Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-98/1726-S		

4. Title and Subtitle	5. Report Date
GUIDELINES FOR TRUCK LANE RESTRICTIONS IN TEXAS	August 1997
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Debbie Jasek, Mark A. Shafer, Dale L. Picha, and Tom Urbanik II	Research Report 1726-S

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135	11. Contract or Grant No. Study No. 0-1726

12. Sponsoring Agency Name and Address		13. Type of Report and Period Covered
Texas Department of Transportation Research and Technology Transfer Office P. O. Box 5080 Austin, Texas 78763-5080	Project Director: Greg Brinkmeyer, P.E. Traffic Operations Div. (512) 416-3330	Project Summary: September 1996 - August 1997 14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration.
Research Study Title: Evaluation of the Feasibility, Legal, and Design Issues of Dedicated Truck Lanes in Texas

16. Abstract

This report describes a one-year project conducted for the Texas Department of Transportation (TxDOT) to assess the current state-of-the-practice in truck lane restrictions and to recommend guidelines for implementing truck lane restrictions in Texas. Researchers conducted several tasks, including an extensive literature review on the application and evaluation of truck lane restrictions, and a survey of state practices to identify states that have implemented truck lane restrictions for operational/safety benefits or for pavement longevity purposes. During the conduct of this research, the 75th Texas Legislature passed Senate Bill 773, permitting local municipalities to request, from TxDOT, lane restrictions on certain highways. This bill, and the results of the research, were used to develop guidelines for TxDOT to implement these lane restrictions when a request is received from a local municipality. The adoption of these guidelines by TxDOT will provide consistent implementation across the state for truck lane restrictions.

17. Key Words	18. Distribution Statement
Trucks, Truck Lanes, Lane Restrictions, Truck Restrictions	No restrictions. This document is available to the public through NTIS: National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	106	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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Sponsored by
Texas Department of Transportation
In Cooperation with
U.S. Department of Transportation
Federal Highway Administration

August 1997

TEXAS TRANSPORTATION INSTITUTE
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IMPLEMENTATION STATEMENT

The research has produced guidelines for implementing truck lane restrictions in Texas which can be used by the Texas Department of Transportation. The guidelines and supporting material are contained herein. Chapter 7 of this report contains the guidelines, which can be used by field personnel to directly implement the study findings.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. This project was conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

ACKNOWLEDGMENT

The authors wish to acknowledge several staff of the Texas Department of Transportation's Traffic Operations Division who provided technical assistance for this project, specifically, Mr. Greg Brinkmeyer, the Project Director (PD), Mr. Carlos Lopez (Deputy Division Director, Traffic Operations Division), Mr. Mike Chacon, and Mr. David Valdez.

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SUMMARY

With yearly increases in truck volumes in Texas on its major highways due to the passage on the North American Free Trade Agreement, the motoring public as well as the Texas Department of Transportation (TxDOT) are concerned about the affects the truck will have on highway safety, traffic operations, roadway structural longevity, and long term maintenance on its highways. A large presence of trucks, both in rural and urban areas, can degrade the speed, comfort, and convenience experienced by passenger car drivers. Some states, to minimize these safety and operational affects, have implemented truck lane restrictions or have designated exclusive truck lane facilities in their states.

The Texas Transportation Institute (TTI) conducted a one-year study for TxDOT to assess the current state-of-the-practice in the United States for rural/urban truck lane restrictions, and to recommend implementation guidelines for truck lane restrictions in Texas in response to recent state legislation. Specific objectives of the project included: 1) determining methods for segregating truck traffic that have been successfully used by other state transportation agencies and other jurisdictions; 2) determining which, if any, methods for segregating truck traffic are cost effective and efficient by improving overall traffic flow and safety, increasing roadway structural longevity, and decreasing long term maintenance costs; and 3) developing implementation guidelines for truck lane restrictions. To accomplish these objectives researchers first conducted a comprehensive literature review and a telephone survey of state practices, followed by a review of new state legislation and work with TxDOT staff to develop guidelines for implementing the restrictions.

The literature review and the survey identified that a total of 28 states have implemented some type of lane restriction at some period in time but also identified that very little quantitative data exists that evaluates the effectiveness of the restriction. Public perception, however, has generally been positive when lane restrictions have been implemented. Comments in almost every study were documented that drivers were pleased that "something was being done." In many instances; the implementation of restrictions were the result of spectacular or serious accidents that received a high level of media coverage. Otherwise, the most common reasons given for implementing lane restrictions were:

- Improve highway operations;
- Reduce accidents;
- Pavement structural considerations; and
- Restrictions in construction zones.

Because of limiting supportive data, the research team recommended that truck lane restrictions not be implemented on rural highways. Studies have shown that on four-lane highways, truck lane restrictions could be detrimental to operations and safety. The minimal

amount of evidence of any substantial positive or negative impact on safety, operations, pavement wear, and congestion indicate that there would be little to no benefit to restricting trucks to certain lanes on six or more lane rural highways.

In urban areas, a majority of the trucks also use only certain lanes of the freeway, and certain geometric conditions may exist that would preclude trucks from using certain lanes, such as access to/from high traffic generators. Furthermore, traffic control devices would also have to be periodically changed to reflect the lane restrictions if agencies attempted to periodically shift the restrictions to different lanes to maximize pavement longevity. Despite the numerous factors that seemingly provide no appreciable benefit to restricting trucks to certain lanes of an urban freeway, one important consideration is public perception. Many passenger car drivers will perceive benefits of truck lane restrictions, namely improved operations and safety.

In May 1997, at the close of the 75th Texas Legislature, Senate Bill 773 was passed that permits a local municipality to request (through an ordinance) lane restrictions on certain highways within the municipality's jurisdiction (see Appendix C). Specific criteria must be met prior to TxDOT's approval of a municipality's request, such as the highway must be a state-maintained, controlled access facility with at least three through lanes in each direction, and an engineering study must be conducted by TxDOT to determine the feasibility of the proposed lane restrictions. To comply with this legislation, researchers developed guidelines (Chapter 7) to aid TxDOT in the implementation of requested truck lane restrictions in urban areas.

The guidelines provide TxDOT with the necessary information to evaluate a municipality's ordinance for lane restrictions. Researchers recommend a total of 12 different steps which provide guidance on information that must be contained in the ordinance related to the proposed lane restrictions, conducting a traffic study, removing/installing the appropriate traffic control devices, and periodically reviewing the lane restrictions to ensure against any negative impacts that may result from the lane restrictions. Researchers recommend that the Texas Department of Transportation monitor the extent to which truck lane restrictions are requested by municipalities. If truck lane restrictions become prevalent, TxDOT should request legislation that would make the restrictions a statewide practice.

1.0 INTRODUCTION AND METHODOLOGY

1.1 OVERVIEW

One effect of the North American Free Trade Agreement (NAFTA) is a rise of truck volume on NAFTA related roadways. The interaction of these large vehicles with other traffic, the publicity given to major truck accidents, the increased pavement wear caused by these vehicles, and the increased public awareness of the effects of truck traffic on NAFTA related roadways has resulted in the need to examine various truck countermeasures including lane restrictions, dedicated truck lanes, and exclusive truck facilities.

The United States, Canada, and Mexico signed NAFTA on December 17, 1992, creating the largest free trade zone in the world. The increased trade with Mexico is projected to aggravate conditions at an already congested U. S.-Mexico border. The largest concentration of trade with Mexico to date is in the southern border region. Texas dominates this concentration of trade with over $17 billion of U. S. export trade with Mexico crossing Texas borders in 1992 (*1*, *2*). The trend for increased trade is predicted to continue, and the impact of increased truck traffic on Texas roads is substantial. Estimated costs for a 10 to 25 percent increase in truck traffic are $66 to 250 million in investment costs (*3*).

In addition to increased truck traffic generated by the NAFTA corridors, truck volumes in the U. S. have risen steadily in recent years. In 1996, the Eno Foundation determined that trucks accounted for 27 percent of all ton-miles of freight carried in the U.S. versus 40 percent for rail, 14 percent for waterways, 17 percent for pipelines, and 2 percent for air (*4*). During this same time period, trucks have become larger and more powerful. In the 1960s, the typical semi-trailer was 10.7 meters (35 feet) long and about 2.4 meters (96 inches) wide. Today's trailers are typically 14.6 meters (48 feet), with some reaching 20.3 meters (57 feet). The typical width of a trailer has increased to 2.6 meters (102 inches). During the same time period, cars have typically become smaller and lighter (*5*).

This increased operation of trucks on interstate and primary highways impacts the overall traffic flow, safety, structural longevity, and long term maintenance costs for Texas roadways. The research conducted in this study looked at implementation of lane restrictions for trucks, dedicated truck lanes, and exclusive truck facilities and examined how each of these measures could be used as a means of improving safety and traffic operations on affected roadways.

1.2 RESEARCH FOCUS

This research focused on the use of truck lanes and lane restrictions as a method of improving overall traffic flow, highway safety, increasing roadway structural longevity, and decreasing long term maintenance on roadways experiencing increased truck traffic due to NAFTA. Specific objectives of the project include: determining methods for segregating truck

traffic that have been successfully used by other state transportation agencies and other jurisdictions, and determining which, if any, methods for segregating truck traffic are cost effective and efficient by improving overall traffic flow and safety, increasing roadway structural longevity, and decreasing long term maintenance costs on NAFTA roadways.

1.3 RESEARCH OBJECTIVES

The work plan for this study consisted of the eight specific research objectives listed below:

- Conduct a literature search and review and a survey of state practices;
- Determine AASHTO vehicle classifications that will best benefit from the use of dedicated truck lanes;
- Determine the benefit/cost analysis per mile of dedicated truck lanes for implementation in urban areas;
- Determine the benefit/cost analysis per mile of dedicated truck lanes for implementation in rural areas;
- Establish warrants for eligible roadways;
- Evaluate the most effective way to inform motorists of lane dedication;
- Compile legislative information regarding truck lane countermeasures; and
- Prepare a project summary report.

Concurrent with the research study, the 75th session of the Texas Legislature met. Legislation was passed that allows municipalities under certain conditions to restrict vehicles by type to designated lanes. This legislation resulted in minor modifications of how researchers approached the study objectives.

1.4 METHODOLOGY

A detailed description of the approach the research team used to accomplish the objectives are presented below.

1.4.1 Literature Search and Review

The research team conducted a comprehensive literature search to identify publications on truck lane restrictions, dedicated truck lanes, and exclusive truck facilities. This search, using key words and phrases, utilized the following catalogs and databases: Texas A&M University's Sterling C. Evans Library NOTIS (local library database), Wilson's Periodical Database, FirstSearch, National Technical Information System (NTIS), and Transportation Research Information Service (TRIS).

Sterling C. Evans Library is a major local source of information with holdings of more than 2 million volumes of books, 4.3 million documents and microforms, 12,000 current

periodical titles, and holdings for more than 28,000 serial titles. FirstSearch is an electronic information system designed to provide access through the Online Computer Library Center (OCLC) national database. The database contains more than 34 million bibliographic records representing the holdings of 22,000 libraries in more than 63 countries, and to Article First and Contents First which index 11,000 journals. NTIS is a CD-ROM database which provides bibliographic records of published scientific and technical information. TRIS is a worldwide source of information on various modes and aspects of transportation including planning, design, finance, construction, equipment, traffic, operations, management, marketing, safety, and other topics. It contains more than 315,000 abstracts of completed research, summaries of research projects in progress, and selected articles from more than 1,000 journals. TRIS also includes access to TLIB (Transportation Library Subfile) which is the bibliographic citations of the new acquisitions of the Institute of Transportation Studies Library at the University of California, Berkeley, and the Northwestern University Transportation Library at Evanston, Illinois. TLIB covers all modes of transportation provides an annual input of more than 9,500 records to TRIS.

Researchers selected key words and key word combinations to conduct a systematic search of the above databases. Some of the key words and key word combinations used in the search included: truck lanes, truck routes, lane restrictions, truck restrictions, auxiliary lane facilities, truck redistribution, truck weights, truck control strategies, truck accident countermeasures, and traffic flow strategies.

Researchers identified approximately 300 documents as possible sources and reviewed those sources for relevance. All relevant documents were analyzed and reviewed. Information was documented in the form of a synoptic review concerning type of restriction; warrant for the restriction; experiences and benefits from the restriction implementation; germane definitions (such as size of trucks targeted by the restriction); and legislative information pertinent to the restriction. The literature review is discussed in detail in Chapter 3 and the synoptic reviews of selected documents are found in Appendix A.

1.4.2 Survey of State Practices

Researchers conducted a survey of state practices by telephone. The telephone survey was general in nature and centered on states identified by the literature review as those most likely to have useful data. The traffic engineering or safety division of each state transportation agency was the source of initial contact. The basic question asked was:

"Has your state used any type of truck lane countermeasure, for example, lane restrictions, either at a point or along a freeway segment, in an attempt to improve traffic flow, traffic safety, increase roadway structural longevity, and/or decrease long term maintenance costs."

A positive response to this question was followed by questions on issues including: is the restriction still being implemented, where is the site of the restriction, who is the most appropriate

person to contact regarding the effectiveness of the countermeasure, what is the availability of data on the effectiveness, and problems implementing the countermeasure.

A detailed discussion of the findings of the survey are in Chapter 3, and Appendix B contains an example of the telephone survey.

1.4.3 Compile Legislative Information Regarding Truck Restrictions

Researchers compiled a summary of all legislation initiated by other states regarding truck restrictions from the literature review and the state survey. The literature review was used to document and discuss the types of restrictions that have been attempted or implemented by states and jurisdictions, the authority for restriction implementation if known, and legal issues raised by the restriction. A summary of the technical memorandum produced to document the authority and legal issues regarding truck lane restrictions can be found in Chapter 4 and a copy of the legislation enacted can be found in Appendix C.

1.4.4 Determine AASHTO Vehicle Classifications That Best Benefits From the Use of Dedicated Truck Lanes

The research team reviewed and analyzed all information obtained from the literature review and survey of state practices concerning the types of vehicles that most benefited from the implementation of truck lane countermeasures. Elements the research team considered included: the vehicle size, weight, number of axles, vehicle power and operating characteristics.

1.4.5 Determine Benefit/Cost Analysis per Mile of Dedicated Truck Lanes for Implementation in Rural Areas and in Urban Areas

The literature review and survey of state practices revealed that there was not enough data available to conduct a detailed benefit/cost analysis of dedicated truck lanes for implementation in either urban or rural areas. In addition to the lack of data available, the legislation passed by the 75th Texas Legislature narrowed the number of areas that designated lane restrictions are applicable. Therefore, a value-engineering approach was used to address the issues facing a municipality proposing to implement the new legislation. Based on the information gathered from the literature review and the state practices survey, the suitability of restricting vehicles for safety, traffic operations, pavement life, long term maintenance and motorist acceptance and compliance were addressed. Chapters 5 and 6 discuss these issues in detail.

1.4.6 Evaluate the Most Effective Way to Inform Motorists of Lane Dedication

The research team reviewed and evaluated methods to inform the motoring public about the implementation of lane restrictions. The legislation passed by the 75th Texas Legislature required TxDOT to install appropriate traffic control devices to inform motorists of the restriction. Recommendations regarding traffic control devices are found in Chapter 7.

2.0 LITERATURE REVIEW

The review of related literature reveals that a number of states are restricting the lanes in which trucks can operate. In 1986, the Federal Highway Administration (FHWA) asked its division offices to conduct a survey and report on experiences encountered by states with lane restrictions. This survey indicated a total of 26 states used lane restrictions. The most common reasons for implementing lane restrictions were:

- Improve highway operations (14 states)
- Reduce accidents (8 states)
- Pavement structural considerations (7 states)
- Restrictions in construction zones (7 states)

It should be noted that some states provided more than one reason for the restriction (*6*).

2.1 IMPROVING HIGHWAY OPERATIONS

The rise in truck volumes, the interaction of these large vehicles with other traffic, and the publicity given to major truck accidents make the issue of increased truck traffic a vital concern to both traffic managers and the general public. Highway traffic operations are the "yardstick" by which the user measures the quality of the facility. The characteristics which matter most to the driver are: the speed of travel, safety, comfort, and convenience. Highways are designed for a mix of vehicle types; however, an increased presence of large trucks on a roadway may result in serious degradation of flow quality for the following reasons:

- Trucks are significantly heavier than passenger cars.
- Trucks are considerably longer than other vehicles.
- Trucks have lower rates of deceleration and acceleration (*7*).

In urban areas, the demand on the highway system has grown much more rapidly than the corresponding increases in available capacity. This increase in demand has led to high levels of congestion and an increased awareness for traffic operations. Correspondingly, the studies of effects of trucks on highway operations has also increased in recent years.

2.1.1 Florida Lane Restrictions

The FHWA survey included information on experiences with lane restrictions in Florida (*6*). In 1982, the Florida Department of Transportation (FDOT) implemented a truck lane restriction on I-95 in Broward County . The lane restriction on a six lane, 38 kilometer (25 mile) freeway section prohibited trucks from using the left (inside) lane from 7:00 a.m. to 7:00 p.m.

In 1988, Florida conducted a 6-month experiment to determine the effects of prohibiting large trucks from using the left lane on I-95. With signs posted about every 1.6 kilometers (1 mile), good media coverage, and strict police enforcement, a 98 percent compliance was achieved. The accident rate for all vehicles decreased 2.5 percent for an all-day (24 hour) period but increased 6.3 percent during the prohibition period (7:00 a.m. to 7:00 p.m.). The proportion of accidents involving trucks with three or more axles decreased 3.3 percent during the hours of the restriction.

Vargas (*8*), in a thesis study for the University of Cincinnati, evaluated the safety effects of the truck lane prohibition in Broward County and how the lane restriction impacted the accident distribution by lane. The traffic in the study site was composed of 4 percent trucks, and the restriction time period was from 7:00 a.m. to 7:00 p.m. The results of this study showed a reduction in truck accidents and in truck injury accidents. The author also noted that the truck accidents shifted from the left lane to the center lane.

2.1.2 Capital Beltway Lane Restrictions

The Virginia Department of Transportation (VDOT) instituted a lane restriction for trucks on its I-95 section of the Washington, D. C., Capital Beltway between I-395 and the Woodrow Wilson Bridge (near the Virginia state line) in December 1984. The restriction, which was implemented jointly with the State of Maryland, was an attempt to reduce the accident problems on the Capital Beltway.

The Highway and Traffic Safety Division of the Virginia Department of Highways and Transportation conducted a study of accidents, speeds, and volumes for one year prior to implementation of the restrictions. Data was then collected periodically after implementation to determine the impact of the countermeasure. The objective of this study was to assess the impact of the truck restriction on the I-95 section of the Capital Beltway between I-395 and west of Woodrow Wilson Bridge by comparing traffic volume, speed, and accident data prior to the restriction with that during the restriction (*9*).

The authors found that the lane restriction resulted in a redistribution of trucks in the nonrestricted lanes while passenger vehicles using the left lanes increased slightly. An opinion survey of drivers indicated that the majority of users of the Beltway support a truck free lane.

The number of accidents along the restricted area of the Beltway remained constant; however, the accident rate declined slightly with the restriction, and there was a 20 percent reduction in injury accident severity. It should be noted that the 20 percent reduction in accident severity is actually only a reduction of injury accidents by eight (41 versus 33). Property damage only accidents increased during the time period by nine (60 versus 69). Therefore, the reduction is probably insignificant. The overwhelming support for the restriction by the public and the perception of the benefits, in conjunction with the slight reduction in accident rates, resulted in a recommendation that the truck lane restriction be maintained (*9*).

Several follow-on studies of the Virginia I-95 data continued to evaluate accidents, speeds, and volumes to determine the effects of the restriction (*10*, *11*). In 1987, the Traffic Engineering Division of the Virginia Transportation Department (VDOT) updated the initial 1985 Capital Beltway study. This update determined the accident rate increased 13.8 percent during the restriction; however, there was no change in the fatal and injury accident severity. Traffic volume increased nearly 8 percent during the time the restriction was in place. The only significant change for the segment was the lane restriction. The accident rate for the section consisting of the I-95, I-495, and I-395 interchange was the primary contributor to the overall accident rate increase. It was found that accidents were redistributed by lane of occurrence, type of maneuver, and collision type during the restriction.

Although the data showed an increase in accident rates, the authors noted that there was no change in fatal or injury accident severity. This maintenance of accident severity level along with various intangible benefits such as favorable public perception and continuity of the lane restriction with Maryland, resulted in a recommendation of retention of the restriction (*10*).

The Traffic Engineering Division of VDOT issued a final study update in June 1989. This study included the results of a field study of interchange ramps and loop geometrics. The field study was conducted to determine if these locations were properly posted with a maximum safe speed for the existing superelevation. Accident frequency and characteristics were then analyzed to determine the interface between drivers, vehicle, and roadway condition. Finally the study team performed an exploratory evaluation of the Northern Virginia (NOVA) Freeway Management Team (*11*).

The field study of the ramps and interchanges indicated several conditions of concern relative to traffic operations and environmental safety. These conditions were: posted maximum safe speeds on loops and ramps, interchange configurations which violate driver expectancy at their approach, inadequate or poor visibility of advanced signing, and landscaping and vegetation which obscure a driver's line of sight.

An analysis of the data showed that the accident rate increased for trucks on southbound I-95 during the truck lane restriction. The four most prevalent factors in accidents involving trucks were: weather/visibility, vehicle defect, speeding, and road defect. Trucks were involved in 49 percent of the sideswipe collisions and 16 percent of the rear-end collisions As a result of this increase for two consecutive years, the authors recommended that the truck lane restriction be lifted (*11*).

2.1.3 Puget Sound Lane Restriction

Mannering, Koehne, and Araucto conducted a study in the Puget Sound region that considered lane restrictions as a means of increasing roadway capacity, improving highway operations, improving the level of roadway safety, and encouraging even pavement wear (*12*). The study region has a truck volume of approximately 5 percent of the total traffic volume. The

study consisted of a literature review; an in-depth analysis of the effects of restrictions at a specific site; a site comparison analysis to determine if there was enough consistency among various sites to apply the results of the in-depth analysis to other areas; and surveys of motorists to determine awareness and opinions of the driving public about the lane restrictions.

The literature review revealed that although a number of states had instituted truck lane restrictions, very few states had documented the effects of the restriction. The authors found that in nearly every instance where a comprehensive examination of a lane restriction implementation occurred, negligible changes in operations and safety were observed (*12*).

The in-depth analysis by the research team examined traffic composition, traffic flow characteristics, safety, enforcement issues, economic impacts, and pavement deterioration. The analysis revealed there were no significant operational or safety level increases that could be attributed to the restriction. The safety portion of the analysis did reveal that the number of truck related accidents for each lane were proportional to the number of trucks traveling in that lane. The portion of the in-depth analysis that addressed enforcement issues focused on violation rates. Researchers found that the violation rates for trucks during the restriction was 2.1 percent, which was the same as the proportion of trucks that were traveling in that lane prior to the restriction. Therefore, the restriction had no noticeable impact on the distribution of the trucks. Researchers also found that the economic impact of the restrictions was minor for motor carriers, and there was only a minimal impact on pavement life. The authors recommended that truck lane restrictions not be implemented in the Puget Sound area (*12*).

2.1.4 Other Studies of Operational Lane Restrictions

Hanscom addressed the operational effectiveness of restricting trucks from designated lanes on multilane highways (*13*). His study involved sites near Chicago and in rural Wisconsin. Measures of lane restriction effectiveness examined in this study included: voluntary truck compliance to the restrictions, traffic congestion as determined from speeds and platooning of vehicles following trucks, and an all-vehicle sample of differential speeds between the restricted and adjacent lanes.

The author concluded that favorable truck compliance effects were evident at all three locations. However, violation rates were higher at the two-lane site, as a result of increased truck concentrations due to the truck restriction. Reduced speeds of impeded vehicles following trucks were also noted at the two-lane site. At the three-lane sites the results of the lane restriction were beneficial traffic flow effects and reduced congestion. No speed changes (between the restricted and adjacent lanes) were observed to indicate an adverse effect of implementing the truck lane restrictions.

In 1990, Zavoina, Urbanik and Hinshaw examined the effects of truck restrictions on rural Interstates in Texas (*14*). This study analyzed the operational effects of restricting trucks from the left lane on six-lane rural Interstates in Texas. The study sites were six-lane, rural interstate

highway sections with a speed limit of 105 km/hr (65 mph) for automobiles, and 96 km/hr (60 mph) truck speed limit. Vehicle distributions according to classification, vehicle speeds, and time gaps between vehicles were examined. Surveys of the driving public were conducted both before and after the restriction implementation. The objectives of the surveys were to gain an understanding of the opinions of motorists towards the restrictions and to identify which sign best relates the intended message to the motorist.

The authors found no definitive results that could be attributed to the implementation of the truck restriction. Although the directional distribution of trucks changed significantly due to the restriction, no effects were found in the directional distribution of cars, speeds of either cars or trucks, or the time gaps between vehicles that could be attributed to the truck restriction. The authors also found that although the implementation of truck restrictions theoretically have the potential to improve the capacity and safety of roadway, there is a lack of evidence from current research to support these conclusions (*14*).

Garber and Gadiraju (*15*) examined the effects of increased truck operations using a simulation technique to study the effects of implementing different strategies on multilane highways. The primary objective of their study was to provide information about the nature and extent of the impact of specified truck traffic control strategies. The strategies included lane restrictions and differential speed limits. The authors found that: the combination of lowering the speed limit for trucks and restricting the trucks to the right lane increased the interaction between cars and trucks and therefore the potential for passenger car/truck accidents; the restriction of trucks to the right lane decreased the vehicular headway in this lane, and the combination of lowering the speed limit for trucks and restricting the trucks to the right lane resulted in a change in the distribution of vehicle spot speeds, and a slight, but statistically insignificant, increase of accidents on the right lane.

2.2 INCREASING HIGHWAY SAFETY

In research sponsored by the Maryland State Highway Administration, Sirisoponsilp and Schonfeld in 1988 reported on the strategies used by state highway agencies to restrict trucks from certain lanes and the impact that those restrictions had on traffic operations and safety (*16*). The objectives of their study were: to examine strategies used by various state highway agencies to restrict trucks from certain lanes; to examine the impacts of these restrictions on traffic operation and safety; to assess the objectives and effectiveness of the restrictions, current restriction methods, enforcement practices, and procedures for evaluating restrictions; and to predict the impacts of lane restrictions.

The authors concluded that although truck lane restrictions have been imposed by a number of states for many years, the effects of the restrictions on traffic operations and safety are still not well-known, and cost effectiveness is uncertain. The goal of restricting truck lane usage appears to have shifted from traffic operation to traffic safety. This shift stems from public

perceptions of increased truck-related accidents. Truck lane restrictions have not been accepted as a potential solution to the congestion and accident problem on urban freeways.

In 1984, McCasland and Stokes (*17*) also examined truck traffic characteristics and problems on urban freeways in Texas. The authors evaluated six truck restrictions and regulatory practices through information obtained from a literature review and survey of state policies. The regulations and restrictions the authors examined were: lane restrictions; time-of-day restrictions; speed restrictions; route restrictions; driver licensing and certification programs; and increased enforcement of existing regulations.

Results of the McCasland and Stokes study indicated that the restriction of truck traffic to one mixed-flow lane would probably not improve freeway safety or operations based on associated constraints and limitations. The authors also concluded that only reduced speed limits for all vehicles, improvement of driver licensing/training, and incident management techniques appear capable of producing any substantial improvement in the safety and operational aspects of truck usage of urban freeways in Texas. However, it should be noted that all assessments and recommendations are based on findings of the literature review and state policy survey (*17*).

One area of particular concern when implementing truck restrictions in urban roadway settings is the creation of a "barrier effect" in weaving areas. Weaving areas are segments of freeway formed when a diverge area closely follows a merge area. Operationally, weaving areas are of concern because the "crossing" of vehicles creates turbulence in the traffic streams. When trucks are restricted to the rightmost lanes of a freeway and are of significant number, a barrier composed of trucks can form in the weaving areas. The slower moving trucks limit the visibility and maneuverability of the smaller vehicles attempting to enter and exit the freeway system. An indication of the barrier effect is an over-involvement of trucks in weaving area accidents, rear-end collisions, and side collisions. Some studies have shown that this problem may be magnified when a differential speed limit is present (*16*, *17*).

Garber and Gadiraju used simulation to study the effects of implementing different strategies on multilane highways. These strategies included differential speed limit (DSL) for trucks, truck lane-use restrictions and a combination of DSL and lane-use restrictions. Trucks were defined as vehicles having six or more wheels in contact with the road and having a gross vehicle weight greater than 4,531 kilograms (10,000 pounds). Impacts of the strategies were evaluated and compared, and the final report presented the significant changes in flows, speeds, headway, and accidents (*18*).

The authors concluded that the results did not indicate any safety benefits from the imposition of any of the strategies examined in the study. They also concluded that the study results suggested that the potential for an increase in accident rate will be created, particularly when the strategies are imposed on highways with high volumes and a high percentage of trucks, and that the combination of lower speed limits for trucks and right lane restriction of trucks resulted in a slight, but statistically insignificant, increase of accidents in the right lane.

The Department of Civil Engineering at the University of Maryland evaluated the effectiveness and desirability of differential speed limits on the Maryland Interstate System (*19*). Vehicular speed and accident data were collected at 84 study sites, encompassing a variety of geometric designs and locations with and without truck DSL. The study concluded that no consistent and reliable relationship could be found among speed parameters and accident rates, and that there is generally poor compliance by all vehicles with posted speed limits. A decrease in trucks involved in rear-end collisions was noted at locations with higher operating speeds. Increasing truck speeds (effectively removing the DSL) would reduce the truck accident rate. The study also concluded that no consistent and reliable relationship could be found among speed parameters and accident rates (*19*).

2.3 REDUCING PAVEMENT WEAR

Increased truck traffic also creates an impact on pavement life and required roadway maintenance. Traffic is one of the most important factors that must be considered in pavement life. Heavy axle loads create strains and stresses in pavements that cause fatigue failures. The average daily traffic (ADT), peak hour volumes, etc., have very little effect on pavement deterioration; however, the number of heavy loads supported by the pavement over its design life affects deterioration. Because a single 80 kN (18,000 lb) single axle load will cause more damage to a road than 2000 large passenger cars, the number, type, and magnitude of wheel loads predicted to use the road are needed to determine pavement life (*20*).

It is expected that NAFTA will not only result in dramatically increased truck traffic in areas near the border and in corridors leading to and from the borders, the traffic will not necessarily follow the simple traffic increase factor practices used in past pavement modeling (*21*). Trucks traveling from Mexico are heavier than those generally allowed in the United States. Therefore, a fully loaded truck based on limits used in Mexico will cause more damage than a fully loaded truck, based on limits used in the United States (*22*). Dual and triple axles loaded at allowable loads in Mexico would cause nearly twice the damage caused by axles loaded to the allowable limits in Texas. Single axles loaded at the allowable limits in Mexico would cause nearly one and one-half times the damage caused by legal axles in Texas (*21*).

Management of pavement wear through the use of truck lane restrictions has been attempted by several states. Arkansas attempted to move heavy truck traffic to the leftmost lanes of some highways in order to equalize pavement wear. Signs were erected at weight stations entering the State, encouraging the use of the left lane on the Interstate system. The program was not successful because initial attempts were not reinforced through a public awareness campaign and enforcement efforts (*14*).

An increase of truck traffic in Nevada, where 77 percent of the Interstate highways were constructed prior to 1970, resulted in a truck redistribution test requiring trucks to use the left lane. This test was conducted in 1983 on a rural Interstate and was initiated to evaluate truck traffic compliance with a redistribution program which directed trucks to use the left lane of a 37

kilometer (23 mile) section of I-80. The redistribution of truck traffic was made in an attempt to reduce construction, reconstruction, and overlay costs. Early estimates indicated that redistribution of the traffic on rural Nevada interstates would result in substantial annual savings (*23*, *24*).

2.4 CONGESTION AND ECONOMICS

Cambridge Systematics, Inc., (*25*) assessed the impacts of large trucks on freeway congestion for the California Department of Transportation in 1988. Sites for the study consisted of Los Angeles, San Francisco, and San Diego, three areas that were identified as critically congested areas. The objectives of the study were to assess the impacts of large trucks on peak-period freeway congestion; evaluate the effects of freeway and traffic management techniques on congestion reduction; and identify the economic impacts of freeway and traffic management techniques.

The authors found that the volume of large trucks on freeways does not have an inordinate impact on peak period congestion; however, truck-involved accidents and incidents do have a significant impact on freeway congestion. The Cambridge Systematics study also addressed four strategies to reduce congestion. These strategies were a traffic management program, an improved incident management program, night shipping and receiving policies, and peak-period truck bans.

The authors found that peak-period truck bans would temporarily reduce congestion on core freeways; however, congestion would correspondingly increase on parallel arterial routes. Although the authors judged that peak-period truck bans would not be legal under the federal Surface Transportation Assistance Act of 1988, possible impacts of bans were examined due to the favorable perception of bans by the media and general public. The authors concluded that the ban, which would cost the Los Angeles study site alone $22 million in direct costs, would improve speeds slightly on freeways, but the speeds on adjacent arterials would drop. The reduction in total California business sales due to a peak period ban was estimated to be $27 million (*25*).

2.5 SEPARATE TRUCK FACILITIES

The physical separation of heavy vehicle traffic from the general traffic stream has been accomplished at sites in Italy and at least three states by providing separate truck facilities. With the exception of the Bologna-Firenze Freeway in Italy, none of these facilities are exclusively for truck traffic; smaller vehicles are also allowed to use the facilities. Feasibility studies for separate truck facilities have been conducted in Texas and California. In 1990, the Oak Ridge National Laboratories conducted an economic feasibility study.

The Bologna-Firenze Freeway is a freeway facility that is reserved for heavy vehicles. The facility, which traverses the Appennine Mountains, was the result of a study by the Autostrade

Company on improving the operating and safety conditions of the Bologna-Florence Freeway. The Autostrade Company, which oversees the operations on the mountainous Bologna-Florence Freeway, found that the freeway was subjected to irregular traffic flows due to the terrain; routine maintenance contributed to congestion and effective operations; and that there were high traffic volumes that consisted of a high percentage of trucks. The recommendation for increasing effectiveness of the freeway consisted of constructing a new complementary freeway that would be reserved for heavy vehicles. The exclusive facility, which is a 52 kilometer (33 mile) section from Barberino del Mugello to Sasso Marconi, has 80 percent of its length either on viaducts or tunnels (*26*).

The New Jersey Turnpike has a 55 kilometer (35 mile) segment that consists of interior (passenger car) lanes and exterior (truck/bus/car) lanes within the same right-of-way. For 37 kilometers (23 miles), the interior and exterior roadways in each direction have three lanes. On the 16.7 kilometer (10 mile) section that opened in November 1990, the exterior roadway has two lanes, and the interior roadway has three lanes per direction. Each roadway has 3.67-meter (12-foot) lanes and 3.67-meter (12-foot) shoulders, and the inner and outer flows are separated by a guardrail barrier. The current mix of automobile traffic is approximately 60 percent on the inner roadways and 40 percent on the outer roadways (*27*, *28*).

In California, the reconstruction of a section of I-5 north of Los Angeles resulted in two parallel roadways. After completion of the new interstate roadway, the old roadway was maintained to carry truck traffic. Three major interchanges of I-5 with I-405, Route 210, and Route 14 span about 6.7 kilometers (4 miles) and are designed to accommodate heavy traffic demands. The primary purpose of this truck facility is to reduce weaving problems at interchanges (*29*). On a section of I-5 near Portland, Oregon, a truck by-pass at the Tigard Street interchange is similar to some of the California facilities. The bypass lane allows trucks to stay in the right lane, exit onto a truck roadway (passenger cars are also permitted), and re-enter the traffic downstream of the interchange. The main lanes are built on a significant grade. Without the truck roadway, larger vehicles are forced to climb a grade, then weave across faster moving traffic to enter the main lanes (*28*).

Stokes and Albert (*29*) evaluated the feasibility of exclusive truck facilities parallel to I-10 and I-45 in the vicinity of Houston, Texas, while Lamkin and McCasland (*30*) report in detail the feasibility of exclusive facilities for the Beaumont-Houston corridor. Studies on the potential sites in Texas concluded that the construction of exclusive truck facilities was not warranted because the limited volumes of trucks along certain sections of the corridor did not justify the estimated costs of constructing the facility. Lambkin and McCasland recommended that additional travel lanes be constructed on the existing roadway to be shared by trucks and non-trucks.

Proposals for truck facilities for a corridor connecting the San Pedro ports and downtown Los Angeles were also considered. The proposals included using the paved Los Angeles River channel as an exclusive facility and using the Alameda Street corridor to carry trucks and trains within a right-of-way also shared by automobiles (*31*). The paved river bed could accommodate

at least a single lane in each direction, is paved for the 33 kilometers (20 miles) between the ports and downtown, and is dry much of the year.

Jansen and Rathi (*32*) examined the economic feasibility of exclusive facilities for trucks and cars in 1990 in a study conducted by Oak Ridge National Laboratories. The study examined separating the vehicles on controlled access highways using either existing lanes or constructing new lanes. The authors concluded that exclusive facilities are warranted on congested highways where truck volumes exceed 30 percent of the vehicle mix (*32*).

3.0 SURVEY OF STATE PRACTICES

3.1 INTRODUCTION

A survey of state practices was conducted by telephone. The telephone survey was general in nature and centered on states that were identified by the literature review as most likely to have useful data. The traffic engineering or safety division of each state transportation agency was the source of initial contact. The following section is a synopsis of the information collected during the survey.

If a state has restrictions currently in place, researchers obtained the name and telephone number for a point of contact. These states were contacted in later tasks to obtain detailed information and possibly data for analysis.

3.2 STATE PRACTICES SURVEY

State	Restriction	Comment
Alabama	No restrictions	
Alaska	Yes	Route restrictions are used in urban areas to ensure that truck traffic remains on routes that are physically able to handle the load.
Arizona	No restrictions	
Arkansas	Yes	Arkansas has two instances of truck restrictions. The first restriction, on I-40 West of Memphis, restricts through trucks to the left lane to remove them from the massive amount of weaving that takes place in this area. The second restriction was a statewide restriction on lane usage that was implemented in the mid-1980s. The goal of this restriction was to even out pavement wear. However, the restriction was not enforced and was discontinued due to lack of compliance.
California	Yes	There is a statewide restriction of trucks to the right lane on four-to six-lane roadways or the right two lanes on roadways of eight or more lanes. Trucks are allowed to pass in a restricted lane. The restriction is in place, and was implemented

State	Restriction	Comment
California (Continued)		in an attempt to improve safety and traffic flow. Exceptions to the restriction are made in certain areas where they are warranted. For example, in Sacramento, trucks are moved to the left lanes to remove them from the numerous weaving sections along I-5.
Colorado	No restrictions	
Connecticut	Yes	The use of the left lane is prohibited for trucks where designated. Approximately 241 kilometers (150 miles) of freeway is six or more lanes. Freeways between towns or in the suburbs have the restriction. The restriction was directed by legislature for safety purposes.
Delaware	Yes	There are lane restrictions on certain urban arterials in an attempt to prevent trucks from blocking all lanes at signalized intersections. The restrictions are in place on US-13 in Dover and along US-113 in several urban areas. They were put in place to improve traffic flow. This is not a statewide policy. The restriction is implemented for locations where an engineering study has shown the restriction is needed. "Trucks pay their share of taxes so should have equal access."
Florida	Yes	Truck restrictions are in place along I-95 in Broward and Palm Beach Counties. In Palm Beach County, which has a six lane section, trucks are restricted from the left lane. In Broward County and in a portion of Palm Beach County where there are more than six lanes, trucks are restricted from the HOV lane and the next left most lane. These restrictions are from 7 a.m. to 7 p.m. A study examined effects of the restrictions. Netsim and Freesim models showed that the restrictions are not hurting operations.

State	Restriction	Comment
Georgia	No response	
Hawaii	No	
Idaho	No	
Illinois	Yes	There are two examples of lane restrictions in Illinois. The first lane restriction is in Chicago where trucks are restricted to the right two lanes on roadways with six or more lanes. The intended goal of this restriction is to improve traffic flow. The second type of truck restriction occurs in rural areas where uneven pavement wear is occurring. Trucks are moved off of a lane that is in need of repair. This gives the DOT additional time to make repairs on the roadway. Once repairs have been made, the restriction is removed.
Indiana	Yes	Trucks are restricted to the right lane on four lane highways and to the right two lanes on highways with six or more lanes. This restriction is implemented on all state highways with four or more lanes. This restriction was implemented with a state statute. The legislature wanted to improve safety and, therefore, implemented this restriction.
Iowa	No	
Kansas	No	
Kentucky	Yes	Truck routes are designated for through trucks in urban areas. This restriction is an attempt to improve traffic control. Kentucky did ban trucks from a stretch of I-75 outside of Covington. During the reconstruction of the highway on "Death Hill," trucks were rerouted around the area for safety purposes. After the reconstruction of I-75, the public wanted the ban to remain in place. KDOT removed the ban, and trucks are allowed on the roadway.

State	Restriction	Comment
Louisiana	Yes	In the past, Louisiana has invoked voluntary lane restrictions on trucks in an attempt to increase the life of pavement. Trucks have been restricted to the left lane when additional time was needed prior to the start of reconstruction projects.
Maine	No	
Maryland	Yes	On the Baltimore and Capital Beltways, trucks are restricted to the right two lanes on sections where there are eight or more lanes. These restrictions were started to improve safety and traffic flow.
Massachusetts	No	
Michigan	No	
Minnesota	No	
Mississippi	No	
Missouri	No restrictions	Speed limits are the same for passenger cars and trucks; the state uses standard Manual of Uniform Traffic Control Device (MUTCD) signs.
Montana	No response	
Nebraska	No restrictions	Nebraska has laws that permit trucks to use both (assuming two) lanes; standard MUTCD signs are used; restrictions only apply during overlays and other construction or maintenance activities.
Nevada	No response	
New Hampshire	No truck restrictions	
New Jersey	No response	
New Mexico	No response	

State	Restriction	Comment
New York	Yes	There are "Minor" restrictions in the New York City area, but generally, there are no restrictions elsewhere.
North Carolina	No formal truck restrictions	North Carolina generally provides restrictions on non-Interstate Highways and undivided highways climbing lanes.
North Dakota	No response	
Ohio	No response	
Oklahoma	No restrictions	The state is looking at restrictions for pavement wear; they are in need of implementing such measures (with respect to periodically moving trucks and heavy vehicles to other lanes) due to escalating construction/maintenance costs.
Oregon	No formal truck restrictions	In some urban areas, standard MUTCD signs are used to direct trucks to dedicated lanes to maintain truck speeds and improve overall operations for other vehicular traffic (basically to separate flow). However, these lanes are not constructed any differently, and there is no law enforcement to ensure compliance. Further, Oregon has no laws pertaining to truck restrictions.
Pennsylvania	No response	
Rhode Island	No response	
South Carolina	No restrictions	Lane restrictions were attempted in construction and maintenance work zones within the last two years, but the restrictions were difficult to enforce and were not particularly successful.
South Dakota	No response	
Tennessee	No response	

State	Restriction	Comment
Utah	Yes	Utah restrictions are based on vehicles that exceed 12,000 pounds GVW; the state posts advisory signs indicating that "VEHICLES EXCEEDING 12,000 LB GVW SHOULD USE RIGHT LANE NEXT XX MILES." A legislative action passed that has two parts: vehicles in excess of 12,000 pounds GVW are restricted from using the left-most lane on a three-(or more in one direction) lane facility, and it gives the Utah DOT and local agencies the authority to enact restrictions for the purpose of improving safety, maintenance, or the use of high occupancy vehicles. The concept of their implementation actually came from the Wyoming DOT, which has adopted a similar law/action.
Vermont	No formal truck restrictions	
Virginia	Yes	Virginia has restrictions in mountainous terrain only. On multi-lane facilities, trucks are restricted to the right lane or two-most right lanes to improve traffic flow. On secondary roadways (city and residential streets), the Commonwealth Transportation Board (much like Texas' Transportation Commission) has enacted restrictions for vehicles over 7,500 pounds (anything larger than a dump truck) because of the "incompatibilities" with other traffic. A standard MUTCD sign "NO THRU TRUCKS" is used and possibly modified to include street names. On I-66 in Virginia going into Washington, D.C., the facility totally restricts trucks (only passenger cars allowed) to improve operations (heavy commuter route). Again, standard MUTCD sign used. On the Virginia portion of Capital Beltway (I-495), trucks are restricted from the inside lanes to improve operations. NOTE: Virginia has not implemented any restrictions for pavement longevity and long-term maintenance cost savings, only to improve traffic operations

State	Restriction	Comment
Washington	No formal restrictions	The State legislature is in a committee stage of developing restriction guidelines for multi-lane facilities (three or more lanes in one direction) to prevent vehicles in excess of 10,000 lbs GVW from driving in the left (inside) lane. The restriction is only for operational improvements. The restriction information will be provided through static signing and by distributing the information to trucking companies. IMPORTANT: this restriction is only in the development stage at this point. It may "die" in the legislature if the support is not there.
West Virginia	No formal restrictions	The State has had "informal discussions" about implementing right-lane restrictions specifically for SAFETY reasons only. The restriction discussed would keep trucks in the inside lane, adjacent to median barriers, and not impeding traffic, but no attorneys have been involved with respect to writing a specific law. The WV DOT's belief is the state statute gives them the authority and flexibility, much like the state's Secretary of Transportation has, to implement a restriction without initiating a legislative action. This authority is similar to the one they have to implement speed limits, parking restrictions, turning restrictions, etc. They have not, however, challenged this belief with respect to truck lane restrictions.
Wisconsin	No response	
Wyoming	No response	

4.0 LEGAL ISSUES AND NEW LEGISLATION

4.1 INTRODUCTION

Large trucks are often perceived to restrict the free flow of traffic and to affect congestion, operations, and safety on roadways. This perception is especially prevalent in urban areas. In an attempt to remedy this situation, restrictions on trucks have been implemented by many jurisdictions. Truck restrictions are usually implemented in an attempt to obtain one of the following four objectives:

- Improve highway operations;
- Improve the level of safety;
- Equalize pavement wear; and
- Improve operations and safety in work zones.

There are generally four types of truck restrictions utilized by states in an attempt to improve safety and operations. These restrictions are

- **Lane restrictions**. Lane restrictions limit either all trucks or trucks of specified sizes to traveling in specific lanes on the facility;
- **Route restrictions**. Route restrictions restrict either all trucks or specified trucks from traveling on certain routes or freeway sections;
- **Time-of-Day restrictions**. Time-of-day restrictions restrict all trucks or specified trucks from either designated lanes or routes during specific times of the day, usually peak hour; and
- **Speed restrictions**. Speed restrictions restrict all trucks or specified trucks to traveling at lower speeds than the rest of the traffic stream.

The literature review revealed that approximately half of the states employ, or have employed in the past, some type of truck restriction. The following sections discuss the types of restrictions that have been attempted or implemented by states and jurisdictions, the authority for restriction implementation if known, and legal issues raised by the restriction.

4.2 LANE RESTRICTIONS

A lane restriction requires, that trucks use certain lanes or not use certain lanes on the roadway. In some cases, the lane restriction may be a request rather than a requirement. There are several versions of lane restrictions that have been implemented in various states and locations. The following overview of lane restrictions and the authority enabling the restriction to be implemented has been taken from various literature sources. In many cases, state highway authorities, under existing legislation, are able to implement the truck lane restriction.

4.2.1 Arkansas

Arkansas restricted trucks to the leftmost lane(s) statewide in the mid-1980's in an attempt to equalize pavement wear. The restriction is a 24 hour operational restriction. This unenforced restriction was implemented as a voluntary measure. The authority for the restriction was the State of Arkansas. The state also has existing legislation which allows local, city, or county jurisdictions to implement truck restrictions on state highways.

4.2.2 California

California restricts trucks to the rightmost lane(s) statewide. The restriction is for trucks with three or more axles on roadways that have a minimum of two plus directional lanes. The restriction is operational 24 hours a day. Local, city, or county jurisdictions can implement restrictions on state highways with approval from the state.

4.2.3 Colorado

Colorado restricts trucks in certain areas to the rightmost lane(s). The Colorado DOT has the authority to implement restrictions as deemed necessary by engineering studies. Existing legislation allows, local, cities, and county jurisdictions to implement restrictions on state highways with approval from the state.

4.2.4 Connecticut

Connecticut restricts trucks to rightmost lane(s) on freeways statewide. The restriction is operational 24 hours a day for commercial trucks and buses on facilities with three plus directional lanes. The authority for the restriction is a statewide law, and only the DOT can implement the restriction.

4.2.5 Florida

Florida restricts trucks with 3 or more axles from the leftmost lanes in certain areas. The restriction is enforced from 7 a.m. to 7 p.m. In 1982, a truck lane use restriction along I-95 was implemented. The restriction was established for the 40.2 kilometers (25 miles) of the six lane interstate which traverses Broward County. The restriction was enforced from 7 a.m. to 7 p.m. The Florida DOT was the implementing authority. In 1990, the Florida DOT extended the restriction to Palm Beach County.

4.2.6 Georgia

Georgia restricts trucks to the rightmost lane(s) if trucks are allowed by permit to travel within the I-285 perimeter freeway in the Atlanta area.

4.2.7 Idaho

Idaho restricts trucks in certain locations to the leftmost lane(s). The restriction, intended to equalize pavement wear, is used only on facilities with a minimum of two plus directional lanes.

4.2.8 Illinois

Illinois restricts trucks to the rightmost lane(s) in certain areas to improve operations. The restrictions are only used on facilities with a minimum of three plus directional lanes. The authority for the restriction is the Illinois DOT, as authorized by existing legislation.

4.2.9 Indiana

Indiana restricts trucks to the rightmost lane(s). The restriction is in force 24 hours, and is used on all urban freeways with a minimum of two plus directional lanes. The authority is existing legislation.

4.2.10 Kentucky

Kentucky restricts trucks with a gross vehicle weight (GVW) of 13,593 kg (30,000 lbs) to the rightmost lane(s) on certain roadways. The restriction is limited to facilities with a minimum of three plus directional lanes.

4.2.11 Louisiana

Louisiana restricts trucks in some areas to the rightmost lane(s). The restriction is not enforced. The Louisiana DOT is empowered by legislation to establish truck restrictions.

4.2.12 Maryland

Maryland restricts trucks in some areas to the rightmost lane(s) on roadways with grades. The authority for the restriction is existing legislation.

4.2.13 Massachusetts

Massachusetts restricts trucks with a GVW of 4,531 kg (10,000 lbs) in certain areas to the rightmost lane(s). The authority for the restriction is existing legislation.

4.2.14 Missouri

Missouri restricts all trucks statewide to the rightmost lane(s) on all urban freeways with a minimum of three plus directional lanes. The authority for the restriction is existing legislation.

4.2.15 Nevada

Nevada restricts trucks to the leftmost lanes in certain areas. The restriction, which is voluntary, was implemented in an attempt to equalize pavement wear. Existing legislation allows local, city, or county jurisdictions to implement truck restrictions on state highways.

4.2.16 New Jersey

New Jersey restricts trucks with a GVW of 4,531 kg (10,000 lbs) to the rightmost lane(s) on urban freeways with a minimum of three plus directional lanes statewide. Restrictions can be implemented on state highways by local, city, or county jurisdictions with approval. This restriction was the result of requests by local officials and subsequent DOT engineering studies.

4.2.17 New York

New York restricts trucks with a GVW of 4,531 kg (10,000 lbs) to the rightmost lane(s) on urban freeways with a minimum of three plus directional lanes in certain areas.

4.2.18 North Carolina

North Carolina restricts trucks to the leftmost lane(s).

4.2.19 Oregon

Oregon restricts trucks with a GVW of 3,624 kg (8,000 lbs) to the rightmost lane(s) on all urban freeways with a minimum of two plus directional lanes. Existing legislation allows local, city, or county jurisdictions to implement truck restrictions on state highways.

4.2.20 Pennsylvania

Pennsylvania restricts trucks to the rightmost lane(s) on grades.

4.2.21 Virginia

Virginia restricts trucks in certain areas to the rightmost lane(s) on limited access facilities with a minimum of two plus directional lanes. Virginia Highway and Transportation Commission has the authority to implement the restriction by statute.

4.2.22 Wisconsin

Wisconsin restricts trucks in certain rural areas to the leftmost lane(s) in an attempt to equalize pavement wear.

4.3 ROUTE RESTRICTIONS AND BANS

Route restrictions implemented by state and local jurisdictions in an attempt to increase safety and operational effectiveness may take several forms. The most prevalent forms of route restrictions and their objectives are:

- **Freeway Section Bans**, which ban truck traffic from designated sections of freeways. The objective of a freeway section ban is to eliminate or reduce truck traffic on specific freeway sections due to congestion, high numbers of accident severity, and incident reduction.
- **Route Diversions**, which divert trucks from specific freeway sections to other routes which are reasonable alternatives. The objective of the route diversion is to divert the majority of trucks from specific freeway sections to suitable alternative routes, thereby decreasing congestion, accidents, and incidents.
- **Access Routing**, which selectively designates access routes from the Surface Transportation Assistance Act (STAA) network. The objective of access routing is to shift truck traffic to specified routes between STAA highways and terminals.
- **Local Ordinances**, which restrict truck movements on local streets based on size, weight, safety, and noise. The objective of local ordinances is to restrict truck access within a localized area or jurisdiction to minimize noise and safety impacts.
- **Hazmat Restrictions**, which place restrictions, based on safety, on trucks carrying hazardous materials. The objective of hazmat restrictions is to control the movement of hazardous materials to provide safety and reduce incidents (*33*).

4.3.1 Common Route Restrictions and Diversions

Most route restrictions in place are directed at routing hazardous materials carriers or oversize /overweight trucks. The restrictions route the trucks around population centers, or to avoid hilly terrain, toll roads, bridges, and tunnels. General route restrictions for hazardous materials, oversize/overweight, or for a specific segment of road due to a design or geometric feature such as a tunnel are not addressed in the following sections. State transportation agencies usually have the authority to implement these route restrictions by existing legislation. The State of California, however, allows route restrictions to be implemented by both the California State Highway Patrol and the transportation agencies. In some instances, such as Kentucky, new legislation was required. In all cases, suitable alternate routes must be available.

4.3.2 Background

The Surface Transportation Assistance Act (STAA) of 1982 and the Tandem Truck Safety Act (TTSA) of 1984 established a national network of highways as a designated large truck network. The law is insistent that state regulations should not interfere with interstate truck movements, as long as the trucks conform to size and weight limits established by STAA and

TTSA. Since this designation was enacted, a number of state and local jurisdictions have tried to challenge STAA and its provisions.

The Acts give the Secretary of Transportation the discretion to modify the designated route system. The modification of the national network may be made on the basis of safety, environmental, or operational problems. However, there has been only one successful request to remove a freeway section from the national network because of a safety problem.

Kentucky requested authorization to ban tractor-trailer trucks from sections of two Interstates in the Northern Kentucky/Ohio-Kentucky-Indiana region. One of these sections, known as "cut in the hill" or "death hill," is a 3.2 kilometer (2 mile) segment of I-71/75 that includes grades of up to 5 percent, and sections with relatively sharp curvature. These design features in conjunction with a traffic volume of 100,000 vehicles per day of which 10 percent is trucks, give the segment the reputation of a high hazard location. The State of Kentucky argued that the frequency of truck accidents warranted a ban on these sections of road, and that these hazards were amplified by reconstruction activities planned for the sections (*34*).

The Secretary of Transportation and FHWA approved a truck ban on the section known as "cut in the hill"/"death hill" until the reconstruction of that section was complete. Once reconstruction was completed, the ban was lifted. The ban was not approved for the other section of freeway, even during reconstruction (*34*).

Route diversions may also be challenged in court as interfering with Interstate commerce. In all cases, any attempt to ban, divert, or restrict routes for trucks must include or allow alternative routes that provide reasonable access.

4.3.3 Legal Challenges to STAA and TTSA

The following court cases were attempts by various jurisdictions to implement bans or divert trucks after STAA and TTSA legislation:

- **USA vs Connecticut.** In 1983, Connecticut signed a law that prohibited or restricted tandem trucks from using highways in the state.

  Decision: Citing the supremacy clause, the court ruled that Federal law takes precedence over state law; when there is a direct conflict. The court also noted that even without STAA, the Connecticut law may have been unconstitutional because of its impact on interstate commerce (*33*).

- **USA vs Florida.** In March 1984, Florida designated the Florida Department of Transportation as the agency responsible for specifying which Florida highways would be included in the tandem truck network. The state established an overall length for trucks of 16.8 meters (55 feet).

Florida also attempted to restrict the days and hours of operation of tandem trucks on the tandem truck network, based on safety, facility capability, and public convenience.

Decision: Citing the supremacy clause and the previous case of USA vs Connecticut, the court found that tandems could not be banned from the designated STAA system (*33*).

- **Center for Auto Safety vs FHWA.** This case was settled out of court in February 1985. The Center for Auto Safety claimed that the designation of the system for larger trucks was illegal.

  Settlement. The Center for Auto Safety dismissed its claim in exchange for FHWA agreeing to the following actions:

  (1). FHWA will examine the safety of highways with lanes that are less than 3.66 meters (12 feet) wide. Those routes not consistent with highway safety will be deleted from the designated network.

  (2). FHWA will review the states' efforts in monitoring safety of the network and will evaluate the safety of the network.

  (3). FHWA will encourage upgrading state accident reporting to include doubles, 14.6 meter (48-foot) trailers, and trailers that are 2.59 meters (102 inches) wide.

  (4). FHWA will delete secondary system routes, unless there is a gap in the Interstate system.

  (5). FHWA will reevaluate the designated system in 13 states.

  It should also be noted that the Center for Auto Safety retained the right to challenge routes in the future, if new evidence is discovered that concerns safety (*33*).

- **National Freight vs Larson.** In this 1985 Pennsylvania case, the State of Pennsylvania wanted to apply an overall length limit that was in existence prior to the passage of STAA, which would have reduced the length of the trailer in combination vehicles.

  Decision. The court ruled that the state could not apply any restrictions on overall length to vehicles that are in conformance with STAA (*33*).

- **New York State Motor Trucking Association vs City of New York.** In this 1987 case, New York City attempted, through the use of a permit, to limit the length of tandem trailers that operated on Interstate highways within the city to 16.8 meters (55 feet). The Secretary of Transportation gave approval to the restriction.

  Decision. The court ruled against the restriction and declared New York City's proposed permit system invalid. It further found that the Secretary of Transportation's authority did not extend far enough to be able to approve state restrictions on the use of tandem trailers on the Interstate system (*33*).

- **ABF Freight Systems, Inc. vs Suthard.** In this 1988 Virginia case, the state had imposed access restrictions to the National Network that ABF claimed interfered with reasonable access to the National Network. Specifically, Virginia required that prior route approval must be obtained for single "pup" trailers to grant access for loading and unloading.

  Decision. The court declared the Virginia restrictions invalid under the supremacy clause and ruled that they were not based solely on safety analysis. The prior route approval for "pup" trailers was ruled unreasonable. The court ordered the state to identify each stretch of highway to be excluded from access and give specific safety reasons for its particular exclusion (*33*).

4.4 TIME-OF-DAY RESTRICTIONS

Time-of-day bans or restrictions, also known as peak period bans, restrict or prohibit trucks from a specific route during a specific time period. In the past, there have generally been two types of time-of-day restrictions for trucks: restrictions that prohibit travel during peak or daylight hours and restrictions that prohibit travel during the hours of darkness. Most time-of-day restrictions are safety oriented and are directed at oversize/overweight trucks. Restrictions directed solely at oversize/overweight trucks are not discussed. The implementation authority is usually the state transportation agency. California is the exception, as the California Highway Patrol also has the authority to implement a time-of-day restriction.

Recently, congestion management has looked at time-of-day or peak hour restrictions as a way of managing congestion during peak period traffic. However, restrictions that are proposed without providing reasonable alternatives or access may be subject to challenges in court that the restriction interferes with interstate commerce.

4.5 SPEED RESTRICTIONS

Currently, a number of states have differential speed limits for trucks and other vehicles. The speed limit differentials vary from 8.1 km/h (5 mph) to 16.1 km/h (10 mph), with truck speeds always being the lower speed.

4.6 LEGISLATION ENACTED BY 75th TEXAS LEGISLATURE

Two pieces of proposed legislation were submitted during the 75th session of the Texas Legislature. House Bill 393 and Senate Bill 773 were essentially the same piece of legislation that were filed separately in each branch of the legislature. These bills granted municipalities authority to designate truck lanes for through traffic on controlled access highways when needed. The bills required approval of the restriction by TxDOT after a traffic study was performed to study the impact of the restriction and to ensure a systems approach to preclude inconsistent lane restrictions with adjacent municipalities. Senate Bill 773 was passed by both the House and Senate and signed by Governor Bush on May 27, 1997. A final copy of Senate Bill 773 can be found in Appendix C.

4.7 SUMMARY OF TRUCK RESTRICTIONS

Truck restrictions have been implemented by a number of states in an attempt to increase safety, decrease congestion, and improve operations. Lane restrictions are by far the most prevalent form of restriction. The transportation officials for the state usually have the authority to implement lane restrictions. In many instances local, city, and county jurisdictions have the authority through existing legislation to implement restrictions on state highways.

Route restrictions are generally used for hazardous materials carriers, oversize/overweight vehicles, and in instances where the geometry and design of the roadway does not allow truck traffic. These restrictions may be implemented as long as there are reasonable alternative routes. Route restrictions that deny access to terminals and bans that restrict trucks from designated network roadways are not allowable. All attempts to legislate restrictions and bans on STAA designated roadways have been overturned in the courts. In overturning these restrictions the courts have cited the supremacy act and the interference with interstate commerce as the reason for the decision.

Time-of-day restrictions are primarily used in residential areas for noise abatement and are generally directed at oversize/overweight vehicles. Any time-of-day restriction must provide a reasonable alternative route.

5.0 LANE RESTRICTIONS IN RURAL AREAS

5.1 INTRODUCTION

While a number of states have implemented truck lane restrictions, only a few of these restrictions have been placed on rural facilities, and even fewer have been studied to determine the effects of restrictions. The stated reasons for the implementation of truck lane restrictions in rural areas— improving operations, increasing safety, reducing pavement wear, and improving congestion and economic conditions— are similar to the reasons stated for urban areas. This chapter provides a summary of the effects of truck lane restrictions on the operations, safety, and pavement conditions on rural highways. Additionally, recommendations are provided for the use of such restrictions.

5.2 IMPROVING OPERATIONS

The increase of truck volumes on the states' highways has led to an increase in the interaction of large trucks with other traffic. Highways are designed for a mix of vehicle types; however, an increased presence of large trucks on a roadway may result in serious degradation of flow quality. In rural areas, there is only a fraction of the multi-lane facilities when compared to urban areas. This lends itself to a reduction in the opportunities for truck lane restrictions.

Current operations on a typical multi-lane rural highway find the majority of truck traffic in the right lane. State law mandates that the maximum speed limit for truck traffic is usually 8 or 16 kilometers per hour (5 or 10 mph) slower than passenger car traffic. Additionally, state law mandates that slower traffic must keep right. This forces truck traffic to the right lane on multi-lane highways. Therefore, in one sense, trucks are currently restricted to the right lane on multi-lane facilities where there is a differential speed limit.

Only a few studies have been performed to evaluate the operational effects of truck lane restrictions on rural highways. Three of these studies are summarized below.

In one study, Hanscom addressed the operational effectiveness of restricting trucks from designated lanes on multi-lane highways (*13*). One of the three sites selected for this study was located on a four-lane facility in rural Wisconsin. The author found that violation rates were higher at the four-lane site, as compared to the two six-lane sites, as a result of increased truck concentrations due to the truck restriction. Reduced speeds of impeded vehicles following trucks were also noted at the four-lane site.

In 1990, Zavoina, Urbanik, and Hinshaw examined the effects of truck restrictions on rural Interstates in Texas (*14*). This study analyzed the operational effects of restricting trucks from the left lane on six-lane rural Interstates in Texas. The study sites were six-lane, rural interstate highway sections with a speed limit of 105 km/hr (65 mph) for automobiles and 96

km/hr (60 mph) truck speed limit. The authors found no definitive results that could be attributed to the implementation of the truck restriction. Although the lane distribution of trucks changed significantly due to the restriction, no effects were found in the distribution of cars, the speeds of either cars or trucks, or the time gaps between vehicles that could be attributed to the truck restriction. The authors also found that although the implementation of truck restrictions theoretically have the potential to improve the capacity and safety of roadway, there is a lack of evidence from current research to support these conclusions (*14*).

Garber and Gadiraju (*15*) examined the effects of increased truck operations using a simulation technique to study the effects of implementing different strategies on multi-lane highways. The authors found that: the combination of lowering the speed limit for trucks and restricting the trucks to the right lane increased the interaction between cars and trucks and, therefore, the potential for passenger car/truck accidents; the restriction of trucks to the right lane decreased the vehicular headway in this lane, and the combination of lowering the speed limit for trucks and restricting the trucks to the right lane resulted in a change in the distribution of vehicle spot speeds, and a slight, but statistically insignificant, increase of accidents in the right lane.

5.3 INCREASING HIGHWAY SAFETY

Along with the attempt to improve traffic operations, truck lane restrictions have been implemented to increase highway safety. Little of the current research on truck lane restrictions has focused on the safety benefits on rural highways.

In research sponsored by the Maryland State Highway Administration, Sirisoponsilp and Schonfeld in 1988 reported on the strategies used by state highway agencies to restrict trucks from certain lanes and the impact that those restrictions had on traffic operations and safety (*16*). The authors concluded that although truck lane restrictions have been imposed by a number of states for many years, the effects of the restrictions on traffic operations and safety are still not well-known, and cost effectiveness is uncertain. The goal of restricting truck lane usage appears to have shifted from traffic operation to traffic safety. This shift stems from public perceptions of increased truck-related accidents. Truck lane restrictions have not been accepted as a potential solution to the congestion and accident problems on urban freeways.

In 1984, McCasland and Stokes (*17*) indicated that the restriction of truck traffic to one mixed-flow lane would probably not improve freeway safety or operations based on associated constraints and limitations. However, it should be noted that all assessments and recommendations are based on findings of the literature review and state policy survey (*17*).

Garber and Gadiraju used simulation to study the effects of implementing different strategies on multi-lane highways. These strategies included differential speed limit (DSL) for trucks, truck lane-use restrictions, and a combination of DSL and lane-use restrictions (*18*). The authors concluded that the results did not indicate any safety benefits from the imposition of any of the strategies examined in the study. They also concluded that the study results suggested that

the potential for an increase in accident rate will be created, particularly when the strategies are imposed on highways with high volumes and a high percentage of trucks, and that the combination of lower speed limits for trucks and right lane restriction of trucks resulted in a slight, but statistically insignificant, increase of accidents in the right lane.

5.4 REDUCING PAVEMENT WEAR AND MAINTENANCE REQUIREMENTS

Increased truck traffic also creates an impact on pavement life and required roadway maintenance. Traffic is one of the most important factors that must be considered in pavement life. The overall traffic volume has very little effect on pavement deterioration; but, the number of heavy loads supported by the pavement over its design life does affect deterioration. A single 80 kN (18,000 lb) single axle load will cause more damage to a road than 2000 large passenger cars (*20*). Since not all rural highways are designed and built to the standards set forth by interstate highways, the effects of these heavy vehicles could be even greater.

Management of pavement wear through the use of truck lane restrictions has been attempted by several states. Arkansas attempted to move heavy truck traffic to the leftmost lanes of some highways in order to equalize pavement wear. Signs were erected at weight stations entering the State, encouraging the use of the left lane on the Interstate system. The program was not successful because initial attempts were not reinforced through a public awareness campaign and enforcement efforts (*14*).

An increase of truck traffic in Nevada, where 77 percent of the Interstate highways were constructed prior to 1970, resulted in a truck redistribution test requiring trucks to use the left lane. This test was conducted in 1983 on a rural Interstate and was initiated to evaluate truck traffic compliance with a redistribution program which directed trucks to use the left lane of a 37 kilometer (23 mile) section of I-80. The redistribution of truck traffic was made in an attempt to reduce construction, reconstruction, and overlay costs. Early estimates indicated that redistribution of the traffic on rural Nevada interstates would result in substantial annual savings (*23*, *24*).

Current state law mandates that slower traffic must keep right. Furthermore, the maximum speed limit for trucks is usually 8 or 16 kilometers per hour (5 or 10 mph) slower than passenger car traffic. This forces truck traffic to the right lane on multi-lane highways. To move truck traffic to the left lane in an attempt to equalize pavement wear would require a change in the state statutes. Moving trucks to the left lane on a multi-lane highway also violates driver expectancy. Drivers do not expect slower moving vehicles in the left lane. This could cause an increase in accidents.

5.5 CONGESTION AND ECONOMICS

Congestion problems are not usually associated with rural areas. Highways within urban areas are where the overwhelming majority of congestion occurs. Cambridge Systematics, Inc.,

(*25*) assessed the impacts of large trucks on freeway congestion for the California Department of Transportation in 1988. Sites for the study consisted of Los Angeles, San Francisco, and San Diego, three areas that were identified as critically congested areas. The authors found that the volume of large trucks on freeways does not have an inordinate impact on peak period congestion; however, truck-involved accidents and incidents do have a significant impact on freeway congestion. Therefore, it would be expected that if the volume of large trucks on urban facilities does not have an inordinate impact on congestion, the same should be true on rural multi-lane facilities.

5.6 RECOMMENDATIONS

The research team recommends that truck lane restrictions not be implemented on rural freeways. The majority of truck traffic is already in the right lane of multi-lane rural highways. State law mandates that the maximum speed limit for truck traffic on rural highways is usually 8 or 16 kilometers per hour (5 or 10 mph) slower than passenger car traffic. Additionally, state law mandates that slower traffic must keep right. This forces truck traffic to the right lane on many of the multi-lane rural highways in the state. Therefore, in one sense, trucks are currently restricted to the right lane on multi-lane facilities where there is a differential speed limit.

The majority of rural highways could not or should not be considered for truck lane restrictions. A truck lane restriction cannot be used on a two-lane highway. Studies have shown that on four-lane highways, truck lane restrictions could be detrimental to operations and safety. The minimal amount of evidence —any substantial positive or negative impact on the four categories examined by this chapter; operations, safety, pavement wear, and congestion— indicate that there would be little to no benefit to restricting trucks to certain lanes on six or more lane rural highways.

Current state law allows municipalities to restrict the movement of certain vehicles to specified lanes on six or more lane facilities regardless to the speed limit. If the use of this law becomes widespread, TxDOT could recommend that the law be applied to all six- (or more) lane facilities. The State of California has already implemented this for all four or more lane facilities in the state. This could remove the need for the signing necessary to implement truck lane restrictions, aid in the enforcement of the lane restrictions, and standardize the restrictions on trucks around the state.

6.0 LANE RESTRICTIONS IN URBAN AREAS

6.1 INTRODUCTION

Several states have implemented truck lane restrictions in urban areas, primarily to improve traffic operations and reduce accidents, especially if a significant percentage of the traffic stream is trucks. With many roadways experiencing increased truck volumes, the interaction of large vehicles with passenger cars can result in delays, conflicts, and crashes. This chapter provides a summary and recommendations for truck lane restrictions in urban areas, and the affects on operations, safety, and pavement conditions.

6.2 IMPROVING OPERATIONS

Tractor trailers, semitrailers, and other multi-axle truck/trailer combinations are significantly heavier, longer, and have different operating characteristics (namely lower acceleration/deceleration) than passenger cars. Theoretically, if the two primary types of vehicles (trucks and passenger cars) can be separated on urban freeways, the traffic operations should improve (less delays and less driver frustrations). In attempts to separate trucks and passenger cars on urban freeways, several states have implemented truck lane restrictions with the objectives to increase travel speed, comfort, and convenience for all drivers.

In reality, however, truck lane restrictions generally have no appreciable impact on the operational characteristics of that freeway. Most trucks are already using certain lanes of freeways in urban areas, many times because of lower mandated speed limits, and many truck drivers avoid highly congested areas during the peak hours of the day. Furthermore, truck lane restrictions and an active enforcement program can create a "barrier" effect in weave areas, limiting the ability of passenger car drivers to efficiently enter or exit the freeway and to effectively view any traffic control devices that may be placed on the right side of the freeway.

6.3 INCREASING HIGHWAY SAFETY

Similar to the objective of improving operations, transportation agencies have attempted to restrict trucks to certain lanes of urban freeways to improve highway safety. The primary objective is to minimize conflicts and crashes (frequency and severity) by separating trucks and passenger cars. Consequently, some truck lane restrictions, while decreasing the severity of crashes, have resulted in an increase in the crash rate along the section of the freeway with the lane restrictions. A quantifiable effect of truck lane restrictions on safety is still not well known or understood by transportation professionals and is not an accepted practice for reducing crashes on urban freeways. Lane restrictions are, however, perceived by the public as a positive measure in reducing conflicts and crashes with trucks and continue to be used in urban areas in several states.

6.4 REDUCING PAVEMENT WEAR AND MAINTENANCE REQUIREMENTS

There are several factors that must be considered prior to attempting to restrict trucks to certain lanes of an urban freeway to minimize pavement wear and maintenance requirements. A majority of truck drivers already use the right-most through lane of urban freeways unless a left-hand exit or passing maneuver necessitates a lane change. All drivers expect trucks and other slow moving vehicles to use the right-most lane so that higher speed vehicles can use the other lane(s) for passing purposes. A violation of driver expectancy would likely occur for truck and passenger car drivers alike by periodically "shifting" lane assignments for pavement/maintenance purposes. Also, without an effective public information campaign and enforcement program, any attempts to periodically shift lane restrictions would likely be unsuccessful, and any attempts in quantifying the benefits of any reduced pavement wear would be difficult to assess.

6.5 CONGESTION AND ECONOMICS

A high volume of trucks on urban freeways can result in an inordinate amount of congestion, especially during peak periods of the day. One way to reduce congestion would be to restrict trucks to different, off-peak times of the day, essentially imposing a ban during the peak periods. Studies have shown, however, that such bans in urban areas would not be legal under the federal Surface Transportation Assistance Act of 1998, would meet strong resistance from the commercial vehicle industry, and would have a detrimental effect on the economy of that area.

6.6 RECOMMENDATIONS

Even though many factors suggest that truck lane restrictions in urban areas are not effective at improving operations, reducing crashes, and reducing maintenance requirements, many city and state agencies still enact such restrictions. In urban areas, a majority of the trucks already use only certain lanes of the freeway, and certain geometric conditions may exist that would preclude trucks from using certain lanes, such as access to/from high traffic generators. Even if an effective enforcement program was practiced, the policing agency could likely find little justification for fining trucks that violated the lane restrictions. Furthermore, traffic control devices would also have to be periodically changed to reflect the lane restrictions if agencies attempted to periodically shift the restrictions to different lanes to maximize pavement longevity. Despite the numerous factors that seemingly provide no appreciable benefit to restricting trucks to certain lanes of an urban freeway, one important consideration is public perception. Many passenger car drivers will perceive benefits of truck lane restrictions, namely improved operations and safety.

With an agenda likely to meet this public perception need, the 75th Texas Legislature recently enacted a law that provides cities the opportunity to request lane restrictions for certain vehicles on sections of urban freeways. If municipalities so desire, the legislation requires the passing of a city ordinance that requests from the TxDOT the lane restrictions and the appropriate traffic control devices to be installed and maintained within the sections of the restrictions.

Appendix C provides a copy of this legislation and Chapter 7 provides guidelines for TxDOT on implementing these lane restrictions.

7.0 GUIDELINES FOR IMPLEMENTATION OF LANE RESTRICTIONS IN TEXAS

The guidelines for implementation of lane restrictions, described herein, to be used by the Texas Department of Transportation to restrict the use of designated lanes by certain vehicles, must follow the stated law in Senate Bill 773 which was passed by the 75th Legislative Session of the Texas Legislature. This bill is presented in Appendix C. This chapter provides a description of the types of vehicles that can be effected by the law, the guidelines (a 12-step process) for implementing a city ordinance request for vehicle lane restrictions on a controlled-access facility, and the recommended methods of communicating the lane restrictions to the motorists.

7.1 VEHICLES EFFECTED BY LANE RESTRICTIONS

Tractor trailers, semitrailers, and other multi-axle truck/trailer combinations will be most affected by the legislation. Determining which vehicles would actually be effected by lane restrictions brought about by Senate Bill 773 involved a review of the existing state statute on maximum legal speed. To help enforcement of lane restrictions, the definition of a truck should be similar to what currently exists for speed enforcement. Section 545.351 of the Texas Statutes defines a truck as follows:

> Section 545.351 The maximum speed limit is sixty (60) miles per hour in daytime and fifty-five (55) miles per hour during nighttime for any truck, except light trucks as described in this Subdivision 5, truck tractor, trailer or semitrailer, or for any vehicle towing any trailer, semitrailer, another motor vehicle, or any house trailer of actual or registered gross weight, less than four thousand, five hundred (4,500) pounds and over-all length of thirty-two (32) feet or less, excluding the tow bar. 'Light truck' means any truck, as defined in this Act, with a manufacturer's rated carrying capacity not to exceed two thousand (2,000) pounds and is intended to include those trucks commonly known as pick-up trucks, panel delivery trucks and carry-all trucks.

7.2 GUIDELINES FOR THE IMPLEMENTATION OF LANE RESTRICTIONS

When TxDOT receives a request from a municipality to implement vehicle lane restrictions, the Department should follow the 12 steps below for implementation. Most of the steps include a Question/Answer section that addresses key points that, by law, must be met in the proposed restrictions.

7.2.1 Step 1 - City Ordinance

The process of restricting traffic to specific lanes begins with a municipality passing a city ordinance to restrict the use of certain lanes of a highway by a certain vehicle, which will typically

involve trucks. Once the municipality has passed the ordinance, the city must request that TxDOT review the ordinance and evaluate the feasibility of any proposed lane restriction.

Question: Has a municipality asked TxDOT's approval for a lane restriction for a certain type of vehicle?

Answers: Yes - Go to Step 2.
No - Stop.

7.2.2 Step 2 - Lane Restriction on State Highway System

Once TxDOT receives a request for a lane restriction, the location of the restriction must meet three requirements to meet the definition of a highway in Senate Bill 773. The first requirement states that the roadway must be designated a part of the state highway system. The Transportation Codes of the Texas Statutes defines a state highway system as follows:

> Section 221.001 The "State Highway System" (is defined) as the highways in this state included in the plan providing for a system of state highways prepared by the director under Section 201.103. Section 201.103 Comprehensive System of Highways and Roads states that; (a) The commission shall plan and make policies for the location, construction, and maintenance of a comprehensive system of state highways and public roads. In planning and making policies, the commission shall consider, for incorporation into the state highway system, turnpikes that other governmental or private entities are authorized to construct. The commission biennially shall submit a report of its work to the governor and the legislature. The report must include the recommendations of the commission and of the director. (b) The director, under the direction and with the approval of the commission, shall prepare a comprehensive plan providing a system of state highways.

Question: Does the proposed location of the lane restriction fall within the definition of a highway on the State Highway System?

Answer: Yes - Go to Step 3.
No - Stop. The restriction must occur on a highway within the State Highway System, as defined above.

7.2.3 Step 3 - Lane Restriction on Access Controlled Highway

The second requirement for the location of a lane restriction is that the highway must be access controlled. The Transportation Codes of the Texas Statutes defines an access controlled highway as follows:

> Section 203.001 A "controlled access highway" is a designated state highway to or from which access is denied or controlled, in whole or in part, from or to adjoining real property or an intersecting public or private way, without regard to whether the designated state highway is located in or outside a municipality.

Question: Has the proposed highway been designated as a controlled access facility?

Answer: Yes- Go to Step 4.
No - Stop. The restriction must occur on a controlled access facility.

7.2.4 Step 4 - Lane Restriction on Highway With Three or More Lanes

The third requirement states that the controlled access highway location has a minimum of three travel lanes, excluding access or frontage roads, in each direction of traffic. Travel lanes should be considered as the main through lanes of the facility and not include auxiliary lanes, acceleration/deceleration lanes, or High Occupancy Vehicle (HOV)/contraflow lanes.

Question: Does the highway have three through travel lanes in each direction?

Answer: Yes - Go to Step 5.
No - Stop. The restriction must occur on a highway with three or more travel lanes in each direction.

7.2.5 Step 5 - Requirement for Number of Through Lanes To Use

Once the proposed location of the lane restriction has met the definition of a highway that is suitable for a lane restriction, any ordinance passed by a municipality must also meet the following three requirements. The first requirement states that the ordinance may restrict, by class of vehicle, through traffic to two designated lanes of a highway in the municipality.

Question: Do restricted vehicles have at least two through lanes to use?

Answer: Yes - Go to Step 6.
No - Stop. Reword or amend the ordinance to allow two through lanes to be used by restricted vehicles.

Note: The Department has the authority to rescind or suspend the ordinance due to lane closures that are a result of construction and maintenance activity or frequent incident management activity. In the event of such action, all appropriate traffic control devices must be removed or covered.

7.2.6 Step 6 - Requirement for Peak Traffic Hours

The second requirement states that the ordinance should be in effect only during peak traffic hours of a workday. The traditional traffic peaks for passenger cars occur between 7:00 am and 9:00 am and between 4:00 pm and 6:00 pm, Monday through Friday. Research has shown that this is not true for truck traffic. As part of the Urban Freeway Gridlock Study (*25*), a technical memorandum concerning the peak hour population of large trucks concluded that the

largest percentage of truck traffic occurred during the midday off-peak period; however, truck traffic is not limited to any specific time of the day or day of the week. An ordinance specifying certain times would be difficult to enforce, may adversely impact the traffic flow, and would be difficult to convey to the motorists.

Question: Does the ordinance have a time of day restriction?

Answer: Yes - TxDOT should recommend to the municipality that the lane restriction should not be limited to a certain time of day.
No - Go to Step 7.

7.2.7 Step 7 - Requirement for Passing and Entering/Exiting the Highway

The third requirement that an ordinance must follow is that a restricted vehicle must be allowed to use any lane to pass another vehicle or to enter and exit the highway.

Question: Does the ordinance allow restricted vehicles to use any lane to pass another vehicle or to enter or exit the highway?

Answer: Yes - Go to Step 8.
No - Reword or amend the ordinance to allow the use of any lane by a restricted vehicle to pass another vehicle or to enter or exit the highway.

7.2.8 Step 8 - Conduct Traffic Study

After reviewing the proposed ordinance but prior to final approval, TxDOT shall perform a traffic study. At a minimum, TxDOT must conduct a site evaluation to determine the geometric conditions, the existing traffic control devices, and any unique site characteristics within the jurisdiction of the proposed ordinance.

Certain geometric conditions may occur within the limits of the lane restrictions that may adversely affect the traffic flow if the restrictions are implemented. Such conditions as lane drops, left-hand entrances/exits, or multi-level freeway sections may require trucks to change and use lanes that previously were restricted. If such conditions exist, truck lane restrictions should end prior to these conditions and continue again downstream, if feasible.

Prior to approval, TxDOT should investigate the existing traffic control devices within the limits of the proposed restrictions. Inconsistencies or conflicts could result if new traffic control devices are installed to indicate truck lane restrictions. Such devices to be aware of are illustrated in Figure 1. If these or other similar "lane use" devices are present within or near (10 to 15 kilometers) of the proposed restrictions, TxDOT should remove these devices prior to installing new devices that indicate vehicle lane restrictions.

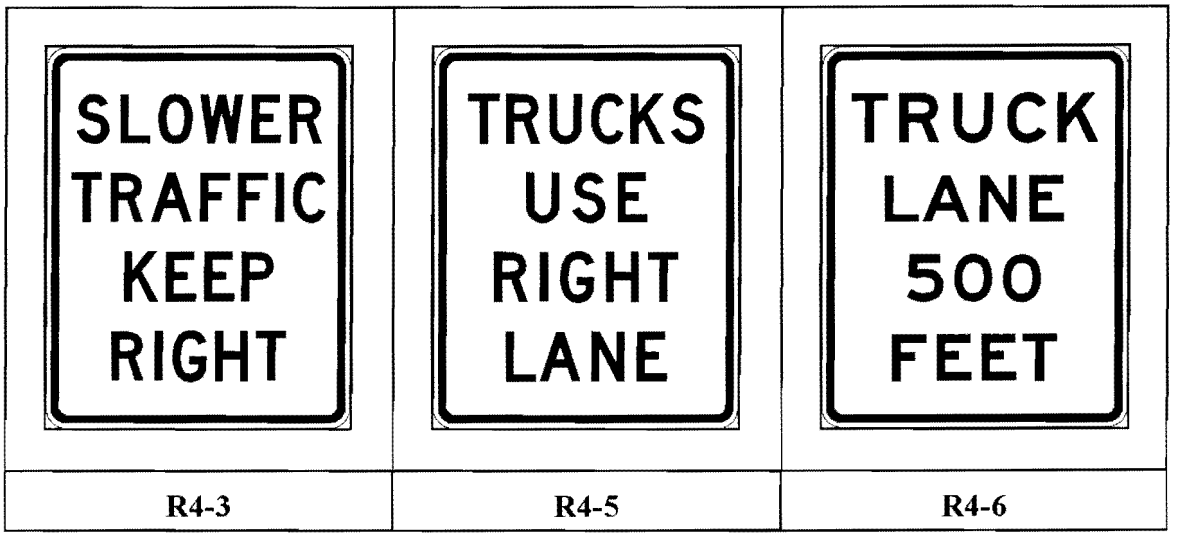

Figure 1. Inconsistent Devices Within Proposed Restrictions

Each site must be examined to determine if there are characteristics that are unique to that site. These characteristics may warrant an exception to the lane restrictions. Some unique site characteristics to consider include land use characteristics (e.g., industrial parks), controlled access facilities near international border crossings where some vehicle types are required to be in certain lanes (e.g., southbound truck traffic on IH-35 in Laredo are required to be in the left lane to enter U.S. Customs), and special event traffic (e.g., sporting events) that could result in localized concentration of traffic attempting to enter/exit the controlled access facility.

Question: Has TxDOT conducted a traffic study as explained above?

Answer: Yes - Go to Step 9.
No - Base Departmental approval on a traffic study to evaluate the impact of the proposed restrictions.

7.2.9 Step 9 - Ensure a Systems Approach

The Department must, to the greatest extent practicable, ensure a systems approach to prevent the designation of inconsistent lane restrictions among adjacent and surrounding municipalities. The continuity of the lane restrictions, as well as the through lanes, should be ensured within and between adjacent municipalities. Frequent beginning and ending of lane restrictions should be avoided. The Department should encourage all concerned municipalities in an area to cooperate in the planning of lane restrictions to achieve a systems approach.

Question: Has TxDOT ensured a systems approach for the proposed lane restrictions?

Answer: Yes - Go to Step 10.

No - The Department must ensure a systems approach to all proposed lane restrictions.

7.2.10 Step 10 - Approve Lane Restriction Ordinance

The municipality shall not begin to enforce the restrictions until the Department's Executive Director or his designee has approved the lane restriction ordinance.

Question: Has the ordinance met all conditions stated in Steps 1 through 9?

Answer: Yes - The ordinance should be accepted.
No - Ordinance shall be amended to meet the conditions of these guidelines.

7.2.11 Step 11 - Install Appropriate Traffic Control Devices

The Texas Department of Transportation shall install appropriate traffic control devices that show the intended meaning of the lane restrictions. Table 1 provides the recommended devices. All conflicting traffic control devices shall be removed, and their existing sign supports should be used for new devices if they generally conform to the recommended placements provided in Table 1. Other new devices should be placed on the right side of the road, in the median, or on an existing overhead sign bridge.

Question: Have all traffic control devices been installed (see Table 1)?

Answer: Yes - Enact ordinance and proceed to Step 12
No - Install all proper devices prior to enactment.

7.2.12 Step 12 - Periodic Review of Lane Restrictions

The TxDOT should conduct a periodic review of the lane restrictions to determine if any negative impacts have resulted due to implementation of the restrictions. TxDOT has the ability to rescind or suspend the ordinance if such impacts are determined. Negative impacts could result from the following and should be justification for suspending or rescinding the vehicle restrictions:

- *A change in pavement conditions* - excessive wear is evident on one or more of the lanes on which vehicles are restricted;
- *A change in traffic conditions* - an increase in accident frequency or severity, observed non-compliance to the restrictions, or changes in land use that affects;
- *A geometric change in roadway configuration* - the addition of an interchange, HOV facilities, lane re-configurations;
- *Construction or maintenance activity* - frequent or anticipated construction projects; and
- *Emergency or incident management activity* - frequent incident management use.

Table 1. Recommended Devices for Lane Restrictions

Device	Location	Illustration
Standard Regulatory Sign for single lane restriction Sign Specifications: Size: 48"x 60" (Freeway) Letter: D.	Beginning, at approximately 1.5 kilometer (one mile) intervals, and at the end of the lane restrictions.	
Standard Regulatory Sign for multi-lane restrictions Sign Specifications: Size: 48"x 60" (Freeway) Letter: d. and 10D	Beginning, at approximately 1 kilometer (one mile) intervals, and at the end of the lane restrictions.	
Supplemental Signing Sign Specifications: Size: 48"x 24" Letter: 10D	BEGIN sign to be placed above standard regulatory sign at beginning of lane restrictions. END sign to be placed above standard regulatory sign at end of lane restrictions.	 
Time-of-Day Supplement Sign Specifications: Size: 48"x 30" Letter: 4D and 6D	Time-of-Day Restrictions to be placed below standard regulatory sign at beginning and throughout lane restrictions	

8.0 SUMMARY AND RECOMMENDATIONS

The rise in truck volumes, the interaction of these large vehicles with other traffic, and the publicity given to major truck accidents make the issue of increased truck traffic a vital concern to both traffic managers and the general public. Highway traffic operations are the "yardstick" by which the user measures the quality of the facility. The characteristics which matter most to the driver are: the speed of travel, safety, comfort, and convenience. Highways are designed for a mix of vehicle types; however, an increased presence of large trucks on a roadway may result in degradation of flow quality for the following reasons:

- Trucks are significantly heavier than passenger cars;
- Trucks are considerably longer than other vehicles; and
- Trucks have lower rates of deceleration and acceleration (*7*).

In urban areas, the demand on the highway system has grown much more rapidly than the corresponding increases in available capacity. This increase in demand has led to congestion and an increased awareness for traffic operations. Correspondingly, the studies of the effects of trucks on highway operations has also increased in recent years.

A comprehensive literature review and a telephone survey of state practices were conducted in Task 1 to identify publications on truck lane restrictions, dedicated truck lanes, and exclusive truck facilities. The literature review identified approximately 300 documents as possible sources. Each of these sources were reviewed for relevance. Researchers analyzed and reviewed all relevant documents. Chapter 1 discusses the literature review in detail and synoptic reviews of selected documents are found in Appendix A. The telephone survey was general in nature and centered on states that were identified by the literature review as most likely to have useful data. The traffic engineering or safety division of each state transportation agency was the source of initial contact.

The literature review and the survey identified that a total of 28 states have implemented some type of lane restriction at some period in time. The most common reasons given for implementing lane restrictions were:

- Improve highway operations;
- Reduce accidents;
- Pavement structural considerations; and
- Restrictions in construction zones.

The review and survey further identified that very little quantitative data exists that evaluates the effectiveness of the restriction. Several reports documented restrictions in Florida and the Virginia-maintained section of I-95 (Capital Beltway).

In 1982, the Florida DOT implemented a truck lane restriction on I-95 in Broward County where the truck volume is 4 percent of the total traffic volume. The lane restriction on a six lane, 38 kilometer (25 mile) freeway section prohibited trucks from using the left (inside) lane from 7:00 a.m. to 7:00 p.m. Subsequent studies found that the proportion of accidents involving trucks with three or more axles decreased during the hours of the restriction.

The Virginia DOT instituted a lane restriction for trucks on its I-95 section of the Washington, D. C., Capital Beltway between I-395 and the Woodrow Wilson Bridge (near the Virginia state line) in December 1984. The restriction, which was implemented jointly with the State of Maryland, was an attempt to reduce the accident problems on the Capital Beltway. Subsequent studies and surveys revealed that the accident rate for the restricted section of the Beltway increased. The studies recommended that the restrictions be removed.

Public perception is generally positive when lane restrictions are implemented. Comments in almost every study documented that drivers were pleased that "something was being done." In many instances, the implementation of restrictions were the result of spectacular or serious accidents that received a high level of media coverage.

Transportation officials for the states usually have the authority to implement lane restrictions. In many instances, local, city, and county jurisdictions have the authority through existing legislation to implement restrictions on state highways. It should be noted that the Surface Transportation Assistance Act (STAA) of 1982 and the Tandem Truck Safety Act (TTSA) of 1984 established a national network of highways as a designated large truck network. The law is insistent that state regulations should not interfere with interstate truck movements, as long as the trucks conform to size and weight limits established by STAA and TTSA.

These Acts give the Secretary of Transportation the discretion to modify the designated route system. The modification of the national network may be made on the basis of safety, environmental, or operational problems. However, there has been only one successful request to remove a freeway section from the national network because of a safety problem.

Guidelines have been developed to aid TxDOT in the implementation of truck lane restrictions in urban areas so as to be consistent with a new state law and the understanding of truck operational issues. It has been recommended that rural areas do not present any additional opportunities for truck lane restrictions except on facilities with six or more through lanes.

Truck lane restrictions do not offer any significant opportunities for improving pavement life or decreasing maintenance costs. TxDOT should consider evaluating its pavement design properties to account for the fact that most truck traffic is concentrated in the right lane on four-lane facilities and in the right two lanes on six-lane facilities. The Department should also monitor the extent to which truck lane restrictions are requested by municipalities. If truck lane restrictions become prevalent, TxDOT should request that the legislature make the restrictions a statewide practice.

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10.0 APPENDIX A
LITERATURE REVIEWS

Mannering, F. L., J.L. Koehne, and J. Araucto, *Truck Restriction Evaluation: The Puget Sound Experience*, WA-RD 307.1, Washington State Transportation Center, University of Washington, Seattle, Wa., August 1993.

There is a public perception that trucks restrict the free flow of traffic and that they present a safety hazard. One strategy advanced as a way of increasing roadway capacity and safety is truck restrictions. Truck restrictions often have one or more of the following objectives:

- Improve highway operations;
- Improve the level of safety;
- Encourage even pavement wear; and
- Better operations and safety in construction zones.

Typically one of four types of restrictions are selected to attempt to accomplish these objectives. These restriction types are:

- Lane restrictions;
- Route restrictions;
- Time-of-day restrictions; and
- Speed restrictions.

This study, which was conducted in the Puget Sound region, considered only lane restrictions. The study consisted of a literature review, an in-depth analysis, site comparison analysis, and surveys (truck drivers, motorists, enforcement officials, and representative trucking associations).

Literature Review

The literature review conducted by the study found that although many states have instituted a lane restriction in some form, very few states have examined the effects of the restriction. The review found that the two main lane restrictions were (1) limiting trucks to the extreme right lane (or lanes if facility size warrants) and (2) limiting trucks to the extreme left lane (or lanes if the facility size warrants). In most instances, state highway authorities are able to implement the restriction under existing legislation.

The literature review also found that in nearly every instance where a comprehensive examination of the restriction occurred, negligible change in operations and safety was observed after implementation of the restriction. The restriction did achieve a positive public reaction and high compliance by truck drivers, which resulted in positive potential effects on pavement deterioration. However, it is difficult to determine the effects of the restriction on pavement deterioration due to the fact that there is such a long time period before noticeable changes in pavement deterioration can be observed empirically.

In-Depth Analysis

The researchers in this study examined traffic composition, traffic flow characteristics, safety characteristics, enforcement issues, economic impacts, and pavement deterioration. The lane redistribution of trucks at the site selected for in-depth analysis did not change significantly with the implementation of the restriction. The restriction violations were 2.1 percent; however, the number of trucks traveling in the restricted lane prior to implementation was also 2.1 percent. In other words the majority of trucks drove in the right lane, and a number of trucks during the restriction either ignored or were unaware of the restriction. Therefore, no significant operational or safety level increases could be attributed to the restriction.

In the safety analysis it is interesting to note that the number of truck related accidents for each lane were proportional to the number of trucks traveling in that lane. The majority of accidents resulting from merging, changing lanes to the left, and moving straight ahead were initiated by non-trucks, and the majority of accidents resulting from changing lane to the right were initiated by trucks.

The portion of the analysis that addressed enforcement issues were mainly about violation rates. The researchers found that the violation rates were 2.1 percent for both the restriction and for the proportion of trucks that were traveling in the lane prior to the restriction. The authors concluded that the restriction had no noticeable impact on the distribution of trucks.

The authors concluded that the economic impact of the restriction on the motor carrier industry was minor. When researchers assumed 100 percent restriction compliance, the economic loss incurred was $4.84 per driver per year and $1,155 per year for the entire motor carrier industry. The authors also concluded that the lane restriction would have minimal impact on the pavement life at the study site.

Site Comparison Analysis

The authors conducted a site comparison analysis to determine whether there was enough consistency among the sites to apply the results of the in-depth analysis to other areas. The conclusions reached by the authors were:

- The proportion of trucks varies;
- Truck distribution, truck and non-truck speeds, and restriction violation rates depend on site proximity, facility size, volume levels of the sites, degree and length of grade, and location of entrances and exits; and
- Time-gap measurement variation could be the result of inaccurate data collection methods.

Surveys

The authors also conducted a survey regarding the awareness and opinion of the driving public about the lane restriction. The survey found that motorists favor the restriction (90.85 percent positive response) while truck drivers did not (31.96 percent positive response).

Conclusion

The authors recommended that truck lane restrictions were not needed for the Puget Sound Region. This recommendation was based on the following four factors.

- Little evidence exists that supports the concept that truck lanes improve operations and safety or reduce pavement deterioration rates.
- The truck proportion in the traffic stream is approximately 5 percent, and the literature indicates that for smaller proportions of truck traffic any impacts of lane redistribution of trucks is limited.
- Too much variability among sites exists for any widespread applications of restrictions.
- Implementation of truck restrictions may be viewed by the trucking industry as an infringement of its rights to operate a business.

Garber, Nicholas J. and Ravi Gadiraju,, *The Effect of Truck Traffic Control Strategies on Traffic Flow and Safety on Multilane Highways*, Report number UVA/537363/CE90/101, School of Engineering and Applied Science, Department of Civil Engineering, University of Virginia, Charlottesville, Va., September 1989.

Garber and Gadiraju used simulation to study the effects of implementing different strategies on multilane highways. These strategies included differential speed limit (DSL) for trucks, truck lane-use restrictions, and a combination of DSL and lane-use restrictions. Trucks were defined as vehicles having six or more wheels in contact with the road and having a gross vehicle weight greater than 4531 kg (10,000 lbs). Impacts of the strategies were evaluated and compared, and the significant changes in flows, speeds, headways and accidents are presented. The authors concluded that:

- The results did not indicate any safety benefits from the imposition of any of these strategies but suggested that the potential for an increase in accident rate will be created, particularly when the strategies are imposed on highways with high volumes and a high percentage of trucks.

- Lower speed limits for trucks had no significant effect on the volume distribution of trucks and non-trucks among the different lanes of multilane highways.

- Restricting trucks to the right lane resulted in a decrease of vehicular headway in this lane. This effect is more significant on highways having three or four lanes in each direction, an AADT greater than 75,000, and at least 4 percent trucks.

- The combination of lower speed limits for trucks and right lane restriction of trucks increased the interaction between cars and trucks and, therefore, increased the potential for passenger car/truck accidents. The best strategy for reducing this interaction was for all vehicles to have the same speed limit of 104.6 km/h (65 mph).

- The combination of lower speed limits for trucks and right lane restriction of trucks resulted in a change in the distribution of vehicle spot speeds. The change increased with the magnitude of the speed differential and the percentage of trucks.

- The combination of lower speed limits for trucks and right lane restriction of trucks resulted in a slight, but statistically insignificant, increase of accidents in the right lane.

Hanscom, Fred R., "Operational Effectiveness of Three Truck Lane Restrictions," Presented at the 69th Annual Meeting of the Transportation Research Board, Washington, D.C., 1990.

Hanscom addresses the operational effectiveness of restricting trucks from designated lanes on multilane roadways. Truck lane restrictions were implemented at two three-lane sites and one two-lane site. Measures of lane restriction effectiveness included: voluntary truck compliance to the restrictions, traffic congestion as determined from speeds and platooning of vehicles following trucks, and an all-vehicle sample of differential speeds between the restricted and adjacent lanes.

Favorable truck compliance effects were evident at all three locations. However, violation rates were higher at the two-lane site as a result of increased truck concentrations due to the truck restriction. Reduced speeds of impeded vehicles following trucks were also noted at the two-lane site. At the three-lane sites the results of the lane restriction were beneficial traffic flow effects and reduced congestion. No speed changes (between the restricted and adjacent lanes) were observed to indicate an adverse effect of implementing the truck lane restrictions.

The following research results found:

- Favorable truck compliance effects were evident at all three locations.

- Violation rates were higher at the two-lane site (10.2 percent as opposed to 0.9 and 5.7 percent at the three-lane sites) as a result of increased truck concentrations due to restricting trucks to a single lane.

- The restriction at the three-lane sites achieved the intended goal of reducing overall congestion.

- An adverse flow effect of reduced speeds of impeded vehicles following trucks was observed at the two-lane restriction site.

- No speed changes were observed in all-vehicle speed comparisons, to indicate increased differential speeds occurring between the restricted and adjacent lanes.

However, it should be noted that the study sites all had an AADT of less than 100,000 vehicles per day, and one study site had an AADT of only 4,478 vehicles per day. Two of the study sites were fringe-area urban sites near Chicago, and the remaining site was in rural Wisconsin. Observed traffic parameters, although statistically significant, were not practically significant.

Department of Civil Engineering, *An Operational Evaluation of Truck Speeds on Interstate Highways*, University of Maryland, February 1974.

The Department of Civil Engineering at the University of Maryland evaluated the effectiveness and desirability of differential speed limits (DSL) on the Maryland Interstate System. Vehicular speed and accident data were collected at 84 study sites, encompassing a variety of geometric design and locations with and without truck DSL. The study concluded that:

- There is generally poor compliance by all vehicles with posted speed limits.

- The level of compliance by trucks is dependent on the geometric design of the road and the existence of a DSL.

- No consistent and reliable relationship could be found among speed parameters, and accident rates.

- Researchers noted a decrease in trucks involved in rear-end collisions at locations with higher operating speeds. Increasing truck speeds (effectively removing the DSL) would reduce the truck accident rate.

- Researchers cited excessive speed or speed too fast for conditions as the probable cause in approximately 20 percent of truck involved accidents, somewhat less than the frequency with which it is reported for all accidents.

- Accidents which occur at higher speeds are more severe.

- Highway design and operational features should be considered in the establishment of a speed limit.

McCasland, William R. and Robert W. Stokes, *Truck Operations and Regulations on Urban Freeways*, Research Report FHWA/TX-85/28+1F, Texas Transportation Institute, College Station, TX., 1984.

McCasland and Stokes examined six general classes of truck regulations and restrictions in terms of their impacts on urban freeway safety and traffic operations. The regulations and restrictions examined were: lane restrictions; time-of-day restrictions; speed restrictions; route restrictions; driver licensing and certification programs; and increased enforcement of existing regulations. The objectives of the study were:

- Identify truck traffic characteristics and problems on urban freeways in Texas.
- Survey existing truck regulations being imposed by Federal, State, and Local governments.
- Develop a comprehensive list of alternative truck regulations.
- Assess the impacts of these truck regulations on traffic operations, safety, the environment, and commerce.
- Evaluate driver-related factors influencing truck operations and safety.
- Identify possible test regulations for evaluation on one or more urban freeways in Texas.

Researchers conducted a literature review for truck related problems and truck restrictions/regulations on urban freeways. They then conducted a survey of state policies relating to truck restrictions/regulations on urban freeways. Forty-three states responded to the state policy survey. Comments on enforceability or effectiveness of truck restrictions and regulations were generally subjective opinions and were not based on quantitative analysis. Six truck restrictions and regulatory practices were then examined by the authors using information obtained from the literature review and the survey of state policies.

The results of the study were:

- Restriction of truck traffic to one mixed-flow lane would probably not improve freeway safety or operations based on associated constraints and limitations. Prohibition of truck traffic from the left lane would be acceptable for roadways of three or more lanes. Trucks may be restricted to the two right lanes, except to pass on roadways with four or more lanes.

- Restriction of truck traffic based on time-of-day or peak periods would not contribute to improved safety because truck traffic peaks do not coincide with typical commuter peaks.

- Speed restrictions of all vehicles or trucks only on urban freeways could improve safety and operations.

- Route restrictions would have little or no effect on freeway safety or operations. However, route restrictions could be beneficial in controlling transport of hazardous materials.

- Revisions in 1984 to the Texas driving statute affecting truck drivers, requiring driving skill examinations taken in the class of vehicle for which the license is being obtained, could substantially improve the safety of truck operations on urban freeways.

- Restrictions evaluated in this study would be difficult to enforce with the possible exception of existing speed limits.

The authors concluded that only reduced speed limits for all vehicles and improvement of driver licensing/training and incident management techniques appear capable of producing any substantial improvement in the safety and operational aspects of truck usage of urban freeways in Texas. However, it should be noted that all assessments and recommendations are based on findings of the literature review and state policy survey.

Cambridge Systematics, Inc., JHK & Associates, Roberts Associates, Inc., and Sydec, Inc., *Urban Freeway Gridlock Study: Summary Report*, California Department of Transportation, 1988.

Cambridge Systematics, Inc. found that the volume of large trucks on freeways does not have an inordinate impact on peak period congestion, but truck-involved accidents and incidents do have a significant impact on freeway congestion and delay. The authors analyzed four freeway and truck management strategies: traffic management, incident management, night shipping and receiving, and peak-period truck bans. The objectives of the study were to assess the impacts of large trucks on peak-period freeway congestion; evaluate the effects of freeway and traffic management techniques on congestion reduction; and identify the economic impacts of freeway and traffic management techniques.

The authors evaluated available data on freeway conditions and conducted a literature review on freeway and truck safety and operations. Three areas— Los Angeles, San Francisco, and San Diego— were identified as critically-congested areas and selected for detailed case study. Large trucks were defined as having three or more axles and a gross vehicle weight rating of 11,780.6 kilograms (26,000 pounds) or more.

Research Approach:

Traffic flows at 40 freeway sites in the Los Angeles area, 25 sites in the San Francisco area, and 13 sites in the San Diego area were analyzed to determine the volume and type of trucks on the freeways at peak periods. The four management techniques selected for analysis were: traffic management, incident management, night shipping and receiving, and peak-period truck bans. Legal ramifications concerning implementation of the four selected strategies were also reviewed. Public officials, industry associations, motor carriers, and shippers and receivers were interviewed to evaluate the impact of congestion on freeway and trucking operations, and the direct economic impacts of implementation of the selected strategies. Indirect economic impacts of the implementation of the strategies on local and state economies were estimated.

Research Results:

The authors found that the volume of large trucks on freeways does not have an inordinate impact on peak period congestion, however truck-involved accidents and incidents do have a significant impact on freeway congestion. Large trucks comprise 4 percent of all vehicles during the morning peak, 2.5 percent during the evening peak, and 5.5 percent during the midday.

A traffic management program could reduce freeway congestion, provide air quality benefits, and significantly improve safety. The program would require adding continuous-merge lanes at critical interchanges, redesigning high-accident ramps, providing traffic condition information to drivers, regulating speed, and enforcing safe truck operations.

An incident management program that could reduce congestion and delay from truck-involved accidents and incidents is feasible and should be implemented in conjunction with a traffic management program.

Night shipping and receiving would modestly reduce peak-period congestion and may improve air quality by reducing truck emissions during daylight hours. Peak-period truck bans could reduce congestion on core freeways; however, congestion would increase on parallel arterial routes.

The authors reached the following conclusions:

- A traffic management program could reduce freeway congestion, provide air quality benefits, and significantly improve safety. The program would require the addition of continuous-merge lanes at critical interchanges, redesigning high-accident ramps, providing traffic condition information to drivers, regulating speed, and enforcing safe truck operations.

- An incident management program that could reduce congestion and delay from truck-involved accidents and incidents is feasible and should be implemented in conjunction with a traffic management program.

- Night shipping and receiving would modestly reduce peak-period congestion and may improve air quality by reducing truck emissions during daylight hours. However, this type of program would only be feasible for large establishments and would have a negative economic impact by raising the cost of doing business. There are also possible legal challenges to this strategy based on alleged interference with interstate commerce.

- Peak-period truck bans would temporarily reduce congestion on core freeways; however, congestion would increase on parallel arterial routes. This strategy is most likely illegal under the Surface Transportation Assistance Act of 1984 and would require FHWA approval.

Stokes, R. W. and S. Albert, *Preliminary Assessment of the Feasibility of an Exclusive Truck Facility for Beaumont-Houston Corridor*. Research Report FHWA/TX-86/393-2, Texas Transportation Institute, College Station, Tx., 1986.

Lamkin, J.T., and W. R. McCasland, *The Feasibility of Exclusive Truck Lanes for the Houston-Beaumont Corridor*. Research Report 393-3F, Texas Transportation Institute, College Station, Tx., 1986.

Stokes and Albert examined in general terms and Lamkin and McCasland studied in detail, the feasibility of exclusive truck facility options for the Beaumont-Houston corridor. Specific attention is given to the feasibility of truck facilities on or adjacent to I-10E and US90. Stokes and Albert's objective was to examine the following general truck facility options for the Beaumont-Houston corridor: construction of an exclusive truck facility within the existing I-10E right-of-way; construction of an exclusive truck facility immediately adjacent to the I-10E freeway outside the existing right-of-way; or construction of an exclusive truck facility on, or immediately adjacent to, an existing roadway which parallels I-10E (e.g., US 90).

Lamkin and McCasland's objectives were: to determine the economic feasibility, safety aspects and design criteria for providing separate facilities for trucks, and to investigate the legal aspects, motor carrier issues, and State Agency issues concerning exclusive truck facilities.

An examination of truck traffic volumes and accident statistics for the corridor by Stokes and Albert indicate that measures directed toward improving truck operations and safety should be implemented. However, Lamkin and McCasland on further evaluation conclude that existing and future trends do not warrant the construction of an exclusive truck facility on I-10. The final

recommendation is to construct additional travel lanes on the existing roadway to be shared by trucks and non-trucks.

Stokes and Albert's results were as follows:

- Measures that improve truck operations and safety should be considered for implementation.
- An exclusive truck lane on I-10E to divert truck traffic from US90 should be investigated, and the legal and operational issues of such a diversion should be addressed.
- The most feasible alternative considered is an outside at-grade truck lane within the I-10E right-of-way. However, a number of physical, operational, legal, and economic issues must be investigated prior to making a final determination of what, if any, improvements should be considered for implementation.

Lamkin and McCasland's research results were:

- Although short sections of the I-10 right-of-way can geometrically accommodate an exclusive truck facility, major structures would be required to obtain continuous facilities.
- The preferred alternative is construction of the exclusive truck facility within the freeway median.
- Traffic volumes (existing and future trends) do not warrant construction of an exclusive truck facility.

Sirisoponsilp, S., and P. Schonfeld, *Impacts and Effectiveness of Freeway Truck Lane Restrictions.* Transportation Studies Center, Maryland State Highway Administration, Baltimore, MD., 1988.

Sirisoponsilp and Schonfeld investigated the strategies used by state highway agencies to restrict trucks from certain lanes, and the impacts of the restrictions on traffic operation and safety.

The objectives of their study were: to examine strategies used by various state highway agencies to restrict trucks from certain lanes; to examine the impacts of these restrictions on traffic operation and safety; to assess the objectives and effectiveness of the restrictions, current

restriction methods, enforcement practices, and procedures for evaluating restrictions; and to predict the impacts of lane restrictions.

The authors conducted a literature review and a survey of state highway agencies to document their experiences with lane restrictions. The authors then evaluated the findings from the literature review and the survey using the following issues: purpose and effectiveness of truck lane restrictions, strategies used to restrict trucks, enforcement and compliance with the restrictions, and evaluation of the effectiveness of the restrictions.

The study found that although truck lane restrictions have been imposed by a number of states for many years, the effects of the restrictions on traffic operation and safety are still not well known and their cost effectiveness is still in doubt. The goal of restricting the trucks' lane usage appears to have shifted from traffic operation to traffic safety. This stems from public perceptions of increased truck-related accidents. Truck lane restrictions have not been accepted as a potential solution to the congestion and accident problem on urban freeways. The authors recommended that additional research on truck lane restrictions be conducted to provide understanding of the true benefits and impacts of the restrictions.

Virginia Department of Transportation, *Assessment of Accidents on I-95 from Petersburg to the Woodrow Wilson Bridge with Truck Accident Update*. Traffic Engineering Division, Unpublished Report, February 1989.

The Virginia Department of Transportation assessed the operational and safety impact of restricting trucks from the inside median lane of an eight-lane section of the Capital Beltway. The objectives of the study were: to identify and compare traffic volume trends and accident histories of three segments of I-95, each with a different restriction, against a control segment; to establish a baseline against which the safety impact of truck restrictions could be measured; and to assess the safety of truck restrictions along the entire length of roadway encompassed by the study.

The Virginia DOT used a case/control approach because of multiple determinants affecting the operational and safety aspects of I-95. Three segments consisting of a toll road, a HOV/shoulder travel lane operation, and a truck restriction segment, were compared with a control segment of roadway. The period of evaluation extended from 1985 through 1987. Traffic volumes and accident histories for each segment were obtained and analyzed.

The study indicated that the total number of accidents increased where restrictions have been enacted and accident rates tend to be lower where there are the least restrictions. The severity of accidents in terms of fatal and injury accidents did not change, although the total number of accidents increased. The majority of truck accidents occur on the right side of the road. Initial accident rate reductions on the truck restriction section may have been due to attentiveness to increased police enforcement during the early stages of the restriction. The authors also found that there is some political and public perception that restriction of trucks to

the right lanes makes the highways safer; however, all known studies indicate that present restrictions should be lifted, and additional restrictions should not be considered.

The authors therefore recommended that truck restrictions for the three segments without truck lane restrictions (HOV operation, control area, and toll road sections of I-95) be left without restrictions and that restrictions in place on the Beltway be removed.

Virginia Department of Transportation, Traffic Engineering Division, *Capital Beltway Truck/Tractor Trailer Restriction Study*, Richmond, VA., February, 1987.

The Virginia DOT instituted a lane restriction for trucks on the I-95 section of the Capital Beltway between I-395 and west of the Woodrow Wilson Bridge on December 1, 1984. The restriction was implemented jointly with the State of Maryland in an attempt to reduce the accident problems on the Capital Beltway. The objective of this study was to assess the impact of the truck restriction on the I-95 section of the Capital Beltway between I-395 and west of Woodrow Wilson Bridge by comparing traffic volume, speed, and accident data prior to the restriction with that during the restriction.

A study of accidents, speeds, and volumes was conducted for a 24-month period prior to implementation of the restrictions with data collected periodically after implementation to determine impact of the countermeasure. Each issue area (such as speed, road geometry, and accident data) was analyzed and then considered for its effect on operation and safety on the Beltway. An analysis of the data showed that the accident rate increased 13.8 percent during the restriction; however, there was no change in the fatal and injury accident severity. Traffic volume increased nearly 8 percent. The only significant change for the segment was the lane restriction. The accident rate for the section consisting of the I-95, I-495, and I-395 interchange was the primary contributor to the overall accident rate increase. It was found that accidents were redistributed by lane of occurrence, type of maneuver, and collision type during the restriction.

Even though the data show an increase in accident rates, the authors noted that there was no change in fatal or injury accident severity. This maintenance of accident severity level along with various intangible benefits such as favorable public perception and continuity of the lane restriction with Maryland, resulted in a recommendation of retention of the restriction.

Virginia DOT, Traffic Engineering Division, *Capital Beltway Safety Study with Truck Accident Update for 1988*. Virginia DOT, Richmond, Va., June 1989.

The Virginia DOT conducted a field study of the ramps and interchanges of the Capital Beltway and an update of truck accident data. The objectives of this field study were: to describe and compare the frequency of truck accidents versus other vehicle accidents, as well as selected accident characteristics of the Capital Beltway ramps and loops from 1985 to 1989; to provide information on the feasibility of existing incident management systems; and to provide an update for the evaluation of the volumes, accident frequencies, and accident rates for 1985 through 1988 for the Capital Beltway study.

A field study of interchange ramp and loop geometrics was conducted to determine if these locations were properly posted with a maximum safe speed for the existing superelevation. Accident frequency and characteristics were then analyzed to determine the interface between drivers, vehicle, and roadway condition. Finally, the study team performed an exploratory evaluation of the Northern Virginia (NOVA) Freeway Management Team.

The field study of the ramps and interchanges indicated several conditions of concern relative to traffic operations and environmental safety. These conditions were: posted maximum safe speeds on loops and ramps, interchange configurations which violate driver expectancy at their approach, inadequate or poor visibility of advanced signing, and landscaping and vegetation which obscure a driver's line of sight.

An analysis of the data showed that the accident rate increased for trucks on southbound I-95 during the truck lane restriction. The four most prevalent factors in accidents involving trucks were: weather/visibility, vehicle defect, speeding, and road defect. Trucks were involved in 49 percent of the sideswipe collisions and 16 percent of the rear-end collisions As a result of this increase for two consecutive years, the authors recommended that the truck lane restriction be lifted.

Virginia Department of Highways and Transportation. *Capital Beltway Truck Trailer Restriction Study Final Report*, Highway and Traffic Safety Division, Richmond, VA., 1985.

The Virginia DOT instituted a lane restriction for trucks on the I-95 section of the Capital Beltway between I-395 and west of the Woodrow Wilson Bridge on December 1, 1984. The restriction was implemented jointly with the State of Maryland in an attempt to reduce the accident problems on the Capital Beltway. A study of accidents, speeds, and volumes was conducted for one year prior to implementation of the restrictions; and data was then collected periodically after implementation to determine the impact of the countermeasure.

The authors found that the lane restriction resulted in a redistribution of trucks in the nonrestricted lanes while passenger vehicles using the left lanes increased slightly. An opinion

survey of drivers indicated that the majority of users of the Beltway indicated support of a truck free lane.

The number of accidents along the restricted area of the Beltway remained constant; however, the accident rate declined slightly with the restriction, and there was a 20 percent reduction in injury accident severity. It should be noted that the 20 percent reduction in accident severity is actually only a reduction of injury accidents by eight (41 versus 33). Property damage only accidents increased during the time period by nine (60 versus 69). Therefore, the reduction is probably insignificant. The overwhelming support for the restriction by the public and the perception of the benefits in conjunction with the slight reduction in accident rates resulted in a recommendation that the truck lane restriction be maintained.

Department of Public Works, *Truck Ban Study, Proposed San Diego City Ordinance - Route 163 From Interstate Route 8 Through Balboa Park*, District 11, California Department of Transportation, San Diego, CA., 1972.

Route 163, south of Interstate 8 through Balboa Park, is considered one of the most beautiful sections of urban freeway in the country. This section of Route 163 is also the site of one of the few existing truck bans in the United States. In 1972, San Diego, California, proposed a city ordinance to restrict trucks from Route 163 through Balboa Park. Congestion, the main problem for this section of freeway, is the result of merging five lanes of traffic to two lanes. This congestion is further aggravated by a 6 percent grade and a lack of acceleration/deceleration lanes for interchanges within the Park. Public opinion prohibited construction of additional lanes because of the extensive landscaping and scenic location of the section.

Ohio-Kentucky-Indiana Regional Council of Governments, *Interstate Truck Diversion Study.* Ohio-Kentucky-Indiana Regional Council of Governments, Cincinnati, OH., 1987.

Concern about the use of Interstate highways by large trucks in the Ohio-Kentucky - Indiana (OKI) region has been a controversial issue for years. The primary target of concern is the truck volumes and safety on a segment of I-71/75 in northern Kentucky, known as "cut-in-the-hill." On June 25, 1986, a fiery accident occurred that involved nine vehicles in the northbound lanes of I-71/75 north of the "cut-in-the-hill." The accident was a result of a series of rear-end collisions in the inside lane near a construction site. Two of the nine vehicles were truck-trailer units. The Kentucky governor visited the site, and the entire incident received heavy media coverage. On July 8, 1986, the Kentucky governor's office announced the imposition of a ban on all northbound through truck traffic on 1-71/75 between the I-275 Beltway and the Ohio River, as well as on I-471 in Campbell County.

A study conducted by the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) examined two specific aspects of a truck diversion order imposed by the governor of

Kentucky on July 8, 1986. These aspects were the impact of the diversion on traffic volumes and accidents on the regional interstate system, in general. It was found that truck volumes prior to the diversion were evenly split on most segments of the interstate system. On the I-71/75 segment known as the "cut-in-the-hill," however, southbound truck volumes were noticeably heavier than northbound volumes. The mandatory diversion has made this imbalance even more pronounced.

Contrary to a common perception that trucks are over involved in accidents, trucks were not involved in more accidents on the "cut-in-the-hill" nor on the regional interstate system, in general. Prior to the diversion the annual accidents involving trucks followed a pattern similar to total accidents. The diversion order is expected to shift accidents from the interstate core to I-275 with no net change in accidents for the entire region. However, for the "cut-in-the-hill" accidents, the diversion is expected to reduce truck involved accidents by approximately 9 percent.

Garber, N.J. and R. Gadiraju, *Impact of Differential Speed Limits on Highway Speeds and Accidents*, School of Engineering and Applied Science, Department of Civil Engineering, University of Virginia, Charlottesville, Va., February 1991.

Some states have restricted truck speeds by using differential speed limits (DSL), where the maximum speed for trucks is lower that the maximum speed for cars. The objective of DSL is to reduce the impact of increased speed limits on truck involved accidents.

Garber and Gadiraju conducted a study to assess the nature and extent of the effects of DSL on vehicle speeds and accident characteristics. The study used speed and accident data collected at test and control sites operating under DSL and non-DSL conditions, respectively, in California, Maryland, Virginia, and West Virginia. The authors found that the imposition of a differential speed limit had no significant effect on mean speeds of trucks or in reducing the rate of accidents. However, there is evidence indicating that the differential speed limit increases the interaction among vehicles and that certain types of accidents, such as rear-end and sideswipe accidents, may have higher rates on interstate highways with AADT less than 50,000.

Zaviona, M. C., T. Urbanik II, and W. Hinshaw, *An Operational Evaluation of the Interstate 20 Truck Restriction in Texas*. Texas Transportation Institute, Texas A & M University, College Station, Tx., January 1991.

Zaviona, Urbanik, and Hinshaw analyzed the operational effectiveness of a left-lane truck restriction on Interstate 20 near Fort Worth, Texas. The study sites were six-lane, rural interstate highway sections with a speed limit of 104.5 km/h (65 mph) [100 km/h (60 mph) truck speed limit]. Vehicle distributions according to classification, vehicle speeds, and time gaps between vehicles were examined. Surveys of the driving public were conducted both before and after the

restriction implementation. The objectives of the surveys were to gain an understanding of the opinions of motorists towards the restrictions and to identify which sign best relates the intended message to the motorist.

The before implementation survey found that 60 percent of the motorists and 28 percent of the truckers favored the restriction of larger vehicles. Truckers who did not respond favorably to the restriction stated reasons including: the restriction would cause merging conflicts (19 percent), the restriction would impede cars (14 percent), and that the restriction would cause undue congestion (13 percent.) The sign that exhibited the highest percentage of correct responses read "No Trucks Trailers in Left Lane."

The after implementation or secondary survey found that 68 percent of the motorists and 76 percent of the truckers noticed the sign. Forty-five percent of the motorists thought the restrictions had improved traffic operation, while only 20 percent of the truckers believed that it had.

The study found that the compliance rate for the restriction was between 62 percent and 76 percent without enforcement. However, it should be noted that few trucks were present in the left lanes prior to the restriction. It was also found that the redistribution of trucks across the three lanes in each direction did not effect any change in the distribution of cars.

The authors found no definitive results that could be attributed to the implementation of the truck restriction. Although the directional distribution of trucks changed significantly due to the restriction, no effects were found in the directional distribution of cars, speeds of either cars or trucks, or the time gaps between vehicles that could be attributed to the truck restriction. The authors also found that although the implementation of truck restrictions theoretically have the potential to improve the capacity and safety of roadway, there is a lack of evidence from current research to support these conclusions.

11.0 APPENDIX B
STATE PRACTICES SURVEY

Project 1726 - State Practices Survey

Date _____
Name of State _____
Name of Initial Contact _____
Phone Number _____

1a. Does you state currently use, or has it used in the past a truck restriction such as dedicated truck lanes or truck lane restrictions, either at a point along a freeway segment, in an attempt to improve traffic flow and safety, increase roadway structural longevity, and/or decrease long term maintenance costs?_____Yes_____No

1b. If yes, describe the type of truck restriction that was used.

_____
_____
_____
_____

2a. Is the restriction still being implemented?

_____
_____

2b. Where or to what extent has the restriction(s) been implemented?

_____
_____
_____

3. Why was the restriction implemented; what were the goals?

_____
_____
_____
_____

4a. Are there any data or reports available regarding the effectiveness, success, and/or problems involved with implementing the restriction?

_____
_____

4b. How may we obtain the data or reports?

5a. What is the name, address, and telephone number of the most appropriate person to contact regarding the operational effectiveness of the restriction?

5b. What is the name, address, and telephone number of the most appropriate person to contact regarding the effects of the restriction on pavement wear?

5c. What is the name, address, and telephone number of the most appropriate person to contact regarding any regulatory or legal issues concerning the restriction?

12.0 APPENDIX C
SENATE BILL (SB) 773
ENACTED BY THE 75th TEXAS LEGISLATURE

Senate Bill 773 of the 75th Legislative Session

AN ACT

relating to restricting the use of designated lanes of certain highways.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Subchapter B, Chapter 545, Transportation Code, is amended by adding Section 545.0651 to read as follows:

Sec. 545.0651. MUNICIPAL RESTRICTION ON USE OF HIGHWAY.

(a) In this section:

(1) "Department" means the Texas Department of Transportation.

(2) "Highway" means a public roadway that:

(A) is in the designated state highway system;

(B) is designated a controlled access facility; and

(C) has a minimum of three travel lanes, excluding access or frontage roads, in each direction of traffic.

(b) A municipality by ordinance may restrict, by class of vehicle, through traffic to two designated lanes of a highway in the municipality.

(c) An ordinance under Subsection (b) must:

(1) be in effect only during peak traffic hours of a workday; and

(2) allow a restricted vehicle to use any lane of the highway to pass another vehicle and to enter and exit the highway.

(d) Before adopting an ordinance under this section, the municipality shall submit to the department a description of the proposed restriction. The municipality may not enforce the restrictions unless:

(1) the department's executive director or the executive director's designee has approved the restrictions; and

(2) the appropriate traffic control devices are in place.

(e) Department approval under Subsection (d) must:

(1) be based on a traffic study performed by the department to evaluate the effect of the proposed restriction; and

(2) to the greatest extent practicable, ensure a systems approach to preclude the designation of inconsistent lane restrictions among adjacent municipalities.

(f) The department's executive director or the executive director's designee may suspend or rescind approval under this

section for one or more of the following reasons:

(1) a change in pavement conditions;

(2) a change in traffic conditions;

(3) a geometric change in roadway configuration;

(4) construction or maintenance activity; or

(5) emergency or incident management.

(g) The department shall erect and maintain official traffic control devices necessary to implement and enforce an ordinance adopted and approved under this section.

SECTION 2. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.

_____ _____

President of the Senate Speaker of the House

I hereby certify that S.B. No. 773 passed the Senate on April 28, 1997, by the following vote: Yeas 31, Nays 0.

_____

Secretary of the Senate

I hereby certify that S.B. No. 773 passed the House on May 14, 1997, by the following vote: Yeas 140, Nays 2, one present not voting.

_____

Chief Clerk of the House

Approved:_____

Date

_____

Governor

13.0 APPENDIX D
PROPOSED AMENDMENTS TO THE TEXAS ADMINISTRATIVE CODE

PROPOSE ADOPTION OF AMENDMENTS TO § 25._ CONCERNING THE MUNICIPAL RESTRICTION ON USE OF HIGHWAY

Description

This Minute Order provides for the proposed adoption of amendments to §25._, concerning restricting the use of designated lanes on certain highways. It allows municipalities to restrict use of designated highways.

Background

Transportation Code, §§545.065 authorizes the state and local regulation of limited-access and controlled-access highways.

Senate bill 773, 75th Legislature, 1997, enabled municipalities the authority to restrict the use of designated lanes on certain highways. The proposed amendments to §25._ implement the statutory amendments.

Criteria

None.

Problem/condition

The proposed amendments are recommended for adoption to define and clarify the authorization of municipalities to restrict the use of designated lanes on certain highways.

Other comments

None.

Alternate solutions/actions

None.

Recommended Action

Approval of the Minute Order

TEXAS TRANSPORTATION COMMISSION

VARIOUS County **MINUTE ORDER** Page 1 of 2 Pages

District Various

WHEREAS, the Texas Transportation Commission (the "commission") is empowered by the Transportation Code, §201.101, to promulgate rules for the conduct of the work of the Texas Department of Transportation (the "department"); and

WHEREAS, Transportation Code, §§545.065 authorizes the state and local regulation of limited-access and controlled-access highways.

WHEREAS, to implement Senate Bill 773, 75th Legislature, 1997, which enabled municipalities the authority to restrict the use of designated lanes on certain highways, the commission deems it necessary to propose amendments to §25._ as shown in Exhibit "A" to this order; and

WHEREAS, the proposed amendments are consistent with the 1997-2001 Strategic Plan strategy to plan, design, and manage highway projects; and

WHEREAS, the proposed amendments have been examined by legal counsel and found to be a valid exercise of the commission's legal authority;

NOW, THEREFORE, IT IS ORDERED that the commission hereby proposed for adoption amendments to §25._ as shown in Exhibit "A" to this order; and the executive director is directed to take the necessary steps to implement the actions as ordered herein, pursuant to the requirements of the Administrative Procedure Act, Government Code, Chapter 2001.

Submitted by:

Director, Traffic Operations Division

Reviewed by:

Assistant Executive Director for Field Operations

Recommended by:

Executive Director

Minute Number _____

Date Passed _____

Proposed Preamble

The Texas Department of Transportation proposes amendments to §25._ concerning restricting the use of designated lanes on certain highways. It allows municipalities to restrict use of designated highways.

Transportation Code, §§545.065 authorizes the state and local regulation of limited-access and controlled-access highways.

Senate bill 773, 75th Legislature, 1997, enabled municipalities the authority to restrict the use of designated lanes on certain highways. The proposed amendments to §25._ implement the statutory amendments.

(a) Purpose. The Department has been designated as the State Approval Agency for Municipal Restrictions on Use of Highways in accordance with the Transportation Code §§ 545.0651. Effective December 11, 1997, the director or the designee of the director is authorized to approve all new municipal ordinances that restrict vehicles to designated lanes by class of vehicle. Any proposed restriction that does not meet the criteria of the Transportation Code §§ 545.0651, and the procedural requirements of this section shall not be approved.

(b) Definitions. The following definitions apply to this section:

(1) "Department" - means the Texas Department of Transportation.

(2) "Director" - means the executive director of the Texas Department of Transportation.

(3) "Highway" - means a public roadway that is on the designated state highway system; is designated a controlled access facility; and has a minimum of three travel lanes, excluding access or frontage roads, in each direction of traffic.

(4) "Municipality" - means a general-law municipality, home-rule municipality, or special-law municipality.

(5) "Designated State Highway System" - means the highways in this state included in the plan providing for a system of state highways prepared by the director under the Transportation Code §§ 201.103.

(6) "Designated Controlled Access Facility" - means a designated state highway to or from which access is denied or controlled, in whole or in part, from or to adjoining real property or an intersecting public or private way, without regard to whether the designated state highway is located in or outside a municipality.

(7) "Class of Vehicle" - means a vehicle type as defined in the Transportation Code §§ 541.201.

(c) Preparation. A municipality seeking approval of an ordinance to restrict vehicles to designated lanes by class of vehicle shall comply with this section and with the Transportation Code §§ 545.0651 to ensure that all restrictions are properly established. The municipality is responsible for all costs of restriction development, public hearings, and public information announcements regarding the ordinance.

(d) Initial Contact. A municipality evaluating whether to establish an ordinance shall contact and coordinate with the Department, the local district office of the Department, and any other municipalities adjacent to the area of the proposed ordinance. Coordination with the local Metropolitan Planning Organization and local emergency planning council and committee is encouraged.

(e) Route Analysis and Ordinance Formulation. A municipality intending to establish an ordinance that restricts through traffic by class of vehicle to designated lanes shall fully consider all of the standards and factors listed in the Transportation Code §§ 545.0651.

(f) Local Public Hearing. A municipality shall hold at least one public hearing on any proposed ordinance that restricts through traffic by class of vehicle to designated lanes. Public hearings may take the form of a city council or commissioner's court meeting and shall conform with all applicable state laws governing public meetings, including the Texas Open Meetings Act, Chapter 551 et seq. Public notification of the hearing should comply with the following criteria:

(1) The public shall be given 30 days prior notice of the hearing through publication in at least two newspapers of general circulation in the affected area, one of which is a newspaper with statewide circulation; and

(2) The notice shall contain a complete description of the proposed ordinance, including the location, route numbers, and beginning and ending points of the ordinance, together with the date, time, and location of the public hearing.

(g) Proposal Submission. A municipality that has drafted a proposed ordinance that restricts through traffic by class of vehicle to designated lanes and conducted a local public hearing in compliance with subsection (f) of this section shall submit six (6) copies of the proposed ordinance to the Department for approval. The proposal shall be submitted to the following address: Texas Department of Transportation, 125 East 11th Street, Austin, Texas 78701-2483. The proposal shall include:

(1) Documentation demonstrating compliance with the Transportation Code §§ 545.0651 and this section;

(2) Two original plan views of the roadway and a complete description of the routes affected by the proposed ordinance; and

(3) A signature approval by an authorized official of the municipality such as the mayor, city manager, county judge, or an equivalent level of authority.

(h) Proposal Review. The Department shall review the proposed ordinance including:

(1) Conduct a traffic study to evaluate the impact of the proposed restriction as specified by subsection (e) of the Transportation Code §§ 545.0651.

(2) Ensure a systems approach to preclude the designation of inconsistent lane restrictions among adjacent municipalities.

(3) Provide the public with notice of the proposed ordinance and a 30-day comment period by placing a notice in the Texas Register. If the comments received warrant public consideration, the Department may conduct a public hearing to receive comments on the proposed ordinance. The public hearing shall be conducted before the director or the designee of the director. If a public hearing is to be conducted, the Department shall give appropriate notice in the Texas Register at least 30 days prior to the date of the hearing and may also publish or direct the political subdivision to publish a notice satisfying the criteria identified in subsection (f) of this section in two newspapers of general circulation. Public hearings under this subsection shall be held in Austin, Texas.

(i) Authorization and Approval. If the Department determines that an ordinance has met all criteria for approval, the Department will notify the municipality in writing that the proposed ordinance is authorized and will issue the appropriate approval notice. A municipality that is issued a letter of authorization and approval shall designate the routes affected by passage of a final ordinance and forward a copy of the final ordinance passage to the Department.

(j) Ordinance Signing. After receipt of the Department director's or designee of the director's approval and passage of the ordinance, but prior to enforcement of the restrictions, the Department shall install appropriate traffic control devices regarding the ordinance. The Department shall erect and maintain official traffic control devices in accordance with subsection (g) of the Transportation Code §§ 545.0651

(k) Suspension or Rescission of the Ordinance The director or the designee of the director of the Department may either temporarily or permanently suspend or rescind the ordinance in accordance with subsection (f) of the Transportation Code §§ 545.0651. Prior to suspension or rescission of the ordinance the Department will notify appropriate authorized officials of the municipality. Reasons for suspension or rescission may include:

(1) Changes in pavement conditions;

(2) Changes in traffic conditions;

(3) Geometric changes in roadway configuration;

(4) Construction or maintenance activities; or

(5) Emergency or incident management.