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16. Abstract The managed lane concept is currently being considered on major freeway projects in Texas cities. The term "managed lanes" encompasses a variety of facility types, including high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, single-occupancy vehicle (SOV) express lanes, special-use lanes, and truck lanes. The premise of the managed lanes concept is to increase freeway efficiency and provide free-flow operations for certain freeway users by packaging various operational and design strategies. The strategies deployed offer the flexibility to be adjusted to match changing corridor and regional goals. This report documents the research undertaken in task seven of the Texas Department of Transportation (TxDOT) research project 0-4160, "Operating Freeways with Managed Lanes." The objective of this task was to assess the federal and state legislative needs necessary for Texas to successfully implement the various types of managed lane facilities across the state and provide recommendations regarding necessary changes to federal and state legislation.					
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STATE AND FEDERAL LEGISLATIVE ISSUES FOR MANAGED LANES

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DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. This project was conducted in cooperation with the Texas Department of Transportation (TxDOT) and the U.S. Department of Transportation, Federal Highway Administration (FHWA). The contents do not necessarily reflect the official view or policies of the Federal Highway Administration or the Texas Department of Transportation. The report does not constitute a standard, specification, or regulation. The engineers in charge of the overall project were Beverly T. Kuhn (Texas P.E. #80308) and Ginger Daniels Goodin, (Texas P.E. #64560).

The United States Government and the State of Texas do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

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CHAPTER 1: SUMMARY

Transportation professionals are currently considering the managed lane concept on major freeway projects in Texas cities. The term “managed lanes” encompasses a variety of facility types, including high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, single-occupancy vehicle (SOV) express lanes, special-use lanes, toll lanes, and truck lanes. The premise of the managed lanes concept is to increase freeway efficiency and provide free-flow operations for certain freeway users by packaging various operational and design strategies. The strategies deployed offer the flexibility to be adjusted to match changing corridor and regional goals. This report documents the research undertaken in task seven of the Texas Department of Transportation research project 0-4160, “Operating Freeways with Managed Lanes.” The objective of this task was to assess the federal and state legislative needs necessary for Texas to successfully implement the various types of managed lane facilities across the state. Numerous federal and state laws govern the operations of these facilities in Texas. However, some gaps exist that prevent TxDOT and other operational agencies from having the complete arsenal of options available to design, operate, and enforce managed lanes under a variety of control scenarios and make operational and eligibility changes over time as conditions change. At the federal level, FHWA fails to provide permanence to HOT lanes. At the state level, several gaps exist. The researchers recommend the following changes to remedy these gaps:

- allow TxDOT the authority to enter into contractual agreements with other transportation-related agencies for the design, operation, and/or maintenance of managed lane facilities;
- define managed lanes as an operational concept in Texas and authorize entities to develop these facilities for congestion mitigation purposes;
- allow entities operational flexibility with managed lane facilities;
- authorize entities to develop exclusive lane facilities for congestion mitigation purposes;

- authorize TxDOT to establish lane restrictions for congestion mitigation purposes and remove the time-of-day limitation on the current municipal authorization for this strategy;
- make unlawful the violation of any managed lane facility in Texas punishable by fine.

Incorporating these recommended changes into the Texas statutes broadens the powers of TxDOT and other transportation organizations and provides them with the tools they need to successfully implement managed lane facilities in their jurisdictions in the most effective manner, thereby working to reduce congestion and enhance the mobility of Texans.

CHAPTER 2: INTRODUCTION AND METHODOLOGY

BACKGROUND

The increasing population growth in Texas has placed enormous demands on the transportation infrastructure, particularly the freeway systems. There is a growing realization that the construction of sufficient freeway lane capacity to provide free-flow conditions during peak travel periods cannot be accomplished in developed urban areas due to cost, land consumption, neighborhood impacts, environmental concerns, and other factors. Like other transportation agencies nationwide, the Texas Department of Transportation is searching for methods to better manage traffic flow and thus improve the efficiency of existing and proposed networks.

A viable method for meeting mobility needs is the concept of “managed” lanes, which is growing in popularity among users and agencies alike. Managed lanes maintain free-flow travel speeds on designated lanes or facilities by providing controlled service to eligible groups of vehicles. Moreover, the eligible user groups can vary by time of day or other factors depending on available capacity and the mobility needs of the community. Because true managed lanes are so new and the experience base is so small, numerous issues surrounding their design and operation deserve additional exploration as planning for them progresses.

Managed lanes are similar to special-purpose lanes, which have been evolving for several decades. Initially, freeway lanes employed access restrictions to control the amount and entry location of traffic, thereby assuring smoother flow and maximum efficiency. Later, the development of high-occupancy vehicle lanes increased total person-movement by providing a lane or lanes designated for buses, vanpools, carpools, and motorcycles only. The rationale behind allowing motorcycles to use HOV lanes is that it is safer to keep these two-wheeled vehicles moving rather than to have them travel in the start-and-stop conditions of the mainlanes (1). However, states do have the authority to disallow motorcycles if they determine that they present a safety risk. In the last few years, several HOV lanes across the country have begun using electronic tolling to expand the eligible groups of users, thereby further improving operating efficiency; those facilities are generally referred to as “HOT lanes”. Recently,

transportation agencies are becoming more interested in not only controlling eligibility, but also in retaining real-time control over portions of a roadway via variable mechanisms, such as price.

TxDOT expects the managed lane operational approach to offer peak-period free-flow travel to certain user groups. These user groups might be HOV, trucks, toll-paying vehicles, transit, low-emitting vehicles, or some combination of these and other groups. The current HOT lane pilot project on the Katy (IH-10) and Northwest (US 290) Freeways in Houston are working examples of the potential application of allowing more than one vehicle user group into a lane designated exclusively for their use during peak travel times.

At present, several major investment studies (MIS) are underway or completed in Texas that are considering some form of managed lanes within upgraded urban freeway sections. In many of these cases, regional transportation agencies have made a public policy decision to proceed with multiple managed lanes within a general-purpose-lane operating environment. Researchers must now address the traffic engineering issues of geometric design and functional operation to make these projects a reality. However, as stated previously, researchers know little about the complexities of designing a practical, flexible, safe, and efficient facility that may have multiple operating strategies throughout the course of a day, week, year, or beyond. Thus, TxDOT initiated this project to research these and other issues that must be addressed to help ensure the successful implementation of managed lanes.

PROJECT VISION AND OBJECTIVE

TxDOT's needs associated with managed lane research are broad and diverse. Answering any and every question associated with the planning, design, and operation of managed lanes in every conceivable scenario within the framework of one single project is difficult. Thus, in an attempt to clarify the overall direction of this project and to identify those issues the researchers plan to resolve, the project team drafted a vision and objective for the project. The idea was to ensure that all involved are in agreement as to where the project is going and what the final product will be to facilitate the implementation of research results.

The research supervisors, in collaboration with the Texas Transportation Institute (TTI) Advisory Council, identified the *vision* of managed lanes research as it relates to TxDOT: to

develop a better understanding of how managed lanes can improve mobility for transportation system users. The *objective* of this managed lanes project is to investigate the complex and interrelated issues surrounding the safe and efficient operation of managed lanes and to develop a managed lanes manual to help TxDOT make informed planning, design, and operational decisions when considering these facilities for its jurisdiction.

TASK FOCUS AND OBJECTIVE

The operation of managed lanes may be sufficiently different from typical freeway operation that it will require changes in legislation and/or regulation. For example, the existing HOT lane in Houston operates under a special provision of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and the 1998 sustaining legislation of the Transportation Equity Act for the 21st Century (TEA-21) with authorization from the Texas Transportation Commission. City of Houston ordinances provide for enforcement. If additional and more complex facilities are to be pursued, then appropriate legislation should be in place to enable, support, and enforce the operation.

The issues explored in this task included:

- federal, state, and local legislative or policy changes required to design, operate, and enforce managed lanes under a variety of control scenarios; and
- legal/regulatory flexibility needed to make appropriate operational and eligibility changes over time as conditions change.

The goal of the task was to identify key legislative or policy changes necessary to facilitate the various managed lane operational strategies with respect to design, operation, enforcement, and other key issues governing their use.

METHODOLOGY

The following sections present a detailed description of the approach used by the research team to accomplish the objectives of the task.

Document Existing Legislation

Researchers compiled a summary of all legislation in existence at the federal and Texas state level that has an impact on the legality of operational strategies for managed lanes. Those operational strategies addressed in this task include HOV lanes, value-priced and HOT lanes, exclusive lanes, separation and bypass lanes, dual facilities, and lane restrictions. Researchers also investigated enforcement and operational flexibility. In an effort to limit the work needed for this task, the researchers elected to focus only on legislation authorizing the operation of managed lane strategies on various roadway categories and did not include legislation associated with funding and financing managed lanes. This area of legislation will be addressed in task 9, the funding and financing task within the project.

Identify Legislation Needs

Once the researchers assembled the existing legislation, they assessed those laws and statutes to identify legislation necessary to facilitate managed lane operational strategies in Texas. In some instances, the existing legislation met the needs of TxDOT and no changes were necessary. In other instances, the researchers identified gaps in the legal code or statutes that, when filled, can provide TxDOT with the authorization to operate the complete gamut of managed lane scenarios while providing flexibility for operational changes as deemed necessary by the department.

Develop Legislation Recommendations

Once the research team identified the legislative needs, they developed recommended changes to legislation to be used by TxDOT in advancing managed lanes issues at both the federal and state levels. In some cases, only minor changes to existing legislation were necessary. In other cases, researchers recommended entirely new sections to address major gaps in the laws. The report also addresses additional recommendations regarding some legal issues.

CHAPTER 3: EXISTING LEGISLATION

OVERVIEW

Perhaps one of the more critical and fundamental components of any managed lane project is the ability for a state or local jurisdiction to legally operate a roadway using a specific managed lane operational strategy. State departments of transportation, including TxDOT, receive authorization regarding the operation of federal-aid highways from the United States government. Once the states receive this federal authorization, each state must establish authorization within its specific legal structure. In Texas, the state legislature passes laws which authorize the Texas Transportation Commission to operate federal-aid and all other state roadways in accordance with the statutes.

During the course of this task, researchers compiled a summary of all legislation in existence at the federal and Texas state level that has an impact on the legality of the various operational strategies for managed lanes. The operational strategies addressed include HOV lanes, value-priced and HOT lanes, exclusive lanes, separation and bypass lanes, dual facilities, and lane restrictions. The researchers also addressed violations, enforcement, and operational flexibility. The following sections provide a brief description of each managed lane operational strategy and a discussion of the federal and state laws that authorize and govern its operation.

HOV LANES

An HOV lane is an exclusive traffic lane or facility limited to carrying HOVs and certain other qualified vehicles. Simply put, HOV lanes are separate lanes that are restricted to vehicles with a specified occupancy and may include carpools, vanpools, and buses (2). HOV lanes can operate on either arterials or freeways and, when implemented on freeways, can be one of three types of facilities—separated roadway, concurrent-flow lanes, and contraflow lanes (3). Additionally, the separated roadway facility may be either a two-way facility or a reversible-flow facility.

Federal Law

Various federal codes, guidelines, and legislation authorize the creation and operation of HOV lanes, including Title 23 of the United States Code (4), which defines carpool projects and gives passenger requirements for vehicles operating on HOV lanes (5). Specific policy regarding carpool projects is also included in Title 23 of the Code of Federal Regulation (6). Furthermore, the United States Department of Transportation (USDOT), Federal Highway Administration provides guidance to states on the Federal-Aid Highway Program as it pertains to HOV lanes (7). This document provides states with background information, the federal policy position regarding HOV lanes, and conditions under which proposed operational changes to existing HOV lanes are subject to federal review. Other relevant legislation includes the National Environmental Policy Act (NEPA) (8) and the Clean Air Act (9).

State Law

The State of Texas provides the Texas Transportation Commission the authority to designate and TxDOT the authority to design, construct, operate, or maintain dedicated HOV lanes on any multi-lane highway on the state highway system (10). This statute also allows vehicles displaying the “low-emissions vehicle” insignia, thereby designating them as an inherently low-emission vehicle (ILEV), to use the HOV lane regardless of the number of occupants (11). The objective of providing this authority is to help relieve traffic congestion.

VALUE-PRICED LANES AND HOT LANES

Within the transportation community, a commonly agreed-upon definition of a HOT lane is an HOV lane that allows vehicles with lower occupancy to have access to the lane by paying a toll. Variations of HOT lanes are value-price, value express, and fast and intertwined regular (FAIR) lanes, which may or may not be occupancy driven depending on the region or state. For example, value express lanes, as proposed by the Colorado DOT, are similar to HOT lanes (12). In most cases, value lanes and FAIR lanes are toll lanes. However, some jurisdictions use these terms to describe strategies similar to a HOT lane. The idea behind HOT lanes is to improve the HOV lane utilization and sell unused lane capacity (2).

Federal Law

ISTEA specifically authorized the creation of up to five congestion pricing pilot programs, no more than three of which could implement tolls on the interstate system (13). TEA-21 modified and enhanced the congestion pricing program in several ways, including the renaming of the program to value pricing, increasing the number of projects to 15, and allowing tolling on any of the programs established under this act (14). TEA-21 also established the Interstate System Reconstruction and Rehabilitation Pilot Program, which authorizes states to collect tolls on an interstate facility for the purposes of reconstructing or rehabilitating that corridor if it could otherwise not be maintained or improved (15). However this program is limited to three projects, each located in a different state.

State Law

Texas statutes authorize TxDOT to charge a toll for the use of one or more lanes of a state highway facility, including an HOV lane (16). Therefore, TxDOT is able to participate in the federal value-pricing program, which it has done with the HOT lane pilot programs on the Katy (IH-10) and Northwest (US 290) Freeways in Houston.

EXCLUSIVE LANES

The operational strategy of exclusive lanes provides certain vehicles, usually designated by vehicle type, an exclusive operational lane. The most common types of vehicles designated for this strategy are buses and large trucks. Buses often have exclusive lanes to provide an incentive for riders by decreasing delay, whereas trucks are separated in an attempt to increase safety and reduce conflicts by the physical separation of truck traffic from passenger car traffic. The maximum operating volumes for exclusive lanes varies depending on the vehicles operating on the facility and the design of that facility. The critical factor is to ensure that the desired level of service is maintained (17).

Federal Law

Any exclusive facility designated for buses falls under the jurisdiction of the laws governing HOV lanes and related transit facilities. Regarding exclusive facilities for trucks, regulations at the federal level specify only that no state may deny reasonable access to heavy vehicles either to or from any facility on the Interstate Highway System (18).

State Law

As with the federal law, any exclusive facility designated for buses in Texas would fall under those laws governing HOV lanes or transit. Regarding exclusive facilities for trucks, Texas has no specific statutes that give TxDOT the authority to establish exclusive truck lanes or facilities for the purposes of alleviating congestion, require trucks to use them, or exclude passenger cars from such lanes or facilities. However, given the potential benefits of such facilities, the researchers recommend providing TxDOT with the authority to create truck-exclusive facilities for the purposes of congestion mitigation.

SEPARATION AND BYPASS LANES

The separation or bypass lane is a treatment for a specific section or segment of roadway. Several areas have successfully used this management strategy, which often addresses a roadway segment that has the following characteristics: weaving area, a significant grade, high percentage of truck traffic, and/or congestion. Some areas have implemented bypass lanes at entrance ramps for transit or HOVs. The concept is that these vehicles receive preferential treatment and may bypass a queue to enter the freeway. Other treatments include the use of truck bypass lanes near high-volume interchanges to physically separate trucks from other traffic and to facilitate weaving maneuvers in the interchange proper.

Federal Law

As with exclusive facilities, any separation or bypass facility designated for HOVs, buses, trucks, or other special-use groups would fall under the jurisdiction of the aforementioned laws governing their operation.

State Law

As with the federal law, any separation or bypass facility designated for buses or HOVs in Texas would fall under those laws governing HOV lanes. Once again, Texas has no specific statutes that would govern the establishment of separation or bypass facilities for trucks. However, the legislation recommended in the previous [section](#) for the creation of exclusive lanes would be appropriate support for separation and bypass lanes.

DUAL FACILITIES

Dual facilities are managed lane strategies that have physically separated inner and outer roadways in each direction. The inner roadway is reserved for light vehicles, cars only, or other specially designated user groups, while the outer roadway is open to all vehicles. For example, the New Jersey Turnpike has a 35-mile segment that consists of interior (passenger car) lanes and exterior (truck/bus/car) lanes within the same right-of-way. For 23 miles, the interior and exterior roadways have three lanes in each direction. On the 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 12-ft lanes and shoulders, and the inner and outer roadways are barrier separated.

Federal Law

Any managed lane facility using the dual operational concept falls under the jurisdiction of the federal laws governing the specific strategies used, such as HOV, HOT, trucks, etc.

State Law

As with the federal laws, any managed lane facility using the dual operational concept in Texas falls under the jurisdiction of the state laws governing the specific strategies used by the operating entity. Therefore, any specific legislation regarding dual facilities is not necessary.

LANE RESTRICTIONS

Lane restrictions are a management strategy that limits certain types of vehicles to specified lanes. The most common type of lane restriction addresses truck traffic. 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 effects, have implemented truck lane restrictions.

Federal Law

At the federal level, the regulation noted under exclusive facilities applies to lane restrictions in that no state may deny reasonable access to heavy vehicles either to or from any facility on the Interstate Highway System (18).

State Law

Texas has no specific statutes that would allow the state to establish lane restrictions for reasons other than when a heavy vehicle might cause damage to the highway or road (19, 20) or on specific holidays (21). However, municipalities are allowed to restrict heavy vehicles to two designated lanes on a highway with three or more lanes, within the municipality, so long as it is only during peak traffic hours (22).

MANAGED LANE VIOLATION

To date, no state legislation exists that specifically prohibits unauthorized use of managed lane facilities per se, with the exception of legislation regarding the failure or refusal to pay toll charges on a HOT lane facility (23). Legislation regarding violations in the use of such facilities is traditionally enacted at the county or local level. For example, in Houston, Metropolitan Transit Authority of Harris County (METRO) enforces the HOV lanes within the city limits under a City of Houston Ordinance (24). Where the HOV lane system operates beyond the city limits, officers ticket violators for disregarding official traffic control devices regulating vehicle occupancy within the HOV lane. Enforcement of the HOT lane restrictions is handled in a similar manner. Similar arrangements exist in other cities across Texas.

With traditional tolled facilities, regulations are in place regarding failure to pay a toll. While the Texas Turnpike Authority (TTA) currently does not operate a toll road, it has the power to prosecute violators under the law (25). Regional mobility authorities have the power in Section 361.003 of the Texas Transportation Code to construct, maintain, and operate turnpike projects in a region within Texas (26). The code grants regional mobility authorities the same powers as the Texas Turnpike Authority, including that of prosecuting violators. Furthermore, in Dallas, the North Texas Tollway Authority (NTTA) enforces its facilities under state regulations governing regional tollway authorities and failure or refusal to pay tolls (27). Likewise, the Harris County Toll Road Authority (HCTRA) in Houston enforces the toll facilities under state laws addressing non-payment of tolls on turnpikes in specific counties (28).

ENFORCEMENT

Enforcement of managed lanes, like the enforcement of all traffic laws, is handled through a combination of state regulations and local ordinances, so long as those laws do not conflict with any federal regulations governing the operation of federal-aid highways. For example, in Texas, the Texas Highway Patrol, part of the Traffic Law Enforcement Division of the Department of Public Safety (DPS), is responsible for “patrolling and supervising more than 200,000 miles of rural highways in Texas” (29). The authority of the DPS is granted through the Texas Government Code. The agency is empowered to enforce the laws protecting the public safety, and state troopers are charged with the duties of enforcing the traffic laws on rural Texas highways (30). Furthermore, TxDOT is directed to cooperate with and assist the DPS in the “enforcement of state laws concerning public safety” (31).

At the county level, the state empowers county peace officers to “enforce state laws that regulate the operation of a motor vehicle on a highway, street, or alley” (32). Therefore, these officers have the power to enforce any state law governing managed lanes within their jurisdictions.

Municipalities in Texas have the necessary powers to enforce traffic laws as well. For example, peace officers in municipalities are empowered by the Texas Local Government Code (33) and have the powers and jurisdiction granted to a peace officer by the Code of Criminal

Procedure (34). Moreover, TxDOT can enter into agreements with municipalities to give them the authority to “provide for the location, relocation, improvement, control, supervision, and regulation of a designated state highway in the municipality” (35).

Other entities with the power to enforce traffic-related laws include transit authorities, regional mobility authorities, and tollway authorities. In Texas, various chapters of the Texas Transportation Code governs transit authorities (36, 37, 38, 39, 40). Under these codes, certain transit authorities are allowed to commission and hire peace officers, who are responsible for enforcing traffic laws and investigating traffic incidents that occur in the transit authority system (41, 42). Additionally, if a transit authority serves an area in which the principal municipality has more than 1.5 million residents, sworn peace officers of the authority have all the “powers, privileges, and immunities of peace officers in the counties in which the transit authority system is located, provides services, or is supported by a general sales and use tax” (43). However, it is important to note that the municipalities in which transit peace officers have this authority do not typically rely on the transit peace officers for all primary control on state highways within the municipal boundaries.

Toll authorities – including the TTA (44), regional tollway authorities (45), and county authorities (46) – enforce operations depending on their type of authority. For example, NTTA contracts with the Department of Public Safety for enforcement while HCTRA has county law enforcement personnel enforce its facilities. In both cases, enforcement of these toll facilities may be handled electronically through the use of technologies that photograph the license plates of violators, thereby fining the owner of the vehicle for violating the applicable state law governing the failure to pay tolls on specific facilities. Beyond this measure, automated enforcement is not addressed at the state level.

Automated or remote enforcement for moving violations, separate from managed lane violations, may also be a viable option for agencies. Various technologies might be used to help detect and help cite violators such as vehicles towing trailers, speeding, crossing buffers, or other violations. In such cases, appropriate authority would need to be put into place to allow law enforcement agencies to enforce in this manner.

OPERATIONAL CHANGES

Over time, an operating agency may need to change the operational strategy of a managed lane facility to better meet the changing needs of the region. The FHWA has guidelines for the operation of HOV lanes, specifically when federal actions might be needed if a “proposed significant operational change can be reasonably expected to affect a specific HOV lane or portions of the regional HOV system, which were funded or approved by FHWA” (7). Texas has no specific regulations regarding operational changes to any type of managed lane facility, though changes to existing HOV facilities would have to follow federal guidelines as noted above.

CHAPTER 4: LEGISLATION NEEDS

OVERVIEW

Once the researchers assembled the existing legislation, they assessed those laws and statutes to identify legislation necessary to facilitate managed lane operational strategies in Texas. In some instances, the existing legislation meets the needs of TxDOT and other appropriate agencies (e.g., county, municipality, transit authority), and no changes are necessary. In other instances, the researchers identified gaps in the legal code or statutes that, when filled, can provide TxDOT and the other agencies with the authorization to operate the complete gamut of managed lanes scenarios while providing flexibility for operational changes as deemed necessary by the department.

Once the research team identified the legislative needs, they developed sample legislation to be used by TxDOT in advancing managed lanes issues at both the federal and state level. In some cases, only minor changes to existing legislation were necessary. In other cases, researchers drafted entirely new sections to address major gaps in the laws. The report also addresses additional recommendations regarding some legal issues. The following sections discuss in detail the recommended changes to federal and state legislation.

FEDERAL LEGISLATION NEEDS

The legislation currently in place at the national level is sufficient to enable TxDOT to establish all types of managed lane facilities discussed herein on the Interstate Highway System in Texas, on state and county highways, and on local streets. Regulations regarding operational changes are also in place to guide TxDOT in the creation and long-term operation of such facilities. However, as noted in the discussion regarding value-priced lanes and HOT lanes and tolling to finance reconstruction or improvements, these facilities are only possible through limited pilot programs established by ISTEA and TEA-21. For this operational strategy to become a widespread feature of HOV lanes in the United States, support for a larger and more permanent program needs to be provided at the federal level. Thus, the research team recommends changes to federal legislation that would facilitate such a program.

Recommendations are to change the wording of ISTEA, as amended by TEA-21, by (1) removing the word “pilot” from the value-pricing program and by (2) removing the limit of 15 on eligible programs. Additional recommendations are to modify the Interstate System Reconstruction and Rehabilitation Pilot Program established by TEA-21 to (1) remove the word “pilot” from the program and (2) remove the limit of three projects.

STATE LEGISLATION NEEDS

Legislation currently in place in Texas, as discussed in the previous [chapter](#), provides for the operation of certain managed lanes scenarios. However, in some instances, the legislation is limited or non-existent. [Table 1](#) provides a summary of the various changes recommended by the research team. The following sections provide a detailed discussion of each type of managed lane operational scenario and the reasons behind any recommended changes to legislation related to that scenario. While the changes recommended are not numerous, they are critical to the long-term success of managed lanes in Texas.

Contractual Agreements

TxDOT is currently limited in its ability to enter into contractual agreements with other types of agencies. The researchers recommend that legislation be developed to provide TxDOT with the authority to enter into contractual agreements with appropriate transportation-related agencies for the design, operation, and/or maintenance of transportation facilities, particularly managed lane facilities. Such legislation would provide TxDOT the flexibility to efficiently and effectively develop managed lanes facilities through cooperation with other agencies across the state.

Managed Lanes

Texas legislation provides TxDOT with sufficient authority to design, construct, operate, or maintain dedicated HOV lanes on any multi-lane highway on the state highway system. The objective of providing this authority is to help relieve traffic congestion, as it is located under Subchapter F entitled Congestion Mitigation Projects and Facilities. Currently, this legislation only defines and authorizes HOV lanes and value-priced lanes. Since managed lanes encompass

these two operational strategies but can include more, the research team recommends that the term “managed lanes” be defined in the legislation and incorporated into the authorization of congestion mitigation projects and facilities.

HOV Lanes

A point of concern in the current legislation is allowing ILEVs to use HOV lanes. This Texas authorization follows that provided at the federal level in TEA-21, with ILEVs being those vehicles certified in Title 40, Code of Federal Regulations (47). Since the number of ILEVs currently in operation in the United States and Texas is extremely small, their impact on HOV systems is virtually undetectable. However, it is reasonable to expect that the number of ILEVs will grow steadily as more vehicle manufacturers design them and offer them for purchase. Thus, Texas may need to revisit this legislation in the future to ensure that the use of HOV lanes by single-occupant ILEVs does not adversely impact the operations of the HOV facility.

Value-Priced Lanes and HOT Lanes

The current legislation in place in Texas is sufficient regarding value-priced lanes or HOT lanes. Texas statutes already authorize TxDOT to charge a toll for the use of one or more lanes of a state highway facility, including an HOV lane, thereby permitting TxDOT to participate in the federal value-pricing program, of which it has taken advantage (16). Any future value-priced lanes or HOT lanes implemented within Texas can operate without further changes to the Texas statutes.

Exclusive Lanes

Until recently, very few truly exclusive facilities existed in the United States, and many of those facilities actually restricted trucks and/or buses to specified lanes and allowed other vehicles to use any lane (48). In recent years, a number of truly exclusive busways have been implemented in various metropolitan areas, often as a cost-effective alternative to either subways or light rail. The advantages of this alternative are flexibility, self-enforcement, incremental development, low construction costs, and implementation speed. As discussed previously, TxDOT currently has the authority to establish HOV lanes on a multi-lane facility on the state

Table 1. Recommended Texas Legislation Changes.

Managed Lane Category	Operational Scenario	Principal Governing State Regulation	Changes Recommended
Contractual Agreements	All		Yes✓
Managed Lanes	All		Yes✓
HOV	All	Sec. 224.153(c) TTC ¹	Yes✓
Value-Priced / HOT		Sec. 224.154(a) TTC	No
Exclusive	Busway	Sec. 224.153(a) TTC	No
	Truck	N/A	Yes✓
Separation / Bypass	Busway	Sec. 224.153(a) TTC	No
	Truck	N/A	Yes✓
Dual Facilities		Encompasses various statutes depending on the operational strategy	No
Lane Restrictions	State	Sec. 201.901(a) TTC Sec. 621.006 TTC	Yes✓
	County	Sec. 251.157(b) TTC	No
	Municipality	Sec. 545.0651 TTC	Yes✓
Managed Lane Violation	State	Sec. 224.155 TTC	Yes✓
	County	Sec. 701.003(a)(3) TTC	No
	Municipality	Sec. 221.002 TTC	No
	Transit Authority	Varies	No
	Tollway Authority	Sec. 366.178 TTC Sec. 284.070 TTC	No
Enforcement	State	Sec. 411.002(a) TGC ²	Yes✓
	County	Sec. 701.003(a)(3) TTC	No
	Municipality	Sec. 341.001(e)(1) TLGC ³	No
	Transit Authority	Sec. 451.108(b)(3) TTC Sec. 451.108(c) TTC	No
	Tollway Authority	Sec. 366.178 TTC Sec. 284.070 TTC	No
Operational Changes		N/A	Yes✓

¹ Texas Transportation Code

² Texas Government Code

³ Texas Local Government Code

highway system as well as create facilities to help alleviate traffic congestion (10, 49).

Therefore, any exclusive facility designated for buses would fall under these existing laws.

The issue of increasing truck traffic is of 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 that matter most to the driver are speed of travel, safety, comfort, and convenience. As a result of increasing demand on highways, many transportation agencies have implemented a variety of strategies or countermeasures for trucks in an attempt to mitigate the effects of increasing truck traffic, including exclusive truck lanes. Feasibility studies regarding restrictions and exclusive lanes found that exclusive barrier-separated facilities were most plausible for congested highways where three factors exist: truck volumes exceed 30 percent of the vehicle mix, peak-hour volumes exceed 1800 vehicles per lane-hour, and off-peak volumes exceed 1200 vehicles per lane-hour (50).

Theoretically, truck facilities could have positive impacts on noise and air pollution, fuel consumption, and other environmental issues. Creating and maintaining an uninterrupted flow condition for diesel-powered trucks will result in a reduction of emissions and fuel consumption when compared to congested, stop-and-go conditions. However, the creation of a truck facility may also shift truck traffic from more congested parallel roadways, thereby shifting the environmental impacts. There may also be increases in non-truck traffic on automobile lanes due to latent demand. Feasibility studies for exclusive truck lanes have also been conducted in Virginia, California, the United Kingdom, and the Netherlands. However, to date, none of the proposed exclusive facilities have been implemented (51).

At this time, Texas has no specific statutes that give TxDOT the authority to establish exclusive truck lanes or facilities for the purposes of alleviating congestion, require trucks to use them, or exclude passenger cars from such lanes or facilities. However, given the potential benefits of such facilities, the researchers recommend providing TxDOT with the authority to create truck-exclusive facilities for the purposes of congestion mitigation.

Separation and Bypass Lanes

Separation and bypass lanes have the potential to improve freeway operations where weaving is a problem. Operationally, weaving areas are of concern because the “crossing” of vehicles creates turbulence in the traffic streams. Trucks and buses limit the visibility and maneuverability of 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 crashes, rear-end collisions, and side collisions. Some studies have shown that this problem may be magnified

when a differential speed limit is present (52, 53). Thus, certain sections of highways in the urban area could benefit from the implementation of separation and bypass lanes, which provide priority to select user groups (i.e., trucks, buses, HOVs) and allow them to bypass congested areas, thereby reducing their impact on the traffic stream. Any separation or bypass facility designated for buses or HOVs in Texas would fall under those laws governing HOV lanes. Once again, Texas has no specific statutes that would govern the establishment of separation or bypass facilities for trucks. However, the legislation recommended in the previous section for the creation of exclusive lanes would be appropriate support for separation and bypass lanes.

Dual Facilities

Any managed lane facility using the dual operational concept in Texas falls under the jurisdiction of the state laws governing the specific strategies used by the operating entity. Therefore, any specific legislation regarding dual facilities is not necessary.

Lane Restrictions

Lane restrictions are a management strategy that limits certain types of vehicles to specified lanes. The most common type of lane restriction addresses truck traffic. 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 effects, have implemented truck lane restrictions or have designated exclusive truck lane facilities. In 1986, the Federal Highway Administration asked its division offices to conduct a survey and report 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 (eight states),
- pavement structural considerations (seven states), and
- restrictions in construction zones (seven states) (54).

Agencies must consider a number of operational considerations when implementing this type of managed lane strategy. 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, and trucks have lower rates of deceleration and acceleration (55). 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, studies concerning the effect of trucks on highway operations have also increased (56).

In an effort to improve truck safety on Houston freeways, the City of Houston decided to conduct a demonstration project restricting trucks from traveling in the left lane in 1999. TxDOT and TTI developed the demonstration project, which consisted of an 8-mile section of IH-10 East Freeway between Waco and Uvalde Streets. The criteria for site selection included the requirements that the site be a radial freeway section within the city limits of Houston, the minimum length of the section be 6 miles, and the truck volume be at least 4 percent (57). TTI researchers monitored and evaluated the restriction for the duration of the demonstration project. In September 2001, the TTI research team published a report outlining and describing the monitoring, evaluation, and findings of the study. The research team monitored the following areas: compliance, enforcement, crash records, freeway operations, public perception, and status of the project. The team reported that compliance rates for the restriction were between 70 and 90 percent. The team also found that vehicle crash rates were reduced during the 36-week monitoring period, although several factors including increased enforcement may have contributed to that reduction. Traffic studies conducted during the evaluation revealed that there was no significant impact on freeway operations, travel time, frequency of lane changes, or traffic patterns. Public opinion was extremely positive with 90 percent of automobile users in favor of the restriction (57).

Currently, only municipalities in Texas have the authority to establish lane restrictions based on vehicle class, and then only during the peak periods of the workday (22). Requiring TxDOT to rely on the implementation of this managed lane strategy only at the municipal level, and only during peak travel periods during the workday, reduces the potential benefits of this

treatment. Thus, given these promising results and the common practices of other states, the researchers recommend that TxDOT be authorized to establish lane restrictions for the purpose of relieving congestion, so long as the restrictions do not violate federal regulations. Moreover, the peak-period restrictions should be removed to allow full-time restrictions.

Managed Lane Violation

Currently, sufficient legislation and legal channels exist with which operating authorities can issue citations for managed lane violations. Depending on the operating strategy in place, managed lane violators can receive citations for violating state statutes, county laws, or municipal ordinances. However, no single law covers all operating strategies on a statewide level. Thus, to remain consistent with the recommendation that “managed lanes” be incorporated into the authorization of congestion mitigation projects and facilities, the research team recommends drafting Texas legislation that addresses the violation of any managed lane facility in operation in Texas. Such a provision is recommended to ensure that all managed lane strategies become widespread across Texas.

Enforcement

As discussed previously, legislation in Texas sufficiently addresses the need for managed lane enforcement. The current state, county, municipal, and toll authorities have adequate jurisdiction to employ or contract with law enforcement personnel to enforce appropriate state, county, or municipal laws governing the unlawful use of their respective managed lane facilities, including the draft legislation provided for the statewide violation of managed lanes. Therefore, any current or future managed lane project can be enforced with the current code and without further changes to the Texas statutes. However, it is important to note that an operating entity must ensure that the appropriate county or local laws are in place prior to operation.

Automated enforcement is a controversial issue in the United States. The most common application of this enforcement technique is at signalized intersections, but it has yet to become mainstream in the arena of managed lanes. For tolling purposes, automated enforcement is feasible since the presence or lack of a transponder or failure to pay is easy to detect. However, any managed lane facility that has vehicle occupancy as an operational strategy presents unique

enforcement challenges that cannot be readily resolved with current automated technology. However, it is anticipated that technologies will advance in the future to overcome these challenges. Also, automated or remote enforcement for moving violations, separate from managed lane violations, may also be a viable option for agencies. In this case, the enforcement may require visual confirmation by personnel, and the technologies required may vary depending on the type of moving violation the agency wishes to enforce.

In all cases involving automated enforcement, legislative action may be necessary to decriminalize the violation of managed lane facilities to authorize the use of such technologies in the future (58). The research team also recommends that a provision be added to the statutes that allows agencies to modify enforcement procedures and laws to accommodate new technological advancements as they become available.

Operational Changes

An important feature of managed lanes is the flexibility to change the operational strategy of the facility to better meet the goals of the region it serves. This feature allows the operating entity to adapt the facility to maximize the benefits to its users and the impact on the transportation system as a whole. Therefore, the researchers recommend that TxDOT have the authorization to make operational changes when deemed appropriate.

CHAPTER 5: FINAL REMARKS

The managed lane concept is currently being considered on major freeway projects in Texas cities. The term “managed lanes” encompasses a variety of facility types, including high-occupancy vehicle lanes, high-occupancy toll lanes, single-occupancy vehicle express lanes, special-use lanes, and truck lanes. The premise of the managed lanes concept is to increase freeway efficiency and provide free-flow operations for certain freeway users by packaging various operational and design strategies. The strategies deployed offer the flexibility to adjust operations to match changing corridor and regional goals. As discussed in detail, numerous federal and state laws govern the operations of these facilities in Texas. However, some gaps exist that prevent TxDOT and other operational agencies from having the complete arsenal of options available to design, operate, and enforce managed lanes under a variety of control scenarios and make operational and eligibility changes over time as conditions change. At the federal level, FHWA fails to provide permanence to HOT lanes. At the state level, several gaps exist. The researchers recommend the following changes to remedy these gaps:

- allow TxDOT the authority to enter into contractual agreements with other transportation-related agencies for the design, operation, and/or maintenance of managed lane facilities;
- define managed lanes as an operational concept in Texas and authorize entities to develop these facilities for congestion mitigation purposes;
- allow entities operational flexibility with managed lane facilities;
- specifically allow ILEVs to operate on HOV lanes;
- authorize entities to develop exclusive lane facilities for congestion mitigation purposes;
- authorize TxDOT to establish lane restrictions for congestion mitigation purposes and remove the time-of-day limitation on the current municipal authorization for this strategy;

- make unlawful the violation of any managed lane facility in Texas punishable by fine;
and
- allow law enforcement agencies to modify enforcement procedures and laws to accommodate new technological advancements as they become available.

Incorporating these recommended changes into the Texas statutes broadens the powers of TxDOT and other transportation organizations and provides them with the tools they need to successfully implement managed lane facilities in their jurisdictions in the most effective manner, thereby working to reduce congestion and enhance the mobility of Texans.

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