Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-03/4160-3		

4. Title and Subtitle	5. Report Date
MEETING SUMMARY: 2002 ANNUAL PROJECT MONITORING COMMITTEE WORKSHOP	November 2002
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Edward Owens and Carol Lewis	Report 4160-3

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Texas Southern University – Center for Transportation Training and Research 3100 Cleburne Avenue Houston, TX 77004	11. Contract or Grant No. Project No. 0-4160

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Texas Department of Transportation Research and Technology Implementation Office P. O. Box 5080 Austin Texas 78763-5080	Research: September 2002 – August 2002
	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 Project Title: Operating Freeways with Managed Lanes

16. Abstract

The Annual Project Monitoring Committee Workshop for Texas Department of Transportation (TxDOT) Research Project 0-4160 – Operating Freeways with Managed Lanes – was held in Austin, Texas, on September 23, 2002. The purpose of the workshop was for the project team to give an annual status report on project progress and to gain consensus of attendees regarding the direction of the project for the upcoming year. The key agenda items included a review of second year activities, updates of three specific tasks by task leaders, an update on managed lanes facilities in various cities across the United States, and an overview of those activities planned for the third year. A project monitoring committee meeting will occur at the end of each year of the research project.

17. Key Words	18. Distribution Statement
Managed Lanes, HOV, HOT Lanes	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	28	

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

MEETING SUMMARY: 2002 ANNUAL PROJECT MONITORING COMMITTEE WORKSHOP

by

Edward Owens
Research Associate
Center for Transportation Training and Research

and

Carol Lewis, Ph.D.
Director
Center for Transportation Training and Research

Report 4160-3
Project Number 0-4160
Research Project Title: Operating Freeways with Managed Lanes

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

November 2002

Center for Transportation Training and Research
Texas Southern University
Houston, Texas 77004

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. The contents do not necessarily reflect the official view or policies of the Federal Highway Administration (FHWA) or the Texas Department of Transportation (TxDOT). 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.

ACKNOWLEDGMENTS

Special thanks are extended to TxDOT and FHWA for support of this research project. The researchers also acknowledge the following members of the project monitoring committee, both past and present, for their leadership, time, efforts, and contributions:

Program Coordinator

- Gary K. Trietsch, P.E., Houston District, TxDOT

Project Director

- Carlos Lopez, P.E., Traffic Operations Division, TxDOT

Current Technical Panel

- Ken Bohuslav, P.E., Design Division, TxDOT
- Chuck Berry, P.E., El Paso District, TxDOT
- Maribel Chavez, P.E., Fort Worth District, TxDOT
- Bill Garbade, P.E., Austin District, TxDOT
- Clint Jumper, P.E., Traffic Operations Division, TxDOT
- John Kelly, P.E., San Antonio District, TxDOT
- James Kratz, P.E., Traffic Operations Division, TxDOT
- Jay Nelson, P.E., Dallas District, TxDOT
- Mary Owen, P.E., Tyler District, TxDOT
- Jim Randall, P.E., Transportation Planning and Programming Division, TxDOT
- Carol Rawson, P.E., Traffic Operations Division, TxDOT
- Phil Russell, P.E., Texas Turnpike Authority, TxDOT
- Amadeo Saenz, P.E., Assistant Executive Director for Engineering Operations, TxDOT
- Richard Skopik, P.E., Waco District, TxDOT

Previous Technical Panel Members

- Mike Behrens, P.E., Executive Director, TxDOT
- Alvin Luedecke, Jr., P.E., Transportation Planning and Programming Division, TxDOT (Retired)
- Steven Simmons, P.E., Deputy Executive Director, TxDOT
- Robert Wilson, P.E., Design Division, TxDOT (Retired)

TABLE OF CONTENTS

Page

Meeting Summary **1**
Overview 1
Introductory Remarks 1
Review of Year TWO Activities 2
Task Updates 3
Task 5. Managed Lanes Modeling – Beverly Kuhn, Texas Transportation Institute 3
Task 6. Decision Matrix – Ginger Daniels Goodin, Texas Transportation Institute 4
Task 7. State and Federal Legislation – Beverly Kuhn, Texas Transportation Institute 5
Task 8. Concept Marketing – Ginger Daniels Goodin, Texas Transportation Institute 5
Task 9. Funding and Financing – Tina Collier, Texas Transportation Institute 6
Task 10. Operational Effects of Geometric Design – Kay Fitzpatrick, Texas Transportation Institute 7
Task 11. Enforcement – Beverly Kuhn, Texas Transportation Institute 8
Task 12. AASHTO Guides Revision Support – Beverly Kuhn, Texas Transportation Institute 9
Highlights of Managed LaneS Projects in the United States 9
SR-91 Express Lanes, Orange County, California 9
IH-15 FasTrak, San Diego, California 10
IH-5 and IH-90 Express Lanes, Seattle, Washington 10
New Jersey Turnpike 10
Overview of Year THREE Planned Activities 11
Group Discussion – Priorities for Year THREE 11
Appendix A: Meeting Agenda **13**
Appendix B: Meeting Attendees **17**

MEETING SUMMARY

OVERVIEW

The Annual Project Monitoring Committee Workshop for Texas Department of Transportation (TxDOT) Research Project 0-4160 – Operating Freeways with Managed Lanes – was held in Austin, Texas, on September 23, 2002. Twenty-four people attended, representing TxDOT and the two project team organizations, Texas Transportation Institute (TTI) with the Texas A&M University System, and the Center for Transportation Training and Research (CTTR) with Texas Southern University.

The purpose of the workshop was for the project team to give an annual status report on project progress and to gain consensus of the committee regarding the direction of the project for the upcoming year. The key agenda items included a review of second year activities, updates of three specific tasks by task leaders, an update on managed lanes facilities in various cities across the United States, and an overview of those activities planned for the third year (Appendix A). A project monitoring committee meeting will occur at the end of each year of the research project.

This report presents a summary of the meeting. Appendix B contains a list of workshop attendees.

INTRODUCTORY REMARKS

Carlos Lopez, P.E., director of traffic operations, TxDOT, provided the opening remarks to begin the annual review meeting. He stated that the purpose of the meeting was to provide an annual project review update and report status, which concludes two years of research activities. Further, this project involves cutting-edge research that is being discussed around the country. Lopez complimented the success of the previous two years of activities and welcomed the attendees to the annual meeting.

REVIEW OF YEAR TWO ACTIVITIES

Beverly Kuhn, co-research supervisor for the project, began the meeting by providing a definition of managed lanes as provided by the monitoring committee. This definition states that a managed lane is, "[A] facility that increases freeway efficiency by packaging various operational and design actions. Lane management operations may be adjusted at any time to better match regional goals." This definition is broad and is the official definition of managed lanes used within TxDOT. Further, managed lanes include a lane or group of lanes with a combination of operating and design strategies that are designed for flexibility so that service options can be modified over time. Transportation agencies may select service strategies or options based on their desire to maximize person-moving capacity, optimize vehicle-carrying capacity, provide travel options and increase flexibility, and/or to achieve corridor and community goals.

Kuhn then discussed the various operational goals of a managed lanes facility as well as the operational strategies that are options for transportation agencies. By emphasizing the specific user groups, period-based options, pricing, physical control, and operational control, Kuhn highlighted the managed lanes strategies. Kuhn also provided examples of typical facilities such as express lanes, high-occupancy vehicle (HOV) lanes, high-occupancy/toll (HOT) lanes, value priced lanes, separation or bypass lanes, and dual facilities. Kuhn then discussed the various user groups for each of these facilities.

Kuhn reviewed the vision of the research project, its purpose, and its objectives. The project objectives involved the desire to design flexibility and to create a comprehensive manual to assist TxDOT with making informed decisions regarding managed lanes projects. The purpose and objectives work to provide a better understanding of how managed lanes can improve mobility for people and freight.

Next, Kuhn briefly summarized the tasks undertaken by the research team during the first two years of the project. Key first year tasks included the state-of-the-practice literature review and the Managed Lanes Symposium held in Austin in 2001. Kuhn also mentioned that the research team has almost completed its support of the development of the American Association of State Highway and Transportation Officials (AASHTO) Guide and Revisions for Park and Rides. Year two tasks included development of a website (http://managed-lanes.tamu.edu) and the publication of a quarterly newsletter, *FastLane*. Kuhn also discussed the establishment of an

external stakeholder committee, whose first meeting was to be held the following day. The intent of the committee is to gather input to ensure that the needs and issues of these stakeholders are addressed. The committee's members represent various agencies, including municipalities, transit, metropolitan planning organizations, the Texas Motor Transportation Association, Greyhound, TxDOT, FHWA, the Federal Transit Administration (FTA), toll authorities, and others.

Kuhn also noted that the research team has as a continuing task to coordinate this project with other research projects related to managed lanes. She added that project coordination was needed due to the large number of activities involved, to develop synergy between various projects, and to avoid duplication or work. Those projects requiring coordination include, but are not limited to, the Houston value-pricing project (FHWA), HOV and managed lanes technical assistance and support (FHWA), credit-based value pricing (TxDOT), and TxDOT coordination with toll authorities (TxDOT).

TASK UPDATES

The research team provided an overview of completed tasks and identified the team member responsible for each task.

Task 5. Managed Lanes Modeling – Beverly Kuhn, Texas Transportation Institute

Beverly Kuhn briefly discussed the results of the managed lanes modeling task completed during year one. Steve Venglar with TTI was the task leader. The objective of the task was to investigate the operational impact of managed lanes and various user groups by using computer-modeling. Using the VISSIM simulation model, researchers analyzed weaving areas across freeways. Special consideration was given to managed lanes access and egress and how the user gets to the managed lanes and the ramps. A key finding was that direct ramps to managed lanes facilities should be considered for weaving volumes greater than 350 vehicles per hour. The research also confirmed the literature review findings that weaving distances should be between 500 to 1000 feet per lane. The results of this task, which include recommended minimum weaving lengths for different geometries and expected volume levels, are provided in report FHWA/TX-02/4160-4, *Managed Lanes – Traffic Modeling*, which is under a second review by TxDOT.

Task 6. Decision Matrix – Ginger Daniels Goodin, Texas Transportation Institute

Ginger Daniels Goodin noted that preparation and revision of the decision matrix is an ongoing task that will take place throughout the life of the research project. The purpose of Task 6 is to develop a basic decision-making framework that can be used to document every step in the managed lanes development process and to serve as a foundation for the managed lanes manual. Goodin added that the research findings would feed into this framework, and researchers will be able to identify gaps with it.

Using a flowchart to illustrate her point, Goodin described a conceptual decision process for development of a managed lanes project. The key steps involved are to identify the goals and objectives, to define the characteristics of the corridor, and to identify any policy issues that may arise. This process will lead to a resulting combination of user groups, which will in turn identify operating strategies and design parameters for the managed lanes facility. The selection of possible vehicle user groups will depend on corridor characteristics, project goals and objectives, and policy issues for the area. This research project will provide specific information and guidance for the operational strategies and design parameters.

Using the Colorado value express lanes on IH-25 as an example, Goodin described a sample hierarchy of vehicle user groups based on project objectives. In hierarchical order, these user groups included bus and other transit operations, vanpools and 3+ carpools, 2+ carpools, inherently low emission vehicles (ILEV), and single occupancy vehicles (SOV) as toll-payers. Further, she explained that if revenue generation is an objective, then this should help define the hierarchy and priorities for managed lanes. Goodin then referred to a graphic courtesy of the Colorado Department of Transportation and UrbanTrans Consultants, Inc. that illustrates the life span of a managed lanes facility and its critical operating threshold. She added that the value placed on the hierarchy, number of vehicle lanes, and operating speeds should work to keep the facility operating below its operating threshold. She noted that this process provides a way to plan facility operations over time and determine how to operate the lanes as the facility matures. Goodin concluded by explaining that the next step in this task is to finalize the matrix tables and use them to develop a decision support system that could be integrated into a structure for the managed lanes manual.

Task 7. State and Federal Legislation – Beverly Kuhn, Texas Transportation Institute

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 lanes facilities across the state. Kuhn began the discussion by pointing out that managed lanes have not been officially recognized at the state and federal levels. A key recommendation of the research is that a definition of managed lanes, including a list of types of facilities, be added to legislation along with authorization for transportation entities to develop them within their jurisdictions. At the federal level, it is recommended that the pilot HOT lane program started with the Intermodal Surface Transportation Efficiency Act (ISTEA) in1992 and extended by the Transportation Equity Act of the 21st Century (TEA-21) be made permanent.

Texas legislation needs to allow operational flexibility concerning managed lanes and specific provisions to allow operational changes to be added. Also missing at the state level is the ability for TxDOT to create exclusive facilities and lane restrictions. The current laws only afford municipalities that right. Furthermore, the time-of-day limit on the current municipal law needs to be removed, and the current wording needs to be changed to restrict vehicles *from* rather than *to* specific lanes. A final recommendation is to make the violation of any managed lane facility within Texas punishable by fine. Such measures will provide the necessary tools to help TxDOT and other transportation agencies effectively implement managed lanes facilities within their jurisdictions. Report FHWA/TX-02/4160-8, *State and Federal Issues for Managed Lanes*, which is under initial review by TxDOT, contains the results of this research task.

Task 8. Concept Marketing – Ginger Daniels Goodin, Texas Transportation Institute

Goodin informed the group that Task 8 represented a research approach focusing on appropriate ways to market a managed lanes project. The intent is to identify effective approaches for communicating the concept of managed lanes and for building consensus. With the assistance of a task advisory group, team members researched and documented public perception, communication messages, and techniques for gaining support by looking at 40 operating projects across the country, six of which are already in the planning stages.

Through the research, several common messages emerged that an entity needs to deliver to the public to have a successful managed lanes project. They include the following:

- provide a choice for the commuter;
- explain that a managed lanes facility is a tool;
- show how managed lanes work to improve efficiency;
- provide clear information on facility operations;
- describe how the facility will be enforced;
- identify the use of any revenues gained from the facility; and
- explain how the facility will be funded.

Other key strategies for success are to determine public perception at the project level and gain support through political champions.

The key products out of this task were two position papers for the policy-maker audience, *Managed Lanes: More Efficient Use of the Freeway System*, and for the media audience, *Managed Lanes: A New Concept for Freeway Travel*, both of which are available on the project website. The next step is to develop these position papers into distributable products for the media and the public. Goodin also indicated that the advisory group thought that the research approach was too broad, but she informed them that the intent is to develop only a general level of understanding on a statewide basis. Some of the group comments regarding this topic focused on explaining the position well and on identifying a specific target audience. The complete position papers are included in reports FHWA/TX-02/4160-P1 and FHWA/TX-02/4160-P2, both of which are available on the project website. The full results of the research are documented in report FHWA/TX-02/4160-7, *Marketing the Managed Lanes Concept*, which is under final review by TxDOT.

Task 9. Funding and Financing – Tina Collier, Texas Transportation Institute

Tina Collier indicated that a major issue and challenge for managed lanes is identifying the funding source and obtaining financing. The objectives of this task were to assess the applicability of innovative finance techniques, determine where managed lanes fit in the current funding framework, and to document approaches used to operate managed lanes projects. She explained that the research approach was to formulate an advisory group to help guide the research efforts and to provide input. This group included representatives from several TxDOT divisions and districts, the Texas Turnpike Authority, the North Texas Tollway Authority, the

Harris County Toll Road Authority, FHWA, and private industry. The intent was to research the applicability of funding techniques to the development of a managed lanes project.

Key research findings indicated that of the three types of transportation projects (marketable revenue projects, revenue projects requiring credit assistance, and traditional non-revenue projects), managed lanes projects can span all three categories. Funding sources available are a function of the type of project, be it Transportation Infrastructure Finance and Innovation Act (TIFIA), Section 129 loans, the State Infrastructure Bank (SIB), or Grant Anticipation Revenue Vehicles (GARVEE) bonds. The key to finding the right funding is to match the financing method to the project goals. Agencies should make sure to leverage monies. Finally, the researchers recommended that updates or changes to current laws may be needed to get more (taxable) private financing as well as tax-exempt private financing involved in managed lanes projects. Report FHWA/TX-03/4160-9, *The Funding and Financing of Managed Lanes Projects,* which is under initial review by TxDOT, contains the complete research results of this task.

Task 10. Operational Effects of Geometric Design – Kay Fitzpatrick, Texas Transportation Institute

Kay Fitzpatrick provided a discussion of the key issues involved in this task. She explained it is important to avoid duplication of project 0-4161, which was completed last year. One of the issues addressed in this task is the design of ramps and ramp design speeds. She informed the group that some of the recommendations in this area were developed prior to the publication of the 2001 *A Policy on Geometric Design of Highways and Streets* by the American Association of State Highway and Transportation Officials (AASHTO). She also indicated that Texas has had some comprehensive discussions on ramp design. However, the literature sidesteps some of the freeway-to-ramp issues.

Part of the research involved a number of case studies, which were handled by team members traveling to Chicago, Seattle, and New Jersey to visit managed lanes facilities and meet with agency staff in those cities to discuss design and operational issues. Some key findings were that New Jersey has dedicated ramps for both sections of the dual portion of the New Jersey Turnpike, whereas Texas primarily provides access to HOV facilities differently. New Jersey also has a separate ramp for maintenance purposes that is not accessible by general users. She

also described the Z openings and U openings, which are openings on the facility created for emergency vehicles to provide easy access and egress.

A key component of the research task was a simulation of managed lanes operations and weaving maneuvers along an entire corridor. The intent was to determine where ramp spacing begins to impact operations. Fitzpatrick gave a brief overview of the simulation scenario and highlighted some of the findings to illustrate the issues of relevance regarding weaving volume and freeway speeds as a function of ramp spacing. Key findings addressed when to use a direct connect ramp to a managed lanes facility. The literature indicates that a weaving volume of 400 vehicles per hour trying to access the managed lanes is the point at which an agency needs to consider a direct connect ramp. The research concluded in this task indicated that a weaving volume threshold of 500 vehicles per hour might be appropriate if trying to preserve the average speed on the freeway. Conversely, a weaving volume threshold of 300 vehicles per hour might be used if trying to maintain the speed of the weaving vehicles. Therefore, the researchers recommended a rounded value of 400 vehicles per hour for average freeway conditions and a more conservative weaving volume of 275 vehicles per hour for the lowest speed observed.

The group asked if the researchers had looked at the number of accidents that resulted from the different operating speeds on ramps, as well as the location of those accidents. Fitzpatrick mentioned that the research looked at the crash history of dual-dual section facilities and that information is included in the task report, which is FHWA/TX-03/4160-10, *Managed Lane Ramp and Roadway Design Issues*, and under initial review by TxDOT.

Task 11. Enforcement – Beverly Kuhn, Texas Transportation Institute

Beverly Kuhn gave a brief overview of the results of the enforcement task, which was led by Doug Skowronek with TTI. The objective of the task was to investigate the role of enforcement on managed lanes and identify enforcement strategies for managed lanes facilities, including routine, specific, selected, and self-enforcement. The research undertaken in this task provides a state-of-the-practice in managed lanes enforcement from around the country, including those agencies responsible for enforcement. It also provided enforcement area design guidelines and information on automated enforcement technology. Current automated technologies include automatic vehicle identification (AVI), license plate recognition (LPR), and electronic toll collection (ETC). Currently, there is no technology that can detect vehicle

occupancy, which can limit the use of automated enforcement on some facilities. Report FHWA/TX-03/4160-11, *Enforcement Issues and Managed Lanes*, which is under initial review by TxDOT, contains the results of this research task.

Task 12. AASHTO Guides Revision Support – Beverly Kuhn, Texas Transportation Institute

Beverly Kuhn noted that this task, led by William Eisele at TTI, focuses on facilitating the revision of two AASHTO design guides last published in 1992: *Guide for the Design of High Occupancy Vehicle Facilities* and *Guide for the Design of Park-and-Ride Facilities.* To date, the members of the task force have updated sections of the HOV Guide and TTI staff have edited and organized the material. TTI staff have also updated the park-and-ride guide. Initial drafts are complete, and the task force will meet in October 2002 to finalize recommendations for the documents. The completed documents are expected to be published in 2003.

HIGHLIGHTS OF MANAGED LANES PROJECTS IN THE UNITED STATES

Ginger Daniels Goodin provided highlights of several managed lanes projects operating across the country. The following is a brief summary of her discussion. Virginia was used as an example. She also highlighted a managed lanes project in Orange County, California. She mentioned that there were no equity issues on these facilities. Goodin indicated that people use these facilities when their value of time is high. Another example was San Diego, which uses dynamic pricing that matches pricing units with level of service changes. The money, in this case, goes exclusively to support bus service. Seattle uses both HOV and Express Lanes. The New Jersey Turnpike is an example of a dual-dual roadway facility. Trucks pay a higher toll than other vehicles.

SR-91 Express Lanes, Orange County, California

The managed lanes facility uses differential pricing, vehicle eligibility, and access to manage and control volumes. The facility is 10 miles long with two access points; there is no intermediate access, and trucks are not allowed. Variable pricing is used with higher prices during the peak period. Preferential treatment is provided for HOV with 3+ vehicles and motorcycles, both receiving a 50 percent discount. A private company built and operates the facility, but Orange County Transportation Authority is currently negotiating its purchase of the

facility. During the P.M. peak, the facility operates at 90 percent capacity or higher and uses photo violation enforcement. Express lane users demographically mirror the freeway lane commuters, thereby removing any toll equity issues that might arise. Also, the project is successful in part because of a continuous marketing program undertaken by the owner corporation.

IH-15 FasTrak, San Diego, California

This managed lanes facility uses vehicle eligibility, dynamic pricing, and access to control users. SOV can pay to use the facility while HOV 2+ may travel for free. Dynamic pricing is in effect, with tolls changing as frequently as every six minutes. Demand is partially controlled through access, with only two access points. All tolls are collected electronically. An expansion of the facility is planned that will have four managed lanes in the center of the freeway with an interior moveable barrier that can be used to change the number of managed lanes available in each direction. Bus rapid transit will have direct access ramps, and SOV will continue to be tolled.

IH-5 and IH-90 Express Lanes, Seattle, Washington

Seattle's managed lanes facilities use access and vehicle eligibility to control operations. The lanes are reversible and serve downtown Seattle, providing express service to SOVs, but providing HOVs and transit with designated access points that SOVs cannot use.

New Jersey Turnpike

The turnpike has a variety of management techniques. It is a 148-mile facility with 28 access points (5 mile average spacing); there are 30 miles of dual-dual roadway where the inside roadway has three lanes for passenger cars only and the outside roadway is for other vehicles, mostly trucks. Within a 20-mile section, HOV 3+ vehicles have a designated lane during peak travel periods. All vehicles are tolled, and there is no special pricing for HOVs. Pricing is by vehicle classification by time-of-day, and it is a very complicated structure. Access management is also used to control congestion.

OVERVIEW OF YEAR THREE PLANNED ACTIVITIES

Beverly Kuhn summarized the activities scheduled to take place during the third year of the project. The first task addresses traveler information needs and will be led by Jerry Ullman at TTI. The objectives of this task will be to define and prioritize the information needs and preferences of users and non-users as well as those needs based on design and operational strategy combinations. The task team will also develop and assess traveler information based on experiences from past projects and an information hierarchy. The related task of traffic control devices will be led by Susan Chrysler with TTI. This task will work to identify gaps between existing traffic control devices and information needs. Researchers will survey state and national manuals and practices to assess existing devices and evaluate driver comprehension of candidate signs, pavement markings, and messages as appropriate.

The incident management task will be led by David Fenno with TTI. This task will begin during the last three months of the fiscal year and will assess the specific incident management needs and strategies appropriate for various types of managed lanes facilities. Kevin Balke with TTI will lead the task of working to develop necessary revisions and additions to the TxDOT Traffic Operations Manual as a result of research project results. Finally, Kuhn and Goodin will work to prepare the initial draft of the Managed Lanes Manual based on the decision matrix, background information, and incorporating research results to date. It will serve as the foundation for the final version of the manual to be completed at the end of the project.

GROUP DISCUSSION – PRIORITIES FOR YEAR THREE

The group discussion centered on several key issues described below.

- The number of accidents that occur with the differential in speeds is of concern. Additional and future research will address specific questions related to this issue. The challenge is the difficulty in pinpointing the location of crashes using the current accident reporting database. It is also difficult to ascertain why these accidents occur.
- The AASHTO guides currently under revision have information on recommendations with respect to pavement markings and signing schemes. The researchers will work to

ensure that the information is part of the overall research agenda of the traffic control devices task.

- Committee members are interested in how the manual will be broken down, such as barrier-separated vs. non barrier-separated facilities, operations, design, etc. Consideration needs to be given on how best to organize the document. Other issues include specifics such as when and where it is best to have managed lanes, (e.g., inside or outside of a six- or eight- or more-lane freeway), and the role that frequency of ramps may play in the design and operations of managed lanes facilities.
- Other questions arose regarding the best location for truck lanes. The research team will locate information regarding recent research looking at truck facilities for use by the committee.
- Other comments surrounded the potential for having higher speeds within a managed lane to make it attractive (e.g., 75 mph and higher). Also, the Texas Transportation Commission is looking at toll facilities, so that arena of managed lanes is of interest to them.
- Some interest was expressed in the potential impacts of ILEV on managed lanes operations and the current status of the program in Texas. The Texas Statutes (Sec. 224.153 of the Transportation Code) allow ILEV to operate on HOV lanes. The latest information is that the sticker program is still under development. Other comments included the issue of travel time predictability and dependability.
- One comment was that the project goals do not always meet the objectives of the public and the community. Transportation agencies need to be to sure to establish a consistent and clear message for their projects.

APPENDIX A: MEETING AGENDA

PROJECT NO. 0-4160

OPERATING FREEWAYS WITH MANAGED LANES

Annual Project Monitoring Committee Workshop

23 September 2002

2:30 - 4:30 p.m.

TxDOT Traffic Operations Division

Building 118 E Riverside, 1st Floor Conference Room

AGENDA

Introductory Remarks Carlos Lopez, TxDOT	5 minutes
Review of Year 2 Activities Beverly Kuhn, Texas Transportation Institute	10 minutes
Task Updates Ginger Goodin, TTI – Concept Marketing, Task 8 Tina Collier, TTI – Funding & Financing, Task 9 Kay Fitzpatrick, TTI – Geometric Design, Task 10	30 minutes
Highlights of Managed Lane Projects in the United States Ginger Goodin, Texas Transportation Institute	15 minutes
Overview of Year 3 Planned Activities Beverly Kuhn, Texas Transportation Institute	15 minutes
Discussion Priorities for Year 3	45 minutes
Adjourn	

APPENDIX B: MEETING ATTENDEES

LIST OF ATTENDEES

Project Director

Carlos Lopez, P.E., Traffic Operations Division, TxDOT

TxDOT

Bill Garbade, P.E., Austin District, TxDOT
Burton Clifton, P.E., Fort Worth District, TxDOT
Wallace Ewell, Fort Worth District, TxDOT
Curtis Hanan, P.E., Fort Worth District, TxDOT
James Kratz, P.E., Traffic Operations Division, TxDOT
Aurora Meza, P.E., Design Division, TxDOT
Jay Nelson, P.E., Dallas District, TxDOT
Wade Odell, P.E., RTI, TxDOT
Ed Pensock, P.E., Turnpike Authority Division, TxDOT
Jim Randall, Dir. Transportation Planning & Programming, TxDOT
Amadeo Saenz, Jr., Asst. Exec. Dir. for Eng. Operations, TxDOT
Richard Schrock, P.E., Waco District, TxDOT

Research Team

Susan Chrysler, Ph.D., TTI
Tina Collier, TTI
Dave Fenno, P.E., TTI
Kay Fitzpatrick, Ph.D., P.E., TTI
Ginger Goodin, P.E., TTI
Beverly Kuhn, Ph.D., P.E., TTI
Steve Schrock, TTI
Jerry Ullman, Ph.D., P.E., TTI

Center for Transportation Training and Research

Edward Owens, Research Associate
Kenneth Pratt, Graduate Research Assistant