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FAST LANE

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Welcome to FastLane

This is the third edition of *FastLane*: a quarterly newsletter that highlights ongoing activities and research on managed lanes in Texas. This month's issue features articles on traffic modeling research, as well as a new feature that highlights news items on managed lanes. Complete copies of the items and related links can be found on the managed lanes web site at <http://managed-lanes.tamu.edu>. Archives of *FastLane* can also be found on the web site. Please feel free to forward this newsletter to anyone who might be interested in its contents, and as always, we welcome your comments and suggestions.

Managed Lanes on the Web

The newly designed managed lanes web site is up and running. The site highlights ongoing research on managed lanes, provides key research results and access to related products. It also has information on meetings and other events related to managed lanes across the country, and has links to key related Internet sites. You can read the newsletter online, access newsletter archives, and join our mailing list. Visit the site at <http://managed-lanes.tamu.edu>.

Managed Lanes — Traffic Modeling

One of the key efforts of the research project undertaken last year was the task on traffic modeling. In this task, "operations-related simulation work on managed lanes was undertaken to demonstrate the impacts of alternative operating strategies on design and traffic operations considerations. From among several traffic models capable of performing detailed modeling of managed lanes within

freeway corridors, the VISSIM model was selected. A VISSIM model of the Katy Freeway corridor in Houston, Texas, was then created as a platform for an analysis of the frequency and location of at-grade (i.e., from within the freeway) access points for managed lanes. Researchers identified several key issues (not fully documented in current analytical practices and guidelines) that have a bearing on managed lanes operation. These issues are:

- Freeway weaving from a freeway entrance to a managed lane entrance,
- Freeway weaving from a managed lane exit to a freeway exit, and
- Intra-freeway vehicle stream separation of vehicles destined for managed lane access.

Though this may be a new term to describe the concept, intra-freeway weaving for accessing managed lanes is the "sorting" of vehicles destined for the managed lanes into the leftmost freeway lane. This maneuver can be viewed as the weaving distance required for a driver who has decided he/she is a candidate for using the managed lanes to reach the correct lane for a transition into the managed portion of the freeway facility.



For each of the three key issues, VISSIM models were constructed to examine different combinations of freeway volume level, percentage of weaving vehicles, weaving distance, and weaving complexity. In total, over 650 combinations of weaving distance, weaving complexity, and traffic volume conditions were designed into modeling experiments, and over 2000 simulations were performed. Based on the simulation modeling work that was performed, researchers were able to make the following recommendations concerning managed lanes operation:

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Managed Lanes — Traffic Modeling

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1. Standard analysis techniques, especially the Highway Capacity Manual (HCM) and Highway Capacity Software (HCS), are appropriate for isolated entrance, exit ramp, and one-sided weaving section analysis where these features must be studied within corridors with managed lanes applications. More complex issues, such as cross-freeway weaving and intra-freeway weaving, are most appropriately and practically studied using simulation.

2. The simulation tools CORSIM and Integration offer sufficient data input flexibility to accommodate a variety of managed lane simulation modeling issues, including complex geometrics, signalization/control, and some routing capabilities. However, where multiple vehicle classes and selective real-time control and routing must be modeled, the simulation tools Paramics and VISSIM are most applicable.

weaving, and

(3) having or not having intermediate ramp/ramps between the freeway entrance/exit and the managed lanes entrance/exit.

4. For general managed lane planning purposes (i.e., but not operations, which requires the condition-specific factors found in recommendation 3), the recommended minimum and desirable distances between a freeway entrance/exit ramp and a managed lanes entrance/exit are 2500 feet and 4000 feet, respectively. The minimum distance applies in cases where a speed reduction of up to 10 mph is acceptable and freeway volumes are moderate. For high freeway volumes, especially in cases where an intermediate ramp is present between the freeway entrance/exit and the managed lanes entrance/exit, 4000 feet of cross-freeway weaving distance is appropriate.

Table 1. Weaving Distances for Managed Lane Cross-Freeway Maneuvers

Design Year Volume Level	Allow up to 10 mph Mainlane Speed Reduction for Managed Lane Weaving ?	Intermediate Ramp (between freeway entrance/exit and managed lanes entrance/exit) ?	Recommended Minimum Weaving Distance Per Lane (feet)
Medium (LOS C or D)	Yes	No	500
		Yes	600
	No	No	700
		Yes	750
High (LOS E or F)	Yes	No	600
		Yes	650
	No	No	900
		Yes	950

Note: The provided weaving distances are appropriate for freeway vehicle mixes with up to 10% heavy vehicles; higher percentages of heavy vehicles will require increasing the per lane weaving distance. The value used should be based on engineering judgment, though a maximum of an additional 250 feet per lane is suggested.

3. Typical managed lane design guidelines specify either minimum (500 feet) and desirable (1000 feet) weaving distances per lane, or a preferred minimum distance (2500 feet) between a freeway entrance or exit and a managed lanes facility entrance or exit. The current research updates and places conditionality on these generic guidelines. A recommended weaving distance application table has been developed for anticipated conditions in the design year (see Table 1). The managed facility designer has the option of:

(1) specifying medium or high volume in the design year (based on HCM level of service - LOS),

(2) allowing for or not allowing for up to a 10 mph reduction in operating speed due to managed lane related

5. Under moderate volume freeway conditions (i.e., LOS C or D), a maximum weaving volume of 450 vehicles per hour is recommended between any given freeway entrance and the next downstream managed lanes entrance (and conversely, for any given managed lanes exit and the next, downstream freeway exit). Under high volume freeway conditions, a maximum weaving volume of 350 vehicles per hour is recommended for the same conditions. In corridors where freeway ramp location, spacing and origin-destination patterns cause managed lane-related weaving volumes that exceed these values, it is recommended that direct access from park and ride/transit facilities to the managed lanes be provided.

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Managed Lanes — Traffic Modeling

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6. To preserve freeway quality of service in the vicinity of managed lanes entrance and exit ramps, it is recommended that for moderate freeway volumes in the design year, a transition distance of 1 mile be allowed for vehicles to selectively maneuver from their initial position in any freeway lane to the leftmost (or rightmost) freeway lane so that they can access a managed lane facility. Under high volume freeway conditions in the design year, a transition distance of 1.5 to 2 miles is appropriate. For both moderate and high volume freeway conditions, the presence of ramps within the transition distance requires that the given value be increased. Note that these distances are the required transition distances once drivers have already determined whether or not they are candidates for the managed facility. Sign locations should be designed based on driver perception and decision distances that are added onto the values given here. Also note that the transition distance values given here provide sufficient upstream warning so that mainlane speeds are not significantly impacted by the selective separation weaving vehicles; if lesser transition distances are used, mainlane and weaving vehicle speed will be reduced.

The researchers have completed their work on this task and the full report for this effort will be available later this spring on the Managed Lanes website.

Trans Texas Corridor Proposal

Texas Governor Rick Perry unveiled a thirty year transportation plan for the State in January 2002. The plan known as the **Trans Texas Corridor** included toll roads, high speed rail, commuter and freight rail.



Conceptual View of Trans Texas Corridor

Courtesy of Governor Perry Web site

Funding elements for the plan included Texas Mobility Fund dollars, as well as establishing Regional Mobility Authorities, which decentralizes toll projects. Exclusive Development Agreements are also a part of the transportation plan. These agreements allow business

consortiums to design, construct, operate, maintain, and finance transportation projects. Information on the Trans Texas Corridor can be found at the following site: <http://www.governor.state.tx.us/transtexas/index.htm>.

Managed Lanes in the News

Twin Cities HOV Study

The Minnesota Legislature passed a bill during 2001, requiring the Minnesota DOT to study how the opening of HOV lanes on I-394 to general traffic would impact traffic flow and safety. Information and the results of the study, which was presented to the legislature in March 2002 is now available. The report recommends that the HOV lanes remain in operation as HOV lanes. Opening them to all traffic would go against Mn/DOT policies and make it nearly impossible to reclaim the lanes in the future. The complete report can be accessed at: <http://www.dot.state.mn.us/information/hov/>.

Texas 121 Project

The Fort Worth City Council voted to approve a \$500,000 contract to Prime Strategies. The Austin-based company will serve as the project manager for the proposed Texas 121 toll road project. Plans call for construction on the roadway, which will run from downtown Fort Worth to Cleburne, to begin in mid-2004. The project is scheduled to be finished by mid-2006 and will cost more than \$275 million. Information on the project can be found on the City of Fort Worth web site: <http://www.fortworthgov.org/>.

President George Bush Turnpike

North Texas Tollway Authority Officials recently announced a revised cost and schedule for Segment IV of the President George Bush Turnpike. Segments I-III extend from SH 78 in Garland to IH-35E in Carrollton and are open to traffic. Segment V, also open to traffic, extends from IH 635 south to Beltline Road in Irving. Segment IV will extend from IH 35E in Carrollton to IH 635 in Irving and connect the existing roadways. When complete the Bush Turnpike will be approximately 30.5 miles in length.

EZ-Pass and Homeland Security

In a recent speech White House Homeland Security Director Tom Ridge listed the EZ-Pass System as one of the technologies that will help the United States meet security goals without smothering commerce. Ridge cited the system as a well-defined way for officials to identify individuals and commercial firm representatives who cross borders on a regular basis.

Pacer Vehicles Used by Maine Turnpike Authority

The Maine Turnpike authority announced the use of pacer vehicles to slow traffic through construction zones. The specially marked vehicles drive side by side through construction areas, forcing other traffic to follow at safe speeds.

The Managed Lanes List

A managed lanes listserv is available to interested readers. This list unlike many other listservs is not a discussion list. It is merely a means for the research team to disseminate information to members of the list in an efficient manner. This listserv is open to anyone interested in managed lanes topics or research. If you have concerns or questions about the list, please contact Beverly Kuhn at b-kuhn@tamu.edu.

Managed Lanes Terminology

This feature of *FastLane* highlights several commonly-used terms in managed lanes that serve as a framework upon which our researchers will base future efforts. The entire glossary of terms may be accessed on the managed lanes web site.

★ Advanced Traffic Management System (ATMS) — remotely operated traffic management system for monitoring and managing operations of a freeway system including HOV lanes and arterial streets. Major elements of the system include surveillance, communications, and controls.

★ Busway — a preferential roadway designed exclusively for use by buses.

★ CBD — Central Business District — commonly referred to as downtown.

★ Direct HOV/HOT Ramps — freeway entrance ramps set up as restricted use ramps for HOV/HOT eligible vehicles.

★ General-Purpose Lanes — lanes on a freeway or expressway that are open to all motor vehicles.

★ Electronic Toll Collection — electronic systems that collect vehicle tolls, reducing or eliminating the need for tollbooths and for vehicles to stop.



Electronic Toll Collection in Laredo



Example of Busway

Courtesy of Utah Metro