B               | 139.8        | 143.4        | 145.1        | 149.8         | 180.7         | 192.1         |
| C               | 168.8        | 165.1        | 183.7        | 204.8         | 219.0         | 265.9*        |
| KAB             | 226.4        | 230.4        | 227.8        | 250.2         | 279.2         | 298.0         |
| KABC            | 395.2        | 395.5        | 411.4        | 455.0         | 498.2         | 563.9         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-15. Injury rates by severity on all rural interstates where speed limit was raised to 70 mph.**

| Injuries per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                     | 1.43         | 1.48         | 1.42         | 1.80          | 1.62          | 1.59          |
| A                     | 6.95         | 6.73         | 6.19         | 6.86          | 6.54          | 6.95          |
| B                     | 13.60        | 13.57        | 13.45        | 12.94         | 14.99         | 15.50         |
| C                     | 16.39        | 15.63        | 16.99        | 17.78         | 18.42         | 21.68         |
| KAB                   | 21.98        | 21.78        | 21.06        | 21.60         | 23.15         | 24.04         |
| KABC                  | 38.37        | 37.41        | 38.04        | 39.38         | 41.57         | 45.72         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Rural" interstates are defined as those interstate highways in areas with population less than 5000.

### Crash Profile: All Rural<sup>1</sup> Interstates - 70 mph

#### Vehicle Type

**Table B-16. Average serious monthly crashes (KAB) by vehicle type on all rural interstate highways where speed limit was raised to 70 mph.**

| Vehicle Type | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Passenger    | 104.1        | 96.8         | 97.4         | 103.7         | 113.8         | 122.3         |
| Truck        | 36.6         | 39.4         | 39.7         | 44.9          | 49.0          | 53.8          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

#### Contributing Factor - Speed

**Table B-17. Average serious monthly crashes (KAB) by contributing factor (speed) on all rural interstate highways where speed limit was raised to 70 mph.**

| Speed Factor | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Unsafe       | 45.3         | 37.9         | 45.7         | 46.1          | 54.2          | 60.6          |
| Over limit   | 14.8         | 13.6         | 11.9         | 14.8          | 16.2          | 12.8          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

#### Contributing Factor - Alcohol Related

**Table B-18. Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all rural interstate highways where speed limit was raised to 70 mph.**

| Alcohol Factor | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Alcohol        | 27.1         | 26.3         | 25.7         | 24.9          | 23.1          | 24.3          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Rural"interstates are defined as those interstate highways in areas with population less than 5000.

**Driver Age****Table B-19. Average serious monthly crashes (KAB) by age of driver on all rural interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 24 & under | 49.7         | 49.9         | 47.2         | 53.4          | 58.1          | 56.4          |
| Over 24    | 91.0         | 86.3         | 89.9         | 95.1          | 104.7         | 119.7         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Driver Age****Table B-20. Average serious monthly crashes (KAB) by age of driver on all rural interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 38 & under | 103.8        | 98.6         | 100.7        | 106.6         | 116.1         | 123.7         |
| Over 38    | 36.9         | 37.7         | 36.4         | 42.0          | 46.7          | 52.4          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Light Condition****Table B-21. Average serious monthly crashes (KAB) by light condition (day/night) on all rural interstate highways where speed limit was raised to 70 mph.**

| Light Condition | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Day             | 82.2         | 78.0         | 78.6         | 90.1          | 98.6          | 113.3*        |
| Night           | 58.4         | 58.2         | 58.6         | 58.4          | 64.2          | 62.8          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Vehicles Involved

**Table B-22. Average serious monthly crashes (KAB) by number of vehicles involved on all rural interstate highways where speed limit was raised to 70 mph.**

| Vehicles in Crash | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Single            | 90.2         | 87.7         | 85.2         | 93.7          | 102.6         | 115.0         |
| Multiple          | 50.4         | 48.6         | 51.9         | 54.9          | 60.2          | 61.1          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Driver Restraint Use

**Table B-23. Percent of drivers restrained in all recorded crashes (KABC) on all rural interstate highways where speed limit was raised to 70 mph.**

| Usage          | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Restrained     | 80.2         | 81.5         | 84.1         | 85.3          | 86.5          | 87.7          |
| Not restrained | 16.1         | 15.0         | 12.8         | 12.1          | 9.9           | 9.4           |
| Unknown        | 3.6          | 3.5          | 3.1          | 2.6           | 3.5           | 2.8           |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Crashes on All Urban<sup>1</sup> Interstates - 70 mph

**Table B-24. Average monthly crashes by severity on all urban interstate highways where speed limit was raised to 70 mph.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 2.2          | 2.4          | 2.7          | 3.9           | 2.1           | 2.9           |
| A              | 10.1         | 8.8          | 9.4          | 9.9           | 9.4           | 13.7*         |
| B              | 22.2         | 21.0         | 24.0         | 26.6          | 24.0          | 34.9*         |
| C              | 39.8         | 38.2         | 49.8         | 59.3          | 56.8          | 74.8*         |
| KAB            | 34.6         | 32.2         | 36.1         | 40.3          | 35.6          | 51.5*         |
| KABC           | 74.3         | 70.4         | 85.9         | 99.6          | 92.3          | 126.2*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-25. Crash rates by severity on all urban interstates where speed limit was raised to 70 mph.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 0.95         | 1.00         | 1.11         | 1.53          | 0.81          | 1.07          |
| A                    | 4.36         | 3.73         | 3.89         | 3.86          | 3.51          | 4.92          |
| B                    | 9.53         | 8.87         | 10.07        | 10.28         | 9.28          | 12.85*        |
| C                    | 17.15        | 16.04        | 20.63        | 23.08         | 21.10         | 27.21*        |
| KAB                  | 14.84        | 13.61        | 15.07        | 15.67         | 13.60         | 18.84*        |
| KABC                 | 31.99        | 29.65        | 35.70        | 38.75         | 34.70         | 46.05*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Urban" interstates are defined as those interstate highways in areas with population more than 5000.

### Injuries on All Urban<sup>1</sup> Interstates - 70 mph

**Table B-26. Average monthly injuries by severity on all urban interstate highways where speed limit was raised to 70 mph.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 2.3          | 2.6          | 3.0          | 4.2           | 2.4           | 3.6           |
| A               | 13.2         | 13.0         | 12.7         | 15.1          | 13.4          | 22.0*         |
| B               | 34.4         | 32.3         | 36.0         | 40.7          | 39.1          | 52.3*         |
| C               | 71.7         | 68.8         | 99.6         | 115.8         | 110.0         | 148.0*        |
| KAB             | 50.0         | 47.9         | 51.7         | 60.0          | 55.0          | 77.9*         |
| KABC            | 121.7        | 116.7        | 151.2        | 175.8         | 165.0         | 225.9*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-27. Injury rates by severity on all urban interstates where speed limit was raised to 70 mph.**

| Injuries per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                     | 1.00         | 1.05         | 1.24         | 1.66          | 0.94          | 1.31          |
| A                     | 5.71         | 5.50         | 5.23         | 5.92          | 4.85          | 7.87*         |
| B                     | 14.87        | 13.84        | 14.99        | 15.78         | 15.15         | 19.05         |
| C                     | 30.30        | 28.93        | 40.98        | 42.94         | 40.87         | 53.75*        |
| KAB                   | 21.58        | 20.39        | 21.46        | 23.37         | 20.94         | 28.23*        |
| KABC                  | 51.88        | 49.33        | 62.43        | 66.30         | 61.81         | 81.98*        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>"Urban" interstates are defined as those interstate highways in areas with population more than 5000.

**Crash Profile: All Urban<sup>1</sup> Interstates - 70 mph****Vehicle Type****Table B-28** Average serious monthly crashes (KAB) by vehicle type on all urban interstate highways where speed limit was raised to 70 mph.

| Vehicle Type | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Passenger    | 25.4         | 25.3         | 28.2         | 29.8          | 24.8          | 37.3*         |
| Truck        | 9.1          | 6.9          | 7.9          | 10.6          | 10.8          | 14.1*         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Contributing Factor - Speed****Table B-29.** Average serious monthly crashes (KAB) by contributing factor (speed) on all urban interstate highways where speed limit was raised to 70 mph.

| Speed Factor | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Unsafe       | 13.3         | 11.6         | 14.2         | 14.4          | 13.7          | 20.8*         |
| Over limit   | 2.7          | 3.3          | 2.6          | 3.0           | 2.3           | 2.9           |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Contributing Factor - Alcohol Related****Table B-30.** Average serious monthly crashes (KAB) by contributing factor (alcohol related) on all urban interstate highways where speed limit was raised to 70 mph.

| Alcohol Related | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Alcohol         | 6.4          | 7.1          | 6.2          | 8.6           | 6.7           | 6.2           |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Urban"interstates are defined as those interstate highways in areas with population more than 5000.

**Driver Age****Table B-31. Average serious monthly crashes (KAB) by age of driver on all urban interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 24 & under | 15.1         | 14.3         | 15.6         | 16.6          | 13.1          | 21.7*         |
| Over 24    | 19.4         | 17.9         | 20.6         | 23.8          | 22.4          | 29.8*         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Driver Age****Table B-32. Average serious monthly crashes (KAB) by age of driver on all urban interstate highways where speed limit was raised to 70 mph.**

| Driver Age | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|------------|--------------|--------------|--------------|---------------|---------------|---------------|
| 38 & under | 28.0         | 26.4         | 29.0         | 33.2          | 29.1          | 41.2*         |
| Over 38    | 6.6          | 5.8          | 7.1          | 7.1           | 6.4           | 10.2*         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Light Condition****Table B-33. Average serious monthly crashes (KAB) by light condition (day/night) on all urban interstate highways where speed limit was raised to 70 mph.**

| Light Condition | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Day             | 20.1         | 19.1         | 20.1         | 21.6          | 20.6          | 32.2*         |
| Night           | 14.4         | 13.1         | 16.0         | 18.8          | 15.0          | 19.2          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Vehicles Involved

**Table B-34. Average serious monthly crashes (KAB) by number of vehicles involved on all urban interstate highways where speed limit was raised to 70 mph.**

| Vehicles in Crash | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Single            | 17.2         | 15.4         | 17.1         | 18.4          | 15.7          | 27.0*         |
| Multiple          | 17.3         | 16.8         | 19.0         | 21.9          | 19.9          | 24.4          |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

## Driver Restraint Use

**Table B-35. Percent of drivers restrained in all recorded crashes (KABC) on all urban interstate highways where speed limit was raised to 70 mph.**

| Usage          | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| Restrained     | 80.6         | 82.9         | 86.7         | 88.4          | 89.2          | 87.7          |
| Not restrained | 11.3         | 8.7          | 6.5          | 5.8           | 5.3           | 5.2           |
| Unknown        | 8.1          | 8.5          | 6.8          | 5.8           | 5.5           | 7.1           |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Crashes on All State System Highways

**Table B-36. Average monthly crashes by severity on all state system highways - all road parts.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 155.1        | 158.0        | 157.3        | 164.1         | 164.7         | 185.9*        |
| A              | 828.8        | 822.6        | 823.3        | 865.9         | 870.7         | 912.6         |
| B              | 2111.1       | 2079.9       | 2074.1       | 2182.1        | 2262.9        | 2450.8*       |
| C              | 3899.0       | 4263.6       | 463.0        | 5009.9        | 5224.1        | 5460.9*       |
| KAB            | 3095.0       | 3060.5       | 3054.8       | 3212.1        | 3298.3        | 3549.3*       |
| KABC           | 6994.0       | 7324.0       | 3517.8       | 8222.0        | 8522.4        | 9010.2*       |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-37. Crash rates by severity on all state system highways - main lanes.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.62         | 1.59         | 1.59         | 1.58          | 1.54          | 1.66          |
| A                    | 8.36         | 7.97         | 7.79         | 7.96          | 7.75          | 7.92          |
| B                    | 20.72        | 19.63        | 19.14        | 19.36         | 19.56         | 20.32         |
| C                    | 35.82        | 37.55        | 39.75        | 41.07         | 41.81         | 42.12         |
| KAB                  | 30.70        | 29.19        | 28.52        | 29.19         | 28.85         | 29.90         |
| KABC                 | 66.52        | 66.74        | 68.27        | 69.97         | 70.65         | 72.02         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Injuries on All State System Highways

**Table B-38. Average monthly injuries by severity on all state system highways - all road parts.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 179.9        | 182.9        | 179.7        | 196.1         | 191.1         | 217.3*        |
| A               | 1142.6       | 1145.6       | 1147.1       | 1224.4        | 1231.0        | 1300.8*       |
| B               | 3202.3       | 3211.9       | 3207.6       | 3369.4        | 3508.0        | 3872.2*       |
| C               | 7179.9       | 7867.0       | 8617.1       | 9373.2        | 9770.2        | 10280.8*      |
| KAB             | 4524.8       | 4540.4       | 4534.4       | 4789.9        | 4930.1        | 5390.3*       |
| KABC            | 11704.7      | 12407.4      | 13151.5      | 14163.1       | 14700.3       | 15671.1*      |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-39. Injury rates by severity on all state system highways -main lanes.**

| Injuries per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                     | 3.78         | 3.72         | 3.63         | 3.80          | 3.59          | 3.91          |
| A                     | 23.20        | 22.40        | 21.81        | 22.64         | 22.11         | 22.71         |
| B                     | 63.44        | 61.23        | 59.75        | 60.30         | 61.21         | 65.03         |
| C                     | 133.48       | 139.92       | 149.93       | 155.44        | 158.08        | 160.52        |
| KAB                   | 90.42        | 87.34        | 85.19        | 86.74         | 86.91         | 91.64         |
| KABC                  | 223.90       | 227.26       | 235.12       | 242.18        | 244.99        | 252.16        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

### Crashes on All State System Highways - Rural<sup>1</sup>

**Table B-40. Average monthly crashes by severity on all rural state system highways - all road parts.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 90.9         | 96.1         | 98.0         | 104.6         | 103.8         | 119.4*        |
| A              | 407.0        | 398.8        | 403.1        | 432.1         | 432.6         | 441.7         |
| B              | 777.9        | 784.6        | 774.0        | 806.0         | 838.6         | 911.0*        |
| C              | 862.8        | 908.4        | 994.6        | 1105.8        | 1113.0        | 1200.6*       |
| KAB            | 1275.8       | 1279.5       | 1275.1       | 1342.7        | 1374.9        | 1472.1*       |
| KABC           | 2138.6       | 2187.9       | 2269.7       | 2448.4        | 2487.9        | 2672.7*       |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-41. Crash rates by severity on all rural state system highways - main lanes.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.96         | 1.98         | 2.01         | 2.03          | 1.96          | 2.18          |
| A                    | 8.64         | 8.21         | 8.01         | 8.31          | 8.03          | 8.01          |
| B                    | 16.52        | 16.06        | 15.50        | 15.43         | 15.57         | 16.35         |
| C                    | 17.84        | 18.12        | 19.31        | 20.46         | 20.11         | 21.08         |
| KAB                  | 27.12        | 26.25        | 25.52        | 25.77         | 25.56         | 26.54         |
| KABC                 | 44.96        | 44.37        | 44.84        | 46.23         | 45.66         | 47.62         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

<sup>1</sup>"Rural" interstates are defined as those interstate highways in areas with population less than 5000.

### Injuries on All State System Highways - Rural<sup>1</sup>

**Table B-42. Average monthly injuries by severity on all rural state system highways - all road parts.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 108.0        | 113.7        | 114.1        | 129.8         | 123.0         | 141.9         |
| A               | 592.2        | 575.8        | 591.4        | 637.7         | 640.7         | 659.4         |
| B               | 1256.2       | 1304.2       | 1305.1       | 1329.3        | 1386.8        | 1543.8*       |
| C               | 1660.4       | 1778.7       | 1919.0       | 2165.4        | 2185.3        | 2385.1*       |
| KAB             | 1956.4       | 1993.7       | 2010.6       | 2096.8        | 2150.5        | 2345.1*       |
| KABC            | 3616.8       | 3772.4       | 3929.6       | 4262.2        | 4335.8        | 4730.2*       |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-43. Injury rates by severity on all rural state system highways - main lanes.**

| Injuries per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                     | 2.34         | 2.35         | 2.34         | 2.53          | 2.34          | 2.59          |
| A                     | 12.61        | 11.89        | 11.77        | 12.30         | 11.95         | 11.99         |
| B                     | 26.76        | 26.78        | 26.20        | 25.52         | 25.87         | 27.81         |
| C                     | 34.52        | 35.72        | 37.48        | 40.26         | 39.68         | 42.16         |
| KAB                   | 41.71        | 41.03        | 40.32        | 40.35         | 40.16         | 42.39         |
| KABC                  | 76.23        | 76.74        | 77.79        | 80.61         | 79.83         | 84.55         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Rural"interstates are defined as those interstate highways in areas with population less than 5000.

### Crashes on All State System Highways -Urban<sup>1</sup>

**Table B-44. Average monthly crashes by severity on all urban state system highways - all roadparts.**

| Crash Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K              | 64.2         | 61.9         | 59.3         | 59.6          | 60.9          | 66.4          |
| A              | 421.8        | 423.8        | 420.2        | 433.8         | 438.1         | 470.9*        |
| B              | 1333.2       | 1295.3       | 1300.1       | 1376.1        | 1424.3        | 1539.8*       |
| C              | 3036.2       | 3355.1       | 3637.4       | 3904.1        | 4111.1        | 4260.3*       |
| KAB            | 1819.2       | 1781.0       | 1779.7       | 1869.4        | 1923.3        | 2077.1*       |
| KABC           | 4855.4       | 5136.1       | 5417.1       | 5773.6        | 6034.4        | 6337.4*       |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-45. Crash rates by severity on all urban state system highways - main lanes.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.26         | 1.19         | 1.14         | 1.10          | 1.09          | 1.12          |
| A                    | 8.07         | 7.71         | 7.56         | 7.58          | 7.45          | 7.82          |
| B                    | 25.11        | 23.33        | 22.95        | 23.56         | 23.81         | 24.55         |
| C                    | 54.61        | 57.66        | 61.12        | 63.09         | 64.90         | 64.55         |
| KAB                  | 34.45        | 32.23        | 31.66        | 32.24         | 32.34         | 33.48         |
| KABC                 | 89.06        | 89.90        | 92.78        | 95.33         | 97.24         | 98.03         |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Urban"interstates are defined as those interstate highways in areas with population more than 5000.

### Injuries on All State System Highways -Urban<sup>1</sup>

**Table B-46. Average monthly injuries by severity on all urban state system highways - all road parts.**

| Injury Severity | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|-----------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K               | 71.9         | 69.2         | 65.6         | 66.3          | 68.1          | 75.4          |
| A               | 550.3        | 569.8        | 555.7        | 586.8         | 590.3         | 641.3*        |
| B               | 1946.1       | 1907.7       | 1902.4       | 2040.1        | 2121.2        | 2328.4*       |
| C               | 5519.4       | 6088.3       | 6698.1       | 7207.9        | 7584.9        | 7895.7*       |
| KAB             | 2568.3       | 2546.7       | 2523.7       | 2693.2        | 2779.6        | 3045.1*       |
| KABC            | 8087.7       | 8635.0       | 9221.8       | 9901.1        | 10364.5       | 10940.8*      |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

**Table B-47. Injury rates by severity on all urban state system highways - main lanes.**

| Crashes per 100 mvmt | Jan -Sept 91 | Jan -Sept 92 | Jan -Sept 93 | Jan - Sept 94 | Jan - Sept 95 | Jan - Sept 96 |
|----------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| K                    | 1.42         | 1.34         | 1.26         | 1.23          | 1.22          | 1.27          |
| A                    | 10.55        | 10.49        | 9.99         | 10.28         | 10.10         | 10.67         |
| B                    | 36.90        | 34.58        | 33.72        | 35.09         | 35.64         | 37.53         |
| C                    | 100.41       | 105.40       | 114.19       | 117.71        | 120.93        | 120.86        |
| KAB                  | 48.87        | 46.41        | 44.97        | 46.41         | 46.96         | 49.47         |
| KABC                 | 149.28       | 151.81       | 159.16       | 164.31        | 167.89        | 170.34        |

\* indicates a statistically significant increase in 1996 compared to all other years ( $p < .05$ ).

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<sup>1</sup>"Urban"interstates are defined as those interstate highways in areas with population more than 5000.