



U.S. Department
of Transportation
Federal Highway
Administration

13th International HOV/HOT Systems Conference Partnerships for Innovation

September 7-9, 2008
Minneapolis, MN

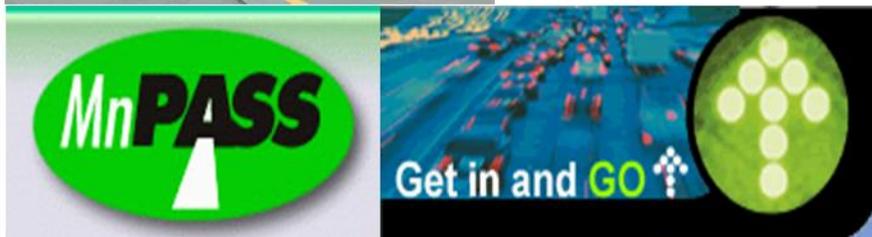
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Conference Proceedings

Prepared by
Texas Transportation Institute

November 2009



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1. Report No. FHWA-HOP-10-008		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle 13th International HOV/HOT Systems Conference Partnerships for Innovation – Conference Proceedings				5. Report Date November 2009	
				6. Performing Organization Code	
7. Author(s) Katherine F. Turnbull				8. Performing Organization Report No. Report	
9. Performing Organization Name and Address Texas Transportation Institute The Texas A&M University System College Station, TX 77843-3135		Prime Contractor: Battelle 505 King Ave. Columbus, OH 43201-2693		10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. DTFH61-01-C-00182 Task No. BA82026	
12. Sponsoring Agency Name and Address Operations Office of Transportation Management Federal Highway Administration 400 Seventh Street, S.W. Room 3404, HOTM Washington, D.C. 20590				13. Type of Report and Period Covered Technical	
				14. Sponsoring Agency Code FHWA-HOTO-01	
15. Supplementary Notes Jessie Yung, FHWA, Office of Transportation Management, Contracting Officer Technical Representative (COTR)					
16. Abstract <p>This report documents the proceedings of the <i>13th International HOV/HOT Systems Conference Partnerships for Innovation</i>. The Conference was held in Minneapolis, Minnesota on September 7-9, 2008. The proceedings summarize the presentations from the general session and the breakout sessions. The general sessions included presentations on the I-394 MnPASS HOT lanes in Minnesota and the Minnesota Urban Partnership Agreement (UPA).</p> <p>A variety of topics were covered in the breakout sessions. Updates were provided on HOV and HOT projects in metropolitan areas throughout the country, planning studies underway, and the UPA and Congestion Reduction Demonstration projects.</p>					
17. Key Words HOV, High-Occupancy Vehicle Lanes, High-Occupancy Toll Lanes, HOT, Value Pricing, Managed Lanes, BRT, Bus Rapid Transit.			18. Distribution Statement 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) Unclassified		20. Security Classif.(of this page) Unclassified		21. No. of Pages 113	22. Price

13th International HOV/HOT Systems Conference Partnerships for Innovation

Sponsored by
HOV Systems Committee
Managed Lanes Joint Subcommittee
Transportation Research Board
National Academy of Sciences

In cooperation with
Federal Highway Administration
U.S. Department of Transportation

Conference Proceedings

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The preparation of these proceedings was funded by the
Federal Highway Administration, United States Department of Transportation

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OPENING SESSION

Katherine F. Turnbull, Texas Transportation Institute, Presiding

Welcome from the Conference Planning Team

Katherine F. Turnbull

Texas Transportation Institute

It is a pleasure to welcome you to the Transportation Research Board's (TRB) 13th International High-Occupancy Vehicle/High-Occupancy Toll (HOV/HOT) Conference. I had the privilege to serve as the Chair of the Conference Planning Team, which included members from the TRB HOV Systems Committee and local agencies here in the Minneapolis-St. Paul metropolitan area. The names of the Planning Team members are included in the conference program. Please thank these individuals for their hard work when you talk with them during the conference.

The theme of this conference is *Partnerships for Innovation*. That theme reflects the involvement of numerous individuals, agencies, and corporations needed to ensure successful HOV/HOT facilities. It also reflects the groups involved in organizing and sponsoring this conference. The TRB HOV Systems Committee and the Managed Lanes Joint Subcommittee are the main sponsors of the conference. I would like to thank Rich Cunard from TRB for his assistance in developing the conference.

In addition to TRB, other supporters of the conference include the Minnesota Department of Transportation (Mn/DOT), the Metropolitan Council of the Twin Cities, Metro Transit, the Center for Transportation Studies and the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota, the Texas Transportation Institute (TTI) of The Texas A&M University System, and the Federal Highway Administration (FHWA). FHWA, through the assistance of Jessie Yung, is supporting the development of the conference proceedings.

I would also like to recognize the corporate partners supporting the conference. Barrier Systems is the supporting partner for the reception this evening. SRF Consulting Group, Inc. is the supporting partner for today's luncheon, and Parsons Brinckerhoff is the supporting partner for the luncheon on Tuesday. AECOM was the partner for the breakfast this morning and Fehr & Peers is the sponsoring partner for tomorrow's breakfast. The assistance of these corporate sponsors is greatly appreciated.

The speakers in the general session and the breakout sessions will be covering numerous topics of interest, including recent HOV and HOT projects, the Urban Partnership Agreement (UPA) and Congestion Reduction Demonstration (CRD) programs, and transit, ridesharing, and other supporting activities.

I hope you will find the topics timely, the speakers informative, and the conference beneficial. I encourage you to share your experiences and ideas with others during the sessions and the breaks. I also hope you will have the opportunity to walk around the University of Minnesota campus and see some of the Twin Cities. Thank you.

Welcome from the TRB HOV Systems Committee
Ginger Goodin, HOV Systems Committee Chair
Texas Transportation Institute

On behalf of the TRB HOV Systems Committee, it is a pleasure to welcome you to the 13th International HOV/HOT Conference. I would like to thank Katie and the Planning Team for organizing the conference program. I would also like to echo Katie's recognition of the conference agency and corporate sponsors. Their support is greatly appreciated.

The TRB HOV Systems Committee has been in existence for almost 20 years. The committee has made significant contributions to the profession in the fields of HOV and HOT facilities, supporting services, planning, enforcement, and performance monitoring. Katie will be highlighting more of the committee's history in her presentation this morning.

One of the committee's roles is to facilitate information sharing, communication, and the dissemination of research findings. This conference provides an excellent venue to learn about new HOV/HOT projects, innovative partnerships, and the latest research studies. With all the transportation challenges facing communities throughout the country, the field is rapidly evolving into new areas, including HOT lanes and managed lanes. While there are numerous projects to learn from, including those here in our host city, and more being implemented, I think most of us would agree that we still have much to learn.

I am very encouraged to see many new people attending the conference. You represent the future of the transportation profession. We had an excellent committee meeting last night with lively discussions on a number of important topics. The committee will continue to actively promote needed research, information sharing, and technology transfer.

I invite you to take very opportunity at this conference to learn something new, to meet new people, and to join us in advancing our field. I hope you enjoy the conference. Thank you.

Innovation and Partnerships at the Minnesota Department of Transportation
Tom Sorel, Commissioner
Minnesota Department of Transportation

Thank you. I am very pleased to have the opportunity to welcome you to Minnesota and this conference. In addition to the tour of the I-394 corridor this afternoon, I hope you will be able to see some of the Twin Cities. It is a great place to visit and a great place to live.

I am very excited about the conference theme, "Partnerships for Innovation." Innovation is very near and dear to my heart. I talk about the role of innovation in shaping the future. I talk about innovation a lot as I truly believe that if we are innovative in all we do, good things will happen. Partnerships are equally important. We need to have a spirit of partnering to address the transportation challenges we face. I believe we have that spirit of partnering in Minnesota. I will share some examples of partnerships that have been key to advancing transportation projects in the Twin Cities metropolitan area and in the state.

It has been a very busy year in Minnesota. The Republican National Convention was held in St. Paul last week. The transportation system worked very well during the convention thanks to partnering among all the agencies and groups involved. Mn/DOT and other agencies were actively involved in planning for the convention. Innovative approaches to traffic management were also important elements during the convention.

I think you are all aware of the collapse of the I-35W Bridge a year ago. The bridge collapse, the innovative strategies utilized to manage traffic without the bridge, and the design and construction of the new bridge all have far-reaching implications for the transportation community. The collapse of the bridge was a tragedy. There were 13 fatalities as a result of the bridge collapse, and 144 individuals were injured.

From a transportation perspective, the bridge collapse resulted in more than the loss of the bridge and more than the loss of a vital segment of the interstate system in the Twin Cities. The bridge collapse resulted in the loss of the public's trust and confidence in Mn/DOT's ability to provide for their safety and mobility. We have to regain the public's trust and confidence. We know that this process will take time and that it will not be easy.

The impact of the bridge collapse was felt by transportation agencies, policy makers, and the public throughout the country. It focused attention on the need to adequately maintain our transportation infrastructure and the funding necessary to maintain and rehabilitate key segments of the transportation system.

Partnering and innovation were key elements of the response to the bridge collapse. The immediate response was characterized by teamwork among all the agencies and groups involved. The response was also characterized by, what I like to call a servant-leadership philosophy, which focuses on serving others. The recovery effort involved numerous diverse groups. Bridge removal experts were brought in. Navy divers assisted. Contracts for the bridge removal had to be developed and awarded.

Partnering and the willingness of all groups to work together was key to the response and recovery effort. It has also been the key to rebuilding the bridge, which will be open to traffic in a few weeks. The partnering among the designers, the builders, the environmental agencies, the City of Minneapolis, FHWA, community groups, and others made it possible. We have worked hard in Minnesota on environmental streamlining. We had policies and procedures in place to ensure a comprehensive environmental review in a timely manner. I believe that the partnering displayed in the response, recovery, and rebuilding of the bridge will help regain the public's trust and confidence in Mn/DOT.

Partnerships have also played key roles in many transportation projects in the area. The development, implementation, and operation of the HOV lanes on I-394 and I-35W represent a partnership among federal, state, and local agencies. The expansion of the I-394 HOV lanes to HOT lanes, with the introduction of the MnPASS project, built on the existing partnerships among public agencies, and added new private sector partners.

The UPA represents further evolution of the transportation partnerships in the metropolitan area. I am very excited about the UPA projects, which you will hear more about from other speakers during the conference. Innovative elements in the Minnesota UPA include expanding the existing HOV lanes on I-35W to HOT lanes, adding new HOT lanes, and implementing a priced dynamic shoulder lane (PDSL) to provide a congestion-free travel option in the corridor. Other elements are a telecommuting program and numerous transit projects, including new and expanded park-and-ride facilities and transit services, the dual bus lanes in downtown Minneapolis, real-time transit information, and a lane guidance system for shoulder-running lanes.

The development of the successful UPA proposal was built on the strong long-standing working relationships among agencies, jurisdictions, and organizations in the Twin Cities. In Minnesota, we value those relationships. We understand that it takes time to develop and maintain strong relationships and partnerships. The benefits of investing time and resources in building partnerships are significant. Those relationships will result in the successful deployment of the UPA projects.

As I travel around the state, I talk about 21st Century solutions for 21st Century problems. I did not invent that phrase. You have heard it from U.S. Department of Transportation Secretary Mary Peters. I believe we need to address issues with solutions for the future, not the present.

I also talk about the potential for the private sector to invest in the transportation infrastructure in the state. We are examining different approaches for possible private sector investments. We realize there are concerns associated with some aspects of private investments or ownership of transportation assets. We are carefully examining possible approaches and ensuring the public interest is protected.

I hope you enjoy the conference and your visit to the Twin Cities. You will have the opportunity to see the new I-35W Bridge and the I-394 MnPASS HOT project this afternoon. I encourage you to share your ideas and experiences with others during the conference. Thank you.

That Was Then/This Is Now – Changes Since the 1988 HOV Conference in Minneapolis
Katie Turnbull, Texas Transportation Institute

In addition to welcoming you to the 13th International HOV/HOT Conference, it is my pleasure to provide an overview of the changes that have occurred with HOV and HOT facilities at the national level since 1988 when the 3rd International Conference was held here in Minnesota. I thought it might be of help to set these changes in the context of cultural changes that have occurred over the past 20 years.

For example, in 1988, the television program with the highest Nielson rating was “The Cosby Show.” In 2008, “American Idol” captured the top spot. At the box office, “Rain Man” was the highest grossing movie of 1988. The “Dark Knight” has been leading box office receipts in 2008.

On the sports scene, the San Francisco 49ers won the 1988 Super Bowl. The New York Giants are the reigning Super Bowl Champions. In 1988, the Los Angeles Dodgers captured the World Series. We are still a few weeks away from the end of the regular season this year, but since we are in Minnesota, I will predict that the Twins will win the 2009 World Series.

You could mail a first class letter for 25 cents in 1988. Mailing that same letter today will cost you 42 cents. A gallon of gasoline cost about \$1.08 in 1988. Current prices at the pump are averaging \$3.89 for regular unleaded gasoline.

Turning toward transportation, if you said “ATM” in 1988, people would think you were referring to the newly introduced automatic teller machines. Of course we know “ATM” today as Active Traffic Management. If you said “hybrid” here in Minnesota in 1988, most people would probably think of hybrid corn and other vegetables grown in the state. “Hybrid” today refers to fuel-efficient vehicles operated on gasoline and electricity, which are allowed to use

HOV lanes in some states. Finally, in 1988, BLT and PBJ were well known as bacon, lettuce, and tomato and peanut butter and jelly sandwiches. These days, a bus rapid transit (BRT) sandwich would be a little hard to digest.

HOV facilities were still a relatively new approach in 1988. By providing travel-time savings and trip-time reliability to buses, vanpools, and carpools through priority treatments, HOV lanes encouraged travelers to change from driving alone to using one of these HOV modes. HOV facilities increase the person – not vehicle – throughput of congested travel corridors.

In 1988, some 25 HOV lanes on freeways and in separate rights-of-way were in operation in 17 metropolitan areas in North America. Concurrent flow HOV lanes accounted for approximately 54 percent of the operating HOV facilities. Exclusive HOV lanes represented 32 percent of the total, busways accounted for 15 percent, and contraflow HOV lanes accounted for one percent. The exclusive HOV facilities included the Houston transitways, the El Monte busway in Los Angeles, and the Shirley Highway HOV lanes in northern Virginia. Busways were in operation in Ottawa and Pittsburgh. Concurrent flow HOV lanes were being implemented in Los Angeles, San Francisco, Seattle, and other areas. The contraflow lanes were in the New York/New Jersey area.

Construction of I-394, which represented the last major segment of the Interstate system in the Minneapolis-St. Paul metropolitan area, was underway in 1988. It was constructed on the alignment of Highway 12, a signalized four-lane roadway. A number of innovative strategies and project elements were used with the I-394 HOV lanes. These activities were accomplished through the coordinated efforts of Mn/DOT, the Metropolitan Transit Commission (now Metro Transit), the Metropolitan Council, the Regional Transit Board, the Minnesota State Patrol, Minnesota Rideshare, and communities in the corridor. Consulting and marketing firms also assisted with a number of elements.

An interim HOV lane, called the *Sane Lane*, was implemented and operated to help manage traffic during construction, to introduce the HOV concept of travelers in the corridor, and to build use for the final facility. Market research was conducted to test the interim HOV lane concept and the name, to identify appropriate outreach and information dissemination methods, and to obtain feedback on different promotional messages. A comprehensive marketing and public information program was developed and conducted based on the market research results. The program included a HELP-394 telephone hotline, a *Sane Lane* radio jingle, media relations, paid advertising and public service announcements, periodic newsletters, brochures, posters, and other outreach activities.

The I-394 Transportation Systems Management Plan guided the development of the supporting facilities and services. Transit stations and park-and-ride lots were constructed at strategic locations in the corridor. Additional express bus service was implemented to take advantage of the travel-time savings and improved trip-time reliability provided by the HOV lanes. Three parking garages, with approximately 6,000 parking spaces were constructed on the edge of the downtown Minneapolis. The project included a direct connection from the HOV lanes and a transit station was located in one of the garages. Discounted parking rates are provided to carpools and vanpools using the I-394 HOV lanes. The garages also provided direct access to the skyway system, which is an extensive second floor bridge and walkway system in the downtown area. Other elements of the plan included a variety of rideshare promotions and extensive marketing and public information programs.

An extensive evaluation was conducted for the *Sane Lane* and final HOV lanes. The evaluation included analyzing use of the HOV lanes, the parking garages, park-and-ride lots, and transit services. Travel-times in the HOV lanes and the general-purpose freeway lanes were recorded. Surveys of users and non-users were conducted.

You are all familiar with the trends that occurred in metropolitan areas throughout the country over the past 20 years. These trends include increases in vehicle miles traveled (VMT), increases in automobile ownership, increases in population, and increases in employment. All of these trends resulted in increasing levels of traffic congestion on freeways and roadways.

HOV facilities represent one approach used in many metropolitan areas to deal with increasing congestion levels. Other techniques include intelligent transportation system (ITS) ATM, and the use of electronic toll collection (ETC) on priced facilities. At the same time, innovative financing strategies, including public/private partnerships, have been promoted in many areas to address funding constraints.

In 2008, HOV facilities are operating in 34 metropolitan areas in North America. A change has occurred since 1988 in the most common type of HOV lane found in areas throughout the country. Approximately 81 percent of these facilities are concurrent flow HOV lanes. Exclusive HOV lanes represent 10 percent of the current facilities, while busways and contraflow lanes account for 5 percent and 4 percent, respectively.

The terms value pricing, HOT lanes, and managed lanes were not part of the transportation vocabulary in 1988. Today, HOT projects are in operation in San Diego, Houston, Denver, Salt Lake City, Seattle, and on I-394 here in Minneapolis. Expanding the HOV lanes on I-95 in Miami to a HOT lane will be implemented soon.

HOT projects allow single-occupancy or lower-occupancy vehicles to use an HOV lane for a fee. The existing projects have been implemented for a number of reasons, including using available capacity, managing HOV demand, generating revenues, providing mobility options, and testing new technologies.

You will be hearing more about the MnPASS HOT project on I-394 and you will have the opportunity to see the facility on the tour this afternoon. The project represents the first expansion of a concurrent flow HOV lane to a HOT lane. The unlimited access allowed during the HOV operation was changed to ingress and egress only at designed locations.

Other areas allow low emission/energy-efficient vehicles, including qualifying hybrid vehicles, to use the HOV lanes without meeting the occupancy requirements. The Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) includes provisions for states to authorize use of the HOV lanes by these types of vehicles. Operating agencies must monitor the HOV lanes and take action if the use by hybrid vehicles degrades the travel-time savings and trip-time reliability of the facilities. At least nine states have legislation allowing hybrids to use HOV lanes.

The factors contributing to the success of HOV projects are very similar to the keys to successful HOV/HOT lanes today. First, HOV/HOT lanes must be designed and operated to provide a safe environment for users of the facility and travelers in the general-purpose freeway lanes. Second, transit services and facilities are key to maximizing the throughput of a facility and providing mobility operations for travelers. Express bus services, BRT, park-and-ride lots, and transit stations are important elements of many HOV/HOT projects. Regional ridesharing

programs and employer-supported programs represent a third key element. These programs may include computerized rideshare matching, vanpool programs, guaranteed ride home programs, preferential parking locations and reduced parking fees for carpools and vanpools, and other employer incentives to use alternative commute modes. Fourth, public education, outreach, and marketing are important to successful HOV/HOT projects. Public education is a critical part of opening a new HOV/HOT facility. Ongoing marketing is also important, however, as we live in a mobile society, with people changing employment and residential locations.

Enforcing the vehicle-occupancy requirements, toll payments, and operating procedures represents still another key to successful HOV/HOT projects. Without adequate enforcement, which typically includes both personnel and technology, motorists may violate the occupancy and toll requirements. Enforcement personnel are also needed to ensure that operating requirements are met to provide a safe environment. Proactively managing all aspects of the facility is also an important key to success.

Finally, HOV/HOT projects require partnerships among agencies in a metropolitan area or region. Agencies typically involved in HOV/HOT projects include the state department of transportation, the transit agency, the Metropolitan Planning Organization (MPO), cities, counties, the regional rideshare agency, the state patrol and local police departments, and other agencies. In addition, representatives from the FHWA and the Federal Transit Administration (FTA) are frequently involved in planning activities and review of operations if federal funds are used on a project. Recent HOT projects have also involved public/private partnerships.

The I-394 HOV lanes, the expansion to the MnPASS HOT project, and the Minnesota UPA provide good examples of the public agency partnerships critical to the success of HOV lanes and the public/private partnerships associated with expansion to HOT projects. Planning, implementing, operating, and enforcing the I-394 HOV lanes involved Mn/DOT, the Metropolitan Council, the Regional Transit Board, the Metropolitan Transit Commission, Minnesota Rideshare, the Minnesota State Patrol and local police departments, and the cities of Minneapolis, St. Louis Park, and Minnetonka.

The public/private partnership implementing and operating the MnPASS project includes Wilber Smith Associates and Cofiroute. You will be hearing more about the Minnesota UPA from other local partners, including Mn/DOT, the Metropolitan Council, which also operates Metro Transit, Minnesota Valley Transit Authority (MVTA), the Center for Transportation Studies and the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota, the City of Minneapolis, and Anoka, Dakota, Hennepin, and Ramsey counties.

The TRB HOV Systems Task Force was established in 1987. In 1988, Task Force members were developing a request for full committee status, which was approved in 1989 with the help of numerous people, including some of you in this room. The Committee has been one of the more active TRB committees over the years.

The Committee has sponsored 13 international conferences. The first conference was held in Orange County, California. Conference locations include Houston, Minneapolis, Washington, D.C., Seattle, Ottawa, Los Angeles, Pittsburgh, Toronto, and Dallas. Seattle, Houston, and Minneapolis have hosted two conferences.

Proceedings have been published on 11 of these conferences. In addition, the Committee has sponsored paper, poster, and invited presentation sessions at the TRB annual meetings. After

publishing a newsletter for many years, the Committee joined the Internet generation with a website.

Committee members have developed numerous research problem statements, which have resulted in funded research projects through a variety of programs. Examples of research projects include the National Cooperative Highway Research Program (NCHRP) HOV Systems Manual, the FHWA HOV Marketing Manual, the FHWA HOV Demand Estimation Procedures Manual, the National Highway Institute (NHI) HOV Training Course, and the FHWA HOT Training Course. Additional HOV/HOT projects have been sponsored by FHWA and numerous states through the Pooled-Fund Study group. The Committee took the lead in forming the Managed Lanes Joint Subcommittee and is the host committee.

Finally, the Committee began an awards program in 2000 to recognize individuals and agencies for excellence in planning and operating HOV/HOT facilities, innovative outreach and public education programs, and research projects. The 2008 awards will be presented at the luncheon on Tuesday.

What might we expect to see 20 years from now when Minneapolis hosts the 2028 conference? On the sporting scene, I am sure the Vikings will have finally won a Super Bowl and the Twins will be playing in the World Series. On the HOV/HOT scene, we may have hybrid HOT (HHOT) lanes and hybrid truck HOT (HTHOT) lanes. You will hear more over the next two days about current trends and future activities related to HOV/HOT lanes.

I encourage you to actively participate in the conference and I hope you will find the sessions and speakers interesting and informative. Thank you.

GENERAL SESSION

Arlene McCarthy, Metropolitan Council of the Twin Cities, Presiding

Introduction

Arlene McCarthy, Metropolitan Council of the Twin Cities

I would like to echo Mn/DOT Commissioner Sorel's welcome. I would also like to thank Katie Turnbull and the Planning Team for organizing an excellent conference.

It is a pleasure to moderate this session. The partnerships among the agencies in the Twin Cities are key to making the transportation system work. Strong, long-standing working relationships exist among the federal, state, and local agencies.

We have a very engaged community when it comes to transportation planning and implementation. Our congressional delegation and members of the state legislature are actively involved, including Senator Scott Dibble, who will be speaking at the Tuesday luncheon. County commissioners, mayors, city council members, advocacy groups, organized system neighborhood groups, educational institutions, and the public all participate in the process. All of these groups are partners in planning and implementing a wide range of transportation projects.

We are very proud in the Twin Cities to have what we call the federal tribeca. Along with Seattle, the Twin Cities is the only metropolitan area to have a UPA, a full-funding grant agreement for the North Star Commuter rail, and the Central corridor light rail transit (LRT) line in the project pipeline and in preliminary engineering. The new I-35W Bridge is also primarily federally funded.

We have a number of large projects. Partnerships are very important to delivering these major projects. Metropolitan Council Chairman Bell, who will be speaking at the luncheon today, says that major projects have had several near-death experiences. Partnerships are key to overcoming these experiences and situations.

The speakers during the session will highlight current transportation projects and the partnerships that made them possible. You will hear more about the Minnesota UPA and the I-394 MnPASS project in other sessions.

Innovation Partnerships Minnesota's Bus-Only Shoulder Program and UPA Program

Nick Thompson, Minnesota Department of Transportation

Thank you, Arlene. The UPA is the most recent example of the successful working relationships among transportation agencies in the Twin Cities. Since the UPA projects will be discussed in more detail in one of the breakout sessions this afternoon, I will focus my comments on the partnership used to develop the UPA proposal. I will begin by highlighting the bus-only shoulder (BOS) program developed through the Team Transit Partnership. This partnership has been very successful and is very relevant to this conference.

The BOS program allows buses to operate on freeway shoulders at speeds up to 35 mph in congested conditions. The program began over 10 years ago. Initially, it was controversial within Mn/DOT, but it is now fully accepted. The BOS program uses the 10 to 12 foot shoulders on freeways to provide significant travel-time savings and trip-time reliability to transit riders.

The current system is near full build-out, with over 250 miles of BOSs in operation in the metropolitan area. The program is institutionalized with staff resources, design standards, and dedicated funding. Benefits from the bus shoulder lanes include guaranteed travel times, use of an underutilized asset, low per-mile costs, and funding for fixed guideways.

Many of the initial concerns emerged from the design section within Mn/DOT. Safety concerns were raised related to buses operating in the shoulder at higher speeds than vehicles in the adjacent general-purpose freeway lanes. A pilot program was conducted to test BOS operations. The pilot was successfully completed 10 years ago and the program has been institutionalized. We have a long history of success with this approach, which is used in all freeway corridors with transit services. The buses on shoulders concept is safe to operate, it is beneficial to riders, and it has an accepted design.

The system has significant benefits, including guaranteed travel times and schedules for express buses using highway corridors. The program allows buses to use an underutilized existing asset – freeway shoulders – for a very low cost of approximately \$250,000 a mile. The region realizes an added benefit of extra federal funding, as the BOSs are considered part of the fixed-guideway system in the area. The Team Transit Partnership includes representatives from Mn/DOT, Metro Transit, and other transit agencies in the region. Team Transit meets on a regular basis to identify improvements in highway corridors that would benefit transit operations. Mn/DOT provides a dedicated program manager. Team Transit sets investment priorities and develops operational policies. It also initiates innovative ideas to improve transit in highway corridors.

There are a number of keys to the success of the Team Transit Partnership and other partnerships in the Twin Cities. First, there is strong support from top management in all agencies. The early resistance to considering the BOS concept within Mn/DOT was overcome by strong support from top leaders. Based on proven benefits of the bus shoulders, Mn/DOT provided dedicated funding of approximately \$2 million a year and a dedicated project manager to move the program forward. Team Transit represented an organizational innovation when it was initiated, and it continues to provide an important focus for transit improvements along freeway corridors.

The 250 miles of BOSs focus on the major congested highway corridors in the metropolitan area. While the system may be expanded slightly in response to increasing congestion levels, we are also re-investing in early segments of the system. Mn/DOT is shifting some dedicated expansion funding into preservation of existing bus shoulders.

We are also exploring techniques to make bus shoulders operate more efficiently. One of the UPA projects is developing and implementing a lane guidance system for shoulder-running buses. Approximately \$5 million has been allocated for this project, which will allow buses to maintain higher speeds, improve trip-time reliability, and improve safety in the bus shoulders.

Another UPA project is converting an existing inside shoulder on I-35W into a PDSL. The PDSL will be implemented in the northbound direction on a segment of I-35W approaching downtown Minneapolis. Use of the shoulder will be dynamic, in that it may be open to general traffic during an incident, it may operate as a HOT lane during the peak hours, it may be closed, or it can be used as a shoulder.

The PDSL is a key component of the Minnesota UPA and it represents an improvement to the BOS lane and the next phase of maximizing available capacity. The speed limit for buses operating on shoulders is currently 35 mph. Buses will be able to travel at 50 mph in the PDSL.

In response to the I-35W Bridge collapse, shoulders on I-94 and other selected freeways were converted to general-purpose lanes to help manage traffic. Response to these conversions from the traveling public has been very positive. With the new bridge about to open, consideration is being given to what to do with these lanes. Alternatives being considered include converting to PDSL, returning to BOS operation, and implementing an unpriced dynamic shoulder lane or managed lane. The last alternative might test the transit partnership, because if not done correctly, it could take away travel-time savings and trip-time reliability for buses.

The UPA is a U.S. Department of Transportation (USDOT) initiative to fight congestion. The USDOT requested proposals from urban areas to address congestion by implementing strategies focusing on the four "T's" of tolling, transit, telecommuting/Travel Demand Management (TDM), and technology. Funding of approximately \$1.1 billion was identified for the program.

The UPA has an aggressive timeline. The program was announced at the end of 2006. The deadline for submitting proposals was April 30, 2007. A total of 28 metropolitan areas submitted proposals. Semi-finalists were selected in June 2007 and revised proposals were requested. Minnesota was selected as one of the five UPAs and awarded \$133 million in federal funds in mid-August 2007.

Building new partnerships to reduce congestion is a goal of the program. Meeting the aggressive timeline for the proposal and project completion would not have been possible without established partnerships. Expanding existing partnerships was also necessary, however. Our innovation was building on existing partnerships and existing initiatives that had support and were ready to be implemented and re-packaging them to target congestion reduction in the I-35W corridor.

Minnesota was awarded \$133.3 million in federal funds for the UPA projects. The federal funds are matched by \$50.2 million in state funds. A total of \$1.6 million in federal funds were released early to Mn/DOT for planning and engineering and \$13.2 million were released to the Metropolitan Council for the I-35W north transit elements. Construction has begun on the various projects.

Legislative authority was required to implement and operate some of the Minnesota UPA projects. The necessary legislation was approved and signed by the governor in May 2008. The authorizing legislation package provides Mn/DOT with the authority to allow driving on freeway shoulders and the authority to charge shoulder lane users. It also includes language on how the revenues will be distributed and operational definitions. A \$50.2 million state match was provided. The funding included \$25.2 million in T.H. Bonds, \$16.7 million in general obligation bonds, \$4.3 million in general and T.H. funds, and \$4.0 million in Regional Transit bonds.

The projects in the I-35W corridor will provide a congestion-free tolled express lane from Burnsville Parkway to downtown Minneapolis. The existing HOV lanes will be expanded to HOT lanes and extended through the I-494 interchange. The HOT lanes will be widened by two feet, a buffer will be added, and the striping will be modified to change from unlimited to limited access. Tolling and lane management technology will be added. Spot capacity improvements

will be constructed. A new southbound auxiliary lane will be added from 106th Street to Highway 13. A new northbound collector ramp system will be added from 90th Street to I-494. A new HOT lane will be added from 66th Street to 42nd Street as part of the Crosstown Commons section reconstruction. This segment will open in 2010.

The PDSL will operate northbound from 42nd Street to downtown Minneapolis. The project maintains the existing four general-purpose freeway lanes and adds the PDSL. The PDSL concept is based on dynamic should lanes in use in the United Kingdom. The cross-section of the Minnesota PDSL will include a 12-foot PDSL and four 12-foot general-purpose freeway lanes. There will be a two-foot buffer between the PDSL and the adjacent general-purpose freeway lanes and a three-foot buffer both on the outside and inside freeway. Active traffic management, including speed harmonization and additional incident response capabilities, will be used when the PDSL is in operation.

The initial UPA proposal, which exceeded \$400 million, had to be scaled back. Developing support for the proposal in the short time period available was challenging. Scaling back the geographic scope of the proposal to meet funding limitations created stress on the partnership. A reduced focus on tolling disappointed some of the partners. The proposal required significant local investment at a time of limited funding. Finally, the local partners did not have the authority to implement all of the proposed projects. Legislative action was required on the PDSL.

We overcame the concerns related to the limited geographical scope by establishing the UPA projects as pilots for future expansion. The tolling elements, which include expanding existing HOV lanes to HOT lanes and adding new HOT lanes and the PDSL, are non-controversial. The Minnesota UPA advances new ideas and existing unfunded plans.

I look forward to hearing about the other UPA projects in one of the breakout sessions. I hope you enjoy the tour of I-394 this afternoon and your stay in Minnesota.

Public Transportation Partners

Brian Lamb, Metro Transit

Thank you, Arlene. Good morning and welcome to the Twin Cities. It is a pleasure to have the opportunity to speak at this session. To really see dedicated transit lanes in operation, you should have been here last week when the Republican National Convention was held in St. Paul. Numerous techniques, including bus lanes, were used to transport delegates, officials, members of the media, and other groups to the various venues.

You are all aware of the challenge we face with traffic congestion in metropolitan areas throughout the country. We often view traffic congestion as an enemy. Congestion robs us of productivity, stalling the movement of people and goods, and slowing the delivery of services. Yet, if infrastructure is sufficient, congestion also can be a symbol of regional vitality and prosperity. The population of the Twin Cities metropolitan area is forecast to increase by 1 million people by 2030. Congestion has increased over the past 15 years, and will continue to be a challenge in the future, especially with the projected population increase. Although we have a very vibrant metropolitan area, we also face significant transportation challenges.

According to TTI, which provides valuable annual information about congestion nationwide, commuters in the Twin Cities waste 43 hours a year stuck in rush-hour traffic. Further, commuters suffer \$790 in delay costs annually. The Metropolitan Council conducts an

annual regional livability survey. Residents routinely rank congestion and transportation issues as major concerns on these surveys. In many years, traffic congestion tops crime and other issues as the major concern.

We are addressing congestion in three significant ways in the region. First, we are focusing on moving more people, not just more vehicles. Transit plays a key role in this strategy. Second, we are expanding and enhancing the transportation infrastructure in the region. Expanding the transit infrastructure is an important part of this strategy. Third, we are implementing strategies focusing on trip reduction and VMT reduction. Transit, carpooling, vanpooling, and other TDM programs play a key role with this strategy. I will discuss each of these approaches.

Transit is a key element in moving people, not vehicles. In 2007, transit ridership in the Twin Cities was the highest it has been in the past 25 years. Metro Transit and other transit systems in the region have experienced steady ridership growth over the past four years. In 2008, we expect approximately 82 million people boarding Metro Transit buses and LRT vehicles. Overall, ridership increased 8 percent from 2007 to 2008. Express bus ridership increased 9.5 percent and LRT ridership increased 18 percent from 2007 to 2008.

There are many factors that influence transit ridership. When commuters face high gasoline prices, traffic congestion, and the stress associated with these factors, they are willing to try new alternatives. The new alternatives have to be reliable, serve major travel patterns, and provide advantages to driving alone, however. We work hard to ensure that our service meets these needs and expectations.

We have focused on building partnerships with area businesses to help increase ridership. Our Metropass program is oriented toward providing incentives at the business level by creating an “all you can ride” commuter program for employees. The Metropass program has grown from 35 participating companies five years ago to approximately 195 companies today. There are about 34,000 Metropasses in circulation among 154,000 eligible employees. Thus, about one of every four employees at the participating companies use transit.

We also offer a similar program, called UPass, to students at the University of Minnesota. Transit has a high market share among students at the university. University of Minnesota students have taken 2 million rides through July of this year, an increase of 30 percent over last year. In fact, nearly 5 percent of our total ridership is from UPass holders. The UPass program has also allowed the University to add new buildings without adding more parking structures.

The Metropass program provides numerous benefits. It provides an important link to the business community. For example, construction begins today on the dual bus lanes on Marquette and Second Avenues in downtown Minneapolis, which will replace the single bus lane. You will hear more about this project later this morning. Communication with riders about changes in bus routes and bus stops during the construction is important. The Metropass program includes a coordinator in each participating businesses. We can send an e-mail to the coordinators with current information on construction activities and changes in bus stops and they forward it on to the Metropass participants.

The Metropass program has also provided a good partnership to increase the visibility of transit with the state legislature. Members of the legislature listen when businesses representatives promote the importance of transit.

The next strategy we are using is expanding and enhancing the transit infrastructure. Investments in transitways, which include LRT, BRT, and commuter rail, are a key part of this approach. The Metropolitan Council is currently revising the Transportation Policy Plan, which focuses on multi-year investments. Future investments are made easier by the success of existing projects, including the Hiawatha LRT line.

The Hiawatha LRT line, which opened in June 2004, has been very successful. In 2007, 9.1 million rides were made on the Hiawatha line. We expect ridership to exceed 10 million rides this year, which was the projected ridership for 2030. It is easier to gain support for other LRT and rail projects based on the success of the Hiawatha line.

The Northstar commuter rail line is scheduled to open late next year. It will provide service in the congested Highway 10 corridor in the northwest portion of the metropolitan area. The Northstar will initially terminate at Midway, but will be extended to St. Cloud in the future.

We submitted an application to FTA last week to begin final design for the Central Corridor LRT line. The Central Corridor is 11 miles in length, linking downtown Minneapolis, the University of Minnesota, and downtown St. Paul. We hope the application will be approved and we can begin final design in 2009. The line is scheduled to open in 2014.

The Southwest LRT line is in the draft Environmental Impact Statement (EIS) process. The results of this process, including the recommended mode and alignment, should be presented to the Metropolitan Council in the next year or two. The Bottineau Boulevard LRT corridor to the northwest is in the Alternatives Analysis (AA) process.

In 2000, this region did not have a fixed guideway transit line in operation. We now have a successful LRT line, a soon to be opened commuter rail line, and more LRT lines in planning and design. We also know it is important to support the bus system, which is the backbone of the region's transit system. As Nick mentioned, we are the national leader in the use of BOSs on freeways and highways, with 270 miles in operation. Every express bus route in the region has access to a BOS for all or a portion of its trip. The use of these shoulders gives our customers a consistent travel time that they cannot get by driving alone.

In downtown Minneapolis, we are expanding the single bus lanes on Second Avenue and Marquette Avenue to dual bus lanes. This building-face to building-face reconstruction will also include new sidewalks, passenger shelters, better signage, real-time bus arrival and departure displays, better lighting, trees, and other amenities. When completed at the end of 2009, 180 buses an hour will be able to use the lanes compared to 60 buses an hour today. The \$30-plus million project is part of the UPA, which also advances key BRT elements in the I-35W and Cedar Avenue corridors.

We know that reliability is very important to our riders. All Metro Transit buses are equipped with global positioning systems (GPS), which allows us to know where every bus is at all times. If problems develop, we can begin corrective actions immediately. We are beginning to provide this real-time information on the status of buses to our customers. Real-time bus information is available on the Metro Transit Internet site, by telephone, and by Blackberry. We will be implementing real-time bus information signs along Marquette and Second Avenues in downtown Minneapolis, at park-and-ride facilities, and at other key locations.

Partnerships have been a critical element in advancing the transit infrastructure elements. We have many partners at the local, state, and federal levels. Nick mentioned Team Transit,

which is a first-in-the-nation partnership created 17 years ago involving Mn/DOT, transit providers, cities, and counties. The biggest success of Team Transit is the BOSs. Team Transit has also been effective in implementing ramp meter bypass lanes for buses and other low cost transit advantage projects.

We have a growing partnership with the seven counties in the region. Counties typically take the first steps in transit infrastructure development by conducting alternatives analyses, building community support, and completing environmental work. Counties are also key funding partners. The County Transit Improvement Board (CTIB) was established to distribute the quarter-cent sales tax recently enacted in five counties. CTIB-funded projects must be consistent with the Metropolitan Council's Transportation Policy Plan.

We are fortunate to have an outstanding working relationship with the FTA that evolved from our on-time, on-budget opening of the Hiawatha LRT line. The success of the Hiawatha line builds confidence for planning and construction future LRT lines.

The third element we are focused on in the region is trip reduction and a reduction in VMT. One of the UPA projects involves promoting telecommuting in the region focusing on an initiative now employed at Best Buy Co., Inc. called Results Only Work Environment (ROWE). Under this program, employees are given goals and deadlines and are empowered to set their own work schedules and agendas in pursuit of those goals. They do not need to report to work every day and may telecommute or work in other locations. As part of the UPA, we will be working to expand to the use of ROWE with other employers in the region.

Under a more traditional program, Metro Transit promotes and manages the region's travel demand management programs including ridesharing, carpooling, and vanpooling efforts. We maintain an on-line database with more than 10,000 people who want to share rides. This system is used by several local partners. Individuals seeking travel partners get a database match 90 percent of the time.

Similar to automobile drivers, we are seeing our transit customers making use of trip-chaining – making multiple stops per trip. We allow unlimited rides for 2.5 hours with each paid fare. Our transfer rate so far this year is up nearly 5 percent.

We work closely with the four Transportation Management Organizations (TMOs) in the region to promote transportation alternatives in specific geographic areas. The existing TMOs focus on Minneapolis, St. Paul, the I-494 corridor, and Anoka. The TMOs are great partners to promote transit, carpooling and vanpooling, biking, walking, and telecommuting with businesses and employers.

As Arlene mentioned, we are very proud of our partnerships with local communities. Over the past seven years, we have comprehensively realigned transit service in the region in a process we call sector studies. We actively engage local governments and citizens in these studies. We are in the process of completing a restructuring of service in the northwest portion of the region that includes extensive involvement of policymakers, city staff, and citizens. Their input helps to adjust service in accordance with community expectations and development patterns.

Thank you again for the opportunity to participate in this session. I hope you have a very productive conference and an enjoyable stay in Minnesota.

The I-394 MnPASS Experience

Ken Buckeye, Minnesota Department of Transportation

Thank you, Arlene. I would also like to welcome our out-of-town guests to Minnesota. I hope you have the opportunity to see some of the area and I hope you enjoy your stay here.

It is a pleasure to have the opportunity to participate in this session. I will begin by providing an overview of the I-394 HOV project and then discuss the expansion to the MnPASS HOT program. I will highlight some of the innovations included in the MnPASS program and the evaluations completed to-date. I will close by describing the next phase of the project.

I would like to acknowledge the contributions of numerous individuals to the different elements of the I-394 HOV and HOT lanes over the years. The project has truly been a team effort among agencies and among individuals.

Katie Turnbull's presentation in the opening session set the stage nicely for my comments on the I-394 MnPASS project. She provided a good history of the I-394 HOV project, including the development of the interim and final HOV lanes, the transit components of the project, and the expansion to the MnPASS HOT lanes. The experience on I-394 and the MnPASS program, which represents the first application of tolling in Minnesota, made considering expanding the HOV lanes on I-35W to include a HOT component as part the UPA project easier.

I-394 is a major east-west freeway serving Minneapolis and western suburban communities. The average daily traffic (ADT) is approximately 150,000 vehicles. The I-394 HOT lanes are 11-miles long. The corridor includes a three-mile, two-lane, barrier-separated reversible HOT segment directly to the west of downtown Minneapolis. The two-lane segment ends at Highway 100 and transitions into eight-miles of concurrent flow HOT lanes. This segment had unlimited access during HOV operations. With MnPASS, it has five eastbound and six westbound access points.

HOVs – buses, vanpools, and carpools – continue to use the I-394 HOT lanes for free. A 2+ vehicle-occupancy requirement is used on the facility. Motorcycles are also allowed to use the HOT lane without meeting the vehicle-occupancy requirement. The MnPASS HOT lanes are only tolled in the peak-period, peak-direction of travel. In the morning the HOT lane is tolled in the eastbound direction into downtown Minneapolis. In the afternoon it is tolled in the westbound direction. The reversible section is tolled whenever the facility is open.

As Katie noted, I-394 was the last major segment of the Interstate system to be constructed in the Minneapolis-St. Paul metropolitan area. There was a lot of controversy over the design and the cross-section of the facility. The state legislature ultimately provided guidance on the number of lanes that could be constructed. The HOV lanes were included in the final design to accommodate the anticipated demand within these limitations.

Construction of I-394 began in 1982 and the facility was completed in 1992. An interim HOV lane was used to help manage traffic during construction and to introduce the HOV concept to travelers in the corridor. The concurrent flow lanes operated with the HOV designation in peak periods, peak direction of travel. The lanes were open to general-purpose traffic at other times. The two-lane, barrier separated segment was open extended hours in the morning and afternoon, and closed to all traffic at other times. This segment was also open to HOVs during sporting and special events in downtown Minneapolis.

Although the HOV lanes were well used, there were ongoing concerns that the lanes were underutilized. There was a lot of legislative debate over the facility, even though studies indicated that it carried more peak-period passengers than the adjacent general-purpose freeway lanes. Even though the HOV lanes were performing quite well, there was still an image that the lanes were underutilized. A 2002 study indicated that there was about 50 percent capacity available in the lanes. The study results fueled discussion to convert the HOV lanes to general-purpose freeway lanes.

At the same time, there was a parallel process underway examining the application of congestion pricing in the region. An advisory committee, including legislators, community leaders, mayors, city council members, and interest groups concluded that pricing could have a role to play in addressing traffic congestion in the area.

State legislation in 2003 allowed Mn/DOT to expand any HOV lane in the Twin Cities region to a HOT lane operation. Based on this legislation, Mn/DOT awarded a design, build, and operate contract in 2003 for a HOT project on I-394. MnPASS became operational in 2005.

Four major goals were identified for the MnPASS project. These goals were to improve the efficiency of I-394, to maintain freeflow speed for transit vehicles and carpools, to use the excess revenues to improve highway and transit elements in the corridor, and to employ technologies for pricing and enforcement.

The I-394 MnPASS project included a number of innovations. It represented a public/private partnership for the expansion of HOV lanes to HOT lanes. It represented Minnesota's first self-funded transportation project. It was also the first HOT application on concurrent flow HOV lanes in the country. The use of multiple access points still allows travelers from communities in the corridor to benefit from the project. MnPASS was the first application of full dynamic pricing on multiple consecutive roadway segments, and featured technology applications to assist in enforcement, including read/write transponders and enforcement readers.

A community task force was formed to assist with planning and implementing the MnPASS project. The task force was charged with providing advice to the Mn/DOT Commissioner on hours of operation, vehicle eligibility, safety and enforcement, access points, traffic operations, transponders, and use of the anticipated revenues. The task force also assisted with public outreach and the evaluation of the project. Many of the task force members toured HOT projects in California as part of the planning process. Overall, the task force helped address numerous issues and became champions for the MnPASS project. The task force also understood that MnPASS was a demonstration project and changes may be needed.

As part of the change from unlimited to limited access, a double white stripe buffer was added between the HOT lane and the adjacent general-purpose freeway lane. A skip stripe is used to designate access/egress points. The electronic tolling technology was also added in the corridor.

The number of annual tolled trips increased during each of the first three years of operation. The first year there were 874,154 recorded toll trips, which translate to approximately 3,300 trips per day. The number of recorded toll trips increased to 908,899 in the second year. In the third year a total of 944,348 trips were recorded. These figures represent an annual growth rate of 3.6 percent to 3.9 percent. The highest usage occurs on Tuesdays, Wednesdays, and

Thursdays. There is a variation in eastbound and westbound toll trips. There are more eastbound toll trips, which may reflect higher use for work trips into downtown Minneapolis. The slight decline in toll trips in the westbound direction appears to be due to the construction of an auxiliary lane in the corridor.

There has also been a growth in the revenues on the project. Revenues for the first year of MnPASS operation were approximately \$575,000. Revenues increased to over \$1 million the second year. This past year, revenues reached approximately \$1.2 million. The revenue growth between the first and second years of operation represents an 84 percent increase. A much more modest increase of 2.4 percent was realized between the second and third years of operation. The revenue is now covering operating costs. The average toll in the corridor is \$1.15, but it varies by direction. The average toll in the eastbound direction is about \$1.50 per trip, while the average toll in the westbound direction is close to \$0.80 per trip.

Surveys have been conducted to obtain information on user satisfaction and user attributes. Overall, the satisfaction with all aspects of the project has been high. Approximately 95 percent of users reported satisfaction with the electronic tolling technology, 85 percent were satisfied with the traffic speeds in the lane, 76 percent were satisfied with the dynamic pricing, and 66 percent reported satisfaction with the safety of merging into and out of the HOT lanes.

The hours of operation are different for the two-lane reversible section and the concurrent flow section. The weekday operating hours for the concurrent flow section are eastbound from 6:00 a.m. to 10:00 a.m. and westbound from 2:00 p.m. to 7:00 p.m. The reversible section is open Monday through Friday from 5:00 a.m. to 1:00 p.m. in the eastbound direction and from 2:00 p.m. to 4:00 a.m. in the westbound direction. The reversible section is open some weekends for special events in downtown Minneapolis.

Dynamic pricing, based on the level of congestion, is used on the MnPASS lanes. The toll rates during the peak average from a \$1.00 to \$4.00, with an \$8.00 maximum. The off-peak average toll per section is \$0.25. The toll is based on traffic conditions in the HOT lane. It is based on data collected by Mn/DOT loop detectors and is updated every three minutes using six-minute averaged data. The toll is set based on a customizable set of rate tables. The existing toll, the level-of-service, and the rate of change determines the new toll. The toll is based on the worst traffic density point downstream of the access.

The operating hours on the concurrent flow section were initially 24/7 in both directions of travel with the implementation of the MnPASS program. This operating scenario represented a significant change from the peak-period, peak-direction of travel during the HOV lane operations. The 24/7 operation caused congestion in the morning in the westbound direction of travel due to high volumes of reverse commuters and the limited access points. There was vocal opposition to the 24/7 operations and a bill was introduced in the legislature to restrict the operating hours. As a result, the operating hours were reduced to the peak-hour, peak direction of travel, similar to the previous HOV operation.

Crash data has been monitored on a regular basis to ensure the safe operation of the facility for HOT lane users and travelers in the general-purpose freeway lanes. The number of annual crashes on I-394 has declined since the opening of MnPASS. The number of crashes declined by approximately 12 percent the first year, 26 percent the second year, and 40 percent the third year. These data reflect crashes throughout the I-394 corridor, not just crashes related

to the HOT lane. We are examining the data in more detail to better understand the factors contributing to the decline in crashes.

The peak hour vehicle volumes in the MnPASS lanes increased 9 percent to 33 percent after opening. The total I-394 roadway volumes increased by 5 percent. The entire corridor is operating at a better level-of-service. Travel speeds in the HOT lanes are at least 50 mph 95 percent of the time. Travel speeds on the general-purpose freeway lanes have increased by 2 percent to 15 percent. Transit operators indicate that the access points improve safety for their bus operators and that the HOT lanes remain free flowing.

Use of the HOT lanes by buses, carpools, and vanpools has increased. From 2006 to 2008, the number of buses operating in the HOT lanes increase by 16 percent and the number of bus riders increased by 25 percent. The number of vanpools and carpools, and the number of carpool and vanpool passengers increased by approximately 25 percent over the same time period.

Enforcement is one of the keys to the successful operation of a HOT lane. The Minnesota State Patrol is responsible for enforcing the I-394 HOT lanes. The use of advanced technologies to support enforcement is one of the innovative elements of the MnPASS project. A mobile enforcement reader located in State Patrol vehicles allows offices to determine if a single-occupant vehicle in the HOT lanes has a valid transponder. Visual enforcement of vehicle-occupancy requirements is still conducted.

State Patrol officers stopped approximately 3,300 vehicles in the first year of HOT operation, 5,200 vehicles the second year, and 4,900 vehicles the third year. Approximately half of these stops involved either not having at least two people in a vehicle to meet the carpool requirement or illegally crossing the double white lines. The violation rates on the I-394 HOT lanes are much lower than the violation rates on the I-35W HOV lanes.

The experience with the MnPASS project on I-394 indicates that adding a HOT component does make better use of an existing HOV lane, further providing HOV and HOT options for travelers. Public acceptance of the MnPASS project is high. The general-purpose freeway lanes also operate better. The success of the I-394 MnPASS project has created additional opportunities, including the UPA project expanding the HOV lanes on I-35W to HOT lanes.

The next phase of the MnPASS project represents an extension of the original project vision. Further improvements will be made to enhance the operation of the facility and to increase efficiency. The MnPASS model focuses on creating synergy with the facility design, transit advantages, and land use integration.

LUNCHEON – INNOVATIVE TRANSPORTATION PARTNERSHIPS IN MINNESOTA

Katie Turnbull, Texas Transportation Institute, Presiding

Innovative Transportation Partnerships in Minnesota

Peter Bell, Chairman, Metropolitan Council of the Twin Cities

I want to join in welcoming you to the Twin Cities. I know you have already heard from several local speakers. You will be hearing from many more about some of the specific transportation projects and partnerships in our region. I will attempt to provide an overview and some historical context to transportation partnerships in the Twin Cities.

As you may have already learned, the Metropolitan Council is heavily involved in transit and transportation. As the MPO for our region, we work closely with Mn/DOT and local officials on the development of the long-range transportation plan, as well as programming federal transportation funds. We operate both Metro Transit, which provides more than 90 percent of the region's regular-route transit service, and Metro Mobility, which provides transportation for individuals with special needs.

Before I talk about HOV and HOT lanes, I should briefly describe the Metropolitan Council and what we do. The Council was created in 1967 to plan for the orderly development of the seven-county metropolitan area and to coordinate the delivery of certain public services that could best be provided at the regional level. The Council consists of 17 members appointed by the governor – 16 from geographic districts of equal size and a chair who serves at large.

In 1994 we were given operating responsibilities for public transportation and wastewater collection and treatment. Almost overnight, we grew from a planning agency with a few hundred employees to one of Minnesota's largest governmental agencies, with approximately 3,700 employees and an operating budget of approximately \$700 million a year.

Our region has a long history of cooperation and involvement in providing financial and travel-time incentives to HOVs and transit. In 1971, the region first began implementing ramp meters and HOV bypass lanes on the entrance ramps to I-35W south of downtown Minneapolis. This system has since been expanded to include virtually the entire freeway system.

The first freeway express buses began operating at the same time, operating on I-35W between Bloomington and downtown Minneapolis. In the 1980s, the design and construction of I-394 west of downtown Minneapolis included diamond lanes and a reversible, dedicated HOV lane. The project included new express bus service with suburban transit stations and park-and-ride facilities, as well as three downtown parking garages with special low rates for carpools using the HOV lanes. In the mid 1990s, HOV lanes were added to I-35W south of I-494.

A hallmark of regional cooperation is Team Transit, which is a partnership between Metro Transit, Mn/DOT, the Metropolitan Council, the cities of Minneapolis and St. Paul, other transit providers, and counties and municipalities in the metropolitan area. Team Transit officially came into being in 1991. Team Transit is responsible for planning and coordinating roadway improvements for transit. Examples of improvements include bus shoulders, HOV lanes, park-and-ride lots, and HOV bypass lanes at freeway ramp meters.

The first BOS lane was tested in 1991 on Highway 252 north of downtown Minneapolis. In 1993, the first general use of a shoulder lane occurred on Highway 77 in Bloomington as an emergency measure to reduce congestion caused by flooding of the Minnesota River. The success of shoulder lanes on arterial streets and on Highway 77 served as the catalyst for implementing such facilities on other highways in the region.

Since the early 1990s, the region has developed an extensive system of BOS lanes, with more than 270 directional miles of shoulder lanes currently in operation. A 2007 FTA study on the effectiveness of our bus-shoulder system reported that the total number of shoulder-lane miles in the Twin Cities was 10 times that of the remainder of the country combined.

While the success of the I-394 HOV lanes was evident for transit and carpoolers, the capacity of the HOV lanes was not fully utilized even after a decade of operation. After an earlier local initiative to convert the HOV lanes to general-purpose lanes failed, the I-394 HOV lanes were converted to HOT lanes as part of the MnPASS initiative by Mn/DOT.

This HOV-to-HOT expansion was a major test for the region. It is fair to say transit operators were concerned about losing freeflow travel conditions, as well as the ability for buses and automobiles to safely merge in the designated access segments.

Through a vigorous process with transit providers and the local community, including local elected officials as well as community and business representatives, operational issues were vetted and addressed. Because of that process, we have a successful HOT lane on I-394 today.

I-394 toll revenues generate enough today to essentially fund the MnPASS operating costs – a break-even situation so to speak. So, even though the Legislature directed 50 percent of excess toll revenue to fund increases in transit service in the corridor, that revenue has not yet materialized.

The experience with the I-394 HOT lane prompted Mn/DOT and the Metropolitan Council to explore tolling as an innovative approach to congestion relief for the regional freeway system. The study found that an interconnected system of MnPASS toll lanes would be an effective congestion management tool, not a revenue-generating device. Moreover, it found public investment is required, since MnPASS lanes are not expected to recover their full capital cost. As a result of this finding, Mn/DOT and the Council executed a Memorandum of Understanding in 2006 that all future highway expansion studies would consider the option of a managed lane.

The success of the I-394 HOT lane laid the groundwork for our UPA project. With a \$133 million grant from the USDOT, we will convert an existing HOV segment on I-35W, as well as an under-construction HOV segment, to HOT lanes and implement a new idea we call a PDSL.

I view the PDSL as the next evolution of HOT lanes – where we use the shoulder capacity rather than a new or expanded general-purpose freeway lane for pricing. Mn/DOT, working closely with FHWA, is leading this highway improvement, which will provide a continuous priced lane option from the suburban area south of the Minnesota River to downtown Minneapolis.

We are very appreciative of the USDOT for selecting our region for a UPA grant and applaud the innovation demonstrated by Mn/DOT. Our expectation is that this priced shoulder

lane will offer a new transportation solution to congestion to the entire nation. We look forward to its opening in September 2009.

While we have accomplished a great deal in this region, it has not been without both challenges and partnerships along the way. The public continues to be suspicious of private partnerships in funding and/or owning tolled roads. Some would say this would be letting the camel's nose get under the tent.

Many, including our own Minnesota Congressman and Chair of the House Transportation Committee, resist tolling and make some valid points. For example, there is a concern about whether a basic "public good," such as a road, should belong to a private company, possibly even one that is foreign-owned.

Then there are those who argue for more intensive tolling. When trying to decide on our UPA proposal, some lobbied for conversion of existing general-purpose lanes to tolled lanes on I-35W. This is much more controversial because it represents a "take-away" to the general public. Pricing of new capacity is much less controversial.

In Minnesota, local units of government have a statutory "municipal consent" approval for highway improvements located in their communities. Gaining municipal consent was a challenge for the I-35W HOV segment now under construction in south Minneapolis. The city wanted a transit solution, such as a busway, rather than the proposed HOV lanes also used by carpools, and denied granting municipal consent. Final resolution required lengthy negotiation and ultimately mediation to reach the HOV solution.

As with all metropolitan areas, many differing opinions exist among the numerous stakeholders. Partnerships are essential to work through the many differing opinions and legitimate issues. We have many successful partnerships in this region at the state, county, and local levels.

The Council and Mn/DOT have a long-standing history of cooperation and partnerships that would be the envy of most state departments of transportation and MPOs in the country. The UPA project is a most recent example, with numerous partners involved. Particularly interesting is that the UPA parties all readily agreed to the HOT lane upgrade for the same I-35W freeway segment that had the lengthy municipal consent process for a HOV lane.

Other examples of partnerships include construction of the region's first light rail line, the Hiawatha line, which was constructed by Mn/DOT while being owned and operated by the Metropolitan Council. The region's first commuter rail line, the Northstar line, is under construction now.

Thank you very much for this opportunity to speak to you about the Metropolitan Council and the transportation partnerships in the Twin Cities. I hope you enjoy the conference and your time in Minnesota.

BREAKOUT SESSION – WHAT’S THE HOV/HOT NEWS ACROSS AMERICA?

John Doán, SRF Consulting Group, Inc., Presiding

I-95 HOT Lanes in Miami/Ft. Lauderdale

Debora Rivera, Florida Department of Transportation

Debora Rivera discussed the 95 Express project, which is one of the Miami UPA projects. She described current conditions in the I-95 corridor, the other UPA project elements, and the experience implementing the first phase of the 95 Express. Debora covered the following points in her presentation.

- South Florida has some of the worst traffic congestion in the country. Travelers in the region experience long commute times, low operating speeds, and trip-time unreliability. The I-95 general-purpose freeway lanes average 13 to 16 mph and the HOV lanes average 20 to 31 mph.
- The region’s population is projected to increase by 45 percent from 2000 to 2030. That increase equates to approximately 360,000 more vehicles per day on the region’s freeways and roadways. In 2005, commuters experienced 50 hours of delay per year. Traditional solutions have focused on increasing the transportation supply. Agencies in the Miami-Ft. Lauderdale region responded to the USDOT UPA initiative to reduce congestion in the I-95 corridor.
- The Florida Department of Transportation (FDOT) is the lead agency on the Miami UPA. Other partnering agencies include the Miami-Dade Expressway Authority (MDX), the Miami-Dade MPO, the Broward MPO, Miami-Dade Transit, Broward County Transit, and the Florida Turnpike Enterprise.
- The Miami UPA projects combine added capacity, value-priced express lanes, transit improvements, bottleneck removal, and complementary operating strategies. The value-priced express lanes on I-95 are called the 95 Express. They replace the existing HOV lanes on I-95. The transit elements include BRT, carpools, and vanpools.
- The projects focus on a 21-mile section of the I-95 corridor, which connect numerous regional facilities. The HOT conversion includes expanding single HOV lanes in each direction to two HOT or express lanes in each direction. Variably-priced tolls will be used to optimize traffic flow. The BRT element will enhance reliable public transportation in the I-95 corridor.
- The freeway cross-section included four general-purpose freeway lanes and one HOV lane in each direction of travel. The new cross-section includes four general-purpose lanes and two HOT express lanes in each direction of travel. To accommodate the additional express lanes, all travel lanes are 11 feet wide. Delineators are being used to separate the express lanes from the adjacent general-purpose lanes.

- The BRT element will expand or extend transit services in the corridor. The current transfer at the Broward/Dade County line will be eliminated. Miami-Dade 95 Express bus service will be enhanced. Bus service into Miami will also be provided on US 441 and University Drive in Broward County. Additional new routes and extensions to existing routes may be implemented in the future.
- The current 95 Express lanes represent the first of three phases. Phase 1A, which includes the northbound lanes on I-95 from SR 112 to the Golden Glades Interchange is almost complete. Traffic is using the facility but the tolling element has not been implemented. Phase 1B, which includes the full system northbound and southbound from I-395 to the Golden Glades Interchange, is scheduled for completion in the fall of 2009. Phase 2, which includes the full system northbound and southbound from Golden Glades Interchange to I-595/Broward Park-and-Ride, is scheduled for completion in the winter of 2011. Lane closures are currently restricted to night time and weekend hours to minimize negative impacts on travelers in the corridor.
- The 95 Express lanes are separated from the general-purpose lanes by delineators. Variable toll rates, based on the level of congestion or demand, will be used on the 95 Express lanes. The existing SunPass electronic toll collection will be used. Toll-free customers include registered 3+ carpools and vanpools, transit buses, hybrid vehicles, and motorcycles. The Florida Highway Patrol is responsible for enforcement during the initial phases, with citations issued to carpools with less than three persons, and trucks.
- The 95 Express lanes are estimated to have a number of benefits. A 50 percent travel time reduction from using the 95 Express lanes from the Golden Globe Interchange to SR 112 is projected. For transit riders, the transfer delay at the Golden Globe Interchange will be eliminated. The 95 Express lanes did not require any additional right-of-way and minimal construction was necessary. The project allows rapid delivery of improved mobility in the corridor. It also offers benefits that traditional freeway widening alone cannot provide, including encouraging ridesharing, providing incentives for transit use, implementing demand management, and reducing or eliminating trips.
- Some issues were encountered with the opening of the initial section of the 95 Express lanes, even though the tolling element has not been implemented yet. Driver confusion resulted in crashes, generating negative publicity for the project. A number of measures were taken to quickly address these issues. Physical improvements implemented included extending the delineators on I-95, reducing the spacing between delineators, and replacing white delineators with orange delineators to improve their visibility. Other changes included adding warning signs advising drivers of the distance to the next exit, pavement markings advising “express only,” and removing references to I-595. Beginning the ramp signal project was also delayed. Additional public information has been provided through additional electronic message boards, highway advisory radio, billboards, public service announcements, and press releases.

- The experience with the implementation of the initial segment of the express lanes highlights a number of important lessons. First, performing an operational analysis early in the process to identify potential problems is important. Second, it is important to anticipate needs in contract documents. Third, conducting more public outreach is necessary, with an emphasis on operation not construction. The outreach should focus on milestones critical to the public, not the project. In addition, the rate of work should not outpace the ability to communicate changes to the public. Developing a strong, simple, and consistent communication plan is important. Driving tips, press releases, and marketing are all important. The signing and marking plans should consider signing for build-out and intermediate phases. It is important not to sign for elements that do not yet exist. Developing a risk management plan for opening day and beyond is important. The process on I-95 identified 32 risks. The top two were delineator spacing and signing. Including the contractor as a risk owner in these efforts can be a good strategy. Comprehensive contract documents are also important.

Congestion Pricing in Los Angeles County – Providing Choices as a Solution to Traffic Congestion

Stephanie Wiggins, Los Angeles Metro and Darren Henderson, Parsons Brinckerhoff

Stephanie Wiggins and Darren Henderson discussed congestion pricing activities in Los Angeles County. They described the traffic congestion problem in the county, the elements of the CRD, and current activities. Stephanie and Darren covered the following points in their presentation.

- Los Angeles has a reputation for some of the worst traffic congestion in the country. Traffic congestion and the resulting air pollution in Los Angeles County has attained legendary status. The population in Los Angeles County is forecast to increase from approximately 10.0 million to 12.3 million by 2035. Without major improvements, traffic congestion expected to increase by over 50 percent.
- Despite the increase in travel demand, transportation revenues are shrinking. As a result, transportation agencies in the area are exploring new ways to maximize efficiency from existing facilities and future investments.
- In the fall of 2007, the Los Angeles County Metropolitan Transportation Authority (Metro) released a request for proposal (RFP) for a Countywide Congestion Pricing Plan. Metro also applied for USDOT funding through the UPA/CRD program. In April of 2008, Metro awarded the development of Countywide Congestion Pricing Plan to a consulting team led by Parsons Brinckerhoff. Metro was also notified of its selection to receive funding through the CRD.
- Partners in the CRD include Metro, the California Department of Transportation (Caltrans), and other regional and local transportation agencies. A total of \$210.6 million is available to implement the demonstration project.
- The Los Angeles CRD Plan focuses on implementing “FastLanes” demonstration projects. The HOV lanes on the I-10 El Monte Busway and the I-110 Harbor Transitway will be converted to HOT lanes. Investments will also be made in

transit services in the I-10 and the I-110 corridors. The “FastLanes” are intended to test innovative strategies to alleviate congestion, to maximize freeway capacity usage, and to help finance additional transit options.

- Examples of specific projects that may be funded through the CRD include new buses, expanded vanpool programs, enhanced park-and-ride lots, increased local bus access, and traffic management strategies.
- A Concept of Operations (ConOps) plan is being developed as part of the Countywide Congestion Pricing Plan. Steps in developing the ConOps plan include analyzing current conditions and alternative concepts, and assessing the performance of each alternative. This performance assessment includes analyzing traffic volumes and speeds, toll optimization, and revenue estimates for the alternatives. Technical, institutional, and enforcement requirements are also being examined. An extensive community and legislative outreach effort is underway as part of the project.
- The HOV lanes on I-10 and I-110 are near capacity during peak hours. Pricing and other congestion management strategies can help better manage demand throughout the day on these facilities. Increasing transit services, enhancing vanpool options, and improving park-and-ride amenities are being proposed to assist in inducing a mode shift. A mode shift of up to 7 percent is being targeted. Additional HOT capacity would be available for priced lower-occupancy vehicles with this mode shift.
- The preferred demonstration concept for I-10 includes retaining the current free use among eligible HOV 3+ during the peak periods and eligible HOV 2+ during the off-peak periods. All other users currently allowed free access, such as hybrid vehicles, would also continue. Single-occupant vehicles and HOV2 would be tolled at the same rate during the peak periods only, as space permits. The lanes would revert to HOV 2+ operations only during the off-peak periods. In addition, the opportunity exists to add one additional HOT lane in each direction along a segment of I-10. Design exceptions would be required to avoid right-of-way acquisition for this option.
- The preferred demonstration concept for I-110 includes retaining the current free use among eligible HOV 2+ carpools and single-occupant hybrids vehicles. Single-occupant vehicles would be tolled during the peak and off-peak periods, as space permits.
- Traffic conditions at select locations are currently being examined. These locations include northbound I-110 at Adams Boulevard and the northern termini of the I-110 Harbor Transitway. The impact of the Expo LRT line currently under construction is also being examined.
- The ConOps plan includes the use of all electronic open-road tolling. All vehicles will likely be required to have transponders. Dynamic, segmented pricing will be used. The potential application of differential payment classes with self declaration using a switchable transponder is being examined.

- The ConOps plan is also examining enhanced enforcement for HOV/toll violations. Requiring transponders in all vehicles simplifies toll enforcement. Enforcement areas at select locations will be provided, and roving enforcement patrols using mobile transponder readers are being explored.
- Next steps in the planning and project development phases include securing state legislative authority by October and refining the ConOps plan to establish HOT implementation plans for I-10 and I-110. Caltrans will conduct simultaneous environmental clearances for both corridors. A low-income economic impact assessment will be conducted. Extensive community outreach will also continue.
- Other future activities include evaluating a full range of congestion pricing options for Los Angeles County. The Los Angeles Department of Transportation (LADOT) Intelligent Parking Program incorporates demand-based pricing for parking. Additional corridor congestion pricing opportunities will also be explored. A related effort in southern California is the Southern California Association of Governments (SCAG) Congestion Pricing Study.

Freeway HOV Lanes in the Toronto Area: A Case Study in Successful Planning and Operation

Stephen Schijns, McCormick Rankin Corporation

Stephen Schijns discussed the freeway HOV lanes in the Toronto area. He described planning, designing, implementing, and enforcing the HOV lanes. He also reviewed the performance measures used to evaluate the HOV lanes and the communication techniques used with outreach efforts. Stephen recognized the assistance of Mike Oliveira, McCormick Rankin Corporation, and Rebecca Li, Ministry of Transportation, with the preparation of the presentation. Stephen covered the following points in his presentation.

- The HOV network concept and policy was developed in the late 1980s. The HOV/bus lane functional plan was completed in 1998. Consideration of bus bypass shoulders began in 1995. The widening design was completed in 2002, and HOV adoption followed in 2003. Construction occurred in 2004 and 2005, with the HOV lanes on Highway 403 and the southbound HOV lanes on Highway 404 opening in 2005. Performance monitoring was initiated in 2006. The northbound HOV lanes on Highway 404 opened in 2007.
- Observing and learning from the experience with HOV facilities in other areas, especially in the U.S., has been an important part of the planning process. A best practices for Ontario applications was developed along with new design guidance. Similar to other areas, changes in elected officials have influenced transportation priorities and the development of HOV facilities in the Toronto area. Based on political direction, designs for general traffic lanes were adapted for HOV use. The potential of reverting to general traffic lanes if the HOV lane did not work out provided a back-up plan for decision makers.
- A number of planning and operational design principles were established. These included the use of buffer-separated HOV lanes with designated access/egress zones. A 24/7 operating scenario is used, along with a 2+ vehicle occupancy designation. Buses are allowed to operate on the shoulders of Highway 403.

Both Highway 403 and Highway 404 were six-lane freeways, with three lanes in each direction, before adding a general-purpose freeway lane or HOV lane was considered.

- New design standards for HOV lanes were established for use in Ontario. These standards address the layout, signage, pavement markings, enforcement, bus-on-shoulder infrastructure, and direct HOV ramps. Bilingual signing in English and French is used. Enforcement design elements include median and shoulder observation areas and enforcement areas on ramps.
- The widening of both highways was originally designed for adding a general-purpose lane in each direction of travel. The cross section was adapted to include an HOV lane in each direction, rather than an additional general-purpose freeway lane. Other HOV features include access/egress areas, signage, and enforcement pockets.
- The bus bypass shoulders were implemented on Highway 403 in 2001. The HOV lanes were opened in 2005. The southbound HOV lane on Highway 404 was opened in December 2005. The northbound HOV lane opened in July 2007. The resulting cross section includes the bus bypass shoulders, three general-purpose lanes, and the HOV lane in each direction of travel.
- The approach to enforcement recognizes the key role of the Ontario Provincial Police. A liaison was established with the Ontario Police to identify operational needs. Standards for enforcement infrastructure were developed. A memorandum of understanding was established to define the level of effort for enforcement. Funding was identified to support the initial enforcement program. The legal basis for enforcement was established through legislation. Media relations were undertaken to advise the public of the enforcement program.
- The performance-monitoring program included collecting and analyzing data before construction, one month after opening of the HOV lanes, six months after opening, and after 16 months of operation. Performance measures include HOV lane utilization, travel times and speeds, vehicle-occupancy levels, and mode share. Other performance measures include HOV lane violations, HOV lane operations, and collisions.
- Use of the Highway 403 and Highway 404 HOV lanes grew over the first 16 months of operation. Volumes on the Highway 403 HOV lanes at Maryland during the morning peak hour in the southbound direction increased from approximately 920 vehicles one month after opening to 1,200 vehicles after 16 months of operation. The AM peak hour HOV lane use on southbound Highway 404 increased from 1,000 vehicles after one month to approximately 1,280 after 16 months of operation.
- Users of the HOV lanes on Highway 403 and Highway 404 realize travel-time savings over vehicles in the general-purpose freeway lanes. The travel times in the HOV lanes have remained relatively constant, while travel times in the general-purpose freeway lanes are now longer due to increased congestion. The vehicle-occupancy rates for Highway 403 and Highway 404 are higher than

freeways in the area without HOV lanes. Transit and carpooling mode share increased after the HOV lanes were opened.

- The operation of the HOV ingress/egress segments was examined. The results indicated uncongested vehicle movements entering and exiting the HOV lanes most of the time. A few instances of speed reductions and stop-and-go traffic during these maneuvers were identified.
- The violation rates in the HOV lanes were in the range of 3 percent to 7 percent in the initial months after opening. The most recent information indicates the violation rates have been lowered to 1 percent to 2.5 percent. Approximately 250 tickets are issued each month for occupancy violations and crossing the buffer illegally.
- Collision data have been mixed. The collision rates on Highway 403 increased slightly after the opening of the HOV lanes. On Highway 404, the collision rates declined slightly after the HOV lanes opened. Rates on both facilities remain within the average range for Ontario freeways. An increase in lane change collisions and a decrease in rear-end, side-swipe, and single-vehicle collisions have been recorded.
- The results from the performance-monitoring program highlight some interesting observations. In terms of demand forecasting, the HOV demand on Highway 403 eastbound is twice the initial estimate. The HOV lane speeds appear to be higher than speeds on HOV lanes in other areas. The buffer and shoulder width allow higher speed differentials, which may be a concern at exit points. Platooning does occur in the HOV lane. This may be beneficial in creating gaps for HOVs entering HOV lane, but it may cause concerns in long corridors due to lack of passing opportunities. The experience in Toronto indicates that occupancy data collection between November and March should be avoided due to darkness during normal commute hours.
- A strategic communications plan was developed and implemented as part of opening the HOV lanes. The plan focused internally on staff, executives, the Minister, and the police. It also included media relations focusing on traffic reporters and transportation columnists. Key elements of the media relations program included Ministerial announcements, photo imagery, and promotion of the HOV network map. The Ministry of Transportation Website included information on using the lanes and frequently asked questions. An educational video was developed and disseminated. Finally, the results from the performance-monitoring program were widely distributed.
- Watching a video of the HOV lane in operation highlights a few points. First, HOV lane motorists respect the buffer, and even in the HOV lane, drivers tend to shy away from the buffer. The buffer and shoulder width combine to ease concerns about speed differentials. Entering the HOV lane from the general-purpose lanes is usually not a problem, although some motorists cross the buffer illegally. Exiting from the HOV lane in a congested area can be problematic. It appears to work reasonably well in the location shown, even though the general

traffic lanes are congested. If it becomes worse, there is always the option of introducing a speed change lane between the HOV lane and the general-purpose lane to reduce the risk of rear-end collisions in the HOV lane as vehicles slow to exit. The 400-meter gap provides adequate room for everyone who wants to find room to change lanes. The presence of a wide median shoulder is very useful. Some drivers use it to smoothly bypass an HOV slowing to exit.

MnPASS Users – Who Are They?

Lee Munnich, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota

Lee Munnich discussed the use of the I-394 MnPASS lanes. He highlighted trip and toll characteristics and summarized the results of panel surveys conducted of travelers in the I-394 corridor and the I-35W corridor. Lee covered the following points in his presentation.

- The Minneapolis-St. Paul Metropolitan area has a population of approximately 2.6 million people. The Twin Cities has a diverse and vibrant economy. The region continues to experience growth. Traffic congestion is increasing as well. I-394 is a major east-west radial route, linking the western suburbs to downtown Minneapolis. The ADT is approximately 150,000 vehicles, with 5 percent heavy commercial vehicles.
- Funding from the Federal Value Pricing Pilot Program was used to conduct panel surveys of travelers in the I-394 corridor, including MnPASS users, carpoolers, and bus riders. A similar panel survey of travelers in the I-35W corridor was conducted, which acted as a control corridor. Three waves of surveys were conducted.
- There was an overall reduction in congestion in the I-394 corridor, not just the HOT lanes, with the introduction of the MnPASS program. Travelers in the general-purpose freeway lanes realized a reduction in congestion, although travel conditions were better in the HOT lanes.
- The average toll paid by MnPASS users for the 12-month period from May 2007 to April 2008 was \$1.15. Approximately 70 percent of MnPASS trips begin or end in the reversible section. Longer trips are the norm for use of the HOT lanes. The highest use of the HOT lanes occurs on Tuesdays and Wednesdays. The lowest weekday use occurs on Fridays. Approximately 52 percent of MnPASS trips are made in the eastbound direction, toward downtown Minneapolis, which accounts for some 65 percent of the revenue. The addition of an auxiliary lane west of Highway 100 reduces westbound use and revenue. Speeds in the MnPASS lanes are above 50 mph 95 percent of the time.
- A valid MnPASS transponder is required to use the HOT lanes. Individuals may register to lease a MnPASS transponder at the MnPASS Service Center or on the MnPASS Internet site. Approximately 4,000 transponders were leased by the first day of MnPASS operations. Within a year, this figure had increased to 9,000 transponders. The growth has slowed somewhat, with approximately 12,000 transponders currently leased.
- On a typical day, approximately 30 percent of all transponders are used. The average user makes two-to-three tolled trips per week. The survey results indicate

there are a wide range of users. The survey results indicate that MnPASS usage is higher among full-time workers, homeowners, individuals between the ages of ages 35 and 55, individuals with incomes over \$50,000, and women.

- Before-and-after panel surveys were conducted of commuters in the corridor and in the I-35W corridor, which was used as a control corridor. A second survey of MnPASS users was conducted, partly because only a small number of MnPASS users were captured in the panel survey. Another sample of transit users, who were also underrepresented in the panel survey, was also conducted. Carpoolers were adequately represented in the initial panel survey.
- The responses from all the surveys indicate that all income levels use the MnPASS lanes, although use is higher among travelers in higher income groups. Approximately 75 percent of respondents in the high-income group (annual incomes over \$125,000) reported using the MnPASS lanes, compared to 70 percent for the middle-income group (annual incomes of \$50,000 to \$125,000), and 55 percent for the low-income group (annual incomes less than \$50,000).
- Respondents were asked if they used the MnPASS lanes as a toll paying single driver, a carpooler, or a bus rider. Use as a toll-paying driver was highest among high-income group. A total of 40 percent of the respondents in the high-income group reported using the MnPASS lanes in the past year as a toll-paying driver, compared to 18 percent of the middle-income respondents, and 7 percent of the low-income respondents. Carpool use was highest among the low-income group, at 75 percent, compared to 66 percent for the middle-income group, and 52 percent for the high-income group. Reported bus use was 12 percent for the low-income group, 13 percent for the middle-income group, and 6 percent for the high-income group.
- Respondents were also asked their opinion of allowing single drivers to use the HOV lanes by paying a toll. The responses were fairly similar across all income groups, although a larger percentage of individuals in the higher income group favored the idea. A total of 71 percent of the high income group reported support for the concept, compared to 62 percent of the lower income group, and 60 percent of the middle-income group. These responses may indicate that individuals with lower incomes value having the option available, even though they may not use it as often as individuals with higher incomes.
- The impacts of MnPASS on transit ridership, carpools, and vanpools have also been examined. There was some concern that the MnPASS program would encourage people to change from an HOV mode to driving alone and paying a toll, as well as degrading the travel-time savings for buses, carpools, and vanpools. From 2006 to 2008 there was a 16 percent increase in the number of buses operating in the HOT lanes during the morning peak period and a 25 percent increase in transit ridership. The number of carpools and vanpools using the lanes during the morning peak period increased by 25 percent between 2006 and 2008. While the price of gasoline and other factors influenced these increases, MnPASS does not appear to have degraded HOV use.

- The panel survey participants in both the I-394 corridor and the I-35W corridor were asked about being delayed by congestion. On I-394, 37 percent of the respondents reported being delayed by congestion in the fall of 2004, before implementation of MnPASS. Responses to the same question in the fall of 2005 and the spring of 2006, with MnPASS in operation, declined to 29 percent, indicating that fewer commuters were experiencing congestion. In comparison, 33 percent of the respondents in the I-35W corridor reported experiencing congestion in the fall of 2004. In the fall of 2005, 37 percent reported experiencing congestion. Individuals experiencing congestion of I-35W increased to 39 percent in the spring of 2008.
- Enforcement of the MnPASS lanes was also examined. During the first year of operation, there were approximately 3,300 enforcement stops. Of these stops, 50 percent involved HOV violations or drivers crossing the double white line. The violation rate on I-394 is much lower than on I-35W. The violation rates on I-394 are different in the reversible, barrier separated segment and the concurrent flow segment. Prior to MnPASS, the violation rates in the reversible section were approximately 7 percent. The violation rate declined from 20 percent to 9 percent on the concurrent flow section before MnPASS and with MnPASS. In comparison, the violation rates on the I-35W HOV lanes increased from 23 percent to 33 percent over the same time period. There was no increase in enforcement on I-35W during the time period, however. The high violation rate on the I-35W HOV lanes was one of the factors influencing expanding it to HOT lanes as part of the UPA.

BREAKOUT SESSION – MINNESOTA’S URBAN PARTNERSHIP AGREEMENT – HOT, PRICED DYNAMIC SHOULDER LANES, TRANSIT, TELECOMMUTING, AND MORE

Connie Kozlak, Metropolitan Council, Presiding

Minnesota Urban Partnership Agreement, I-35W HOV to HOT Conversion and Priced Dynamic Shoulders

Nick Thompson, Minnesota Department of Transportation

Nick Thompson discussed the HOT lanes and the PDSL components of the Minnesota UPA. He described the agencies and jurisdictions involved in the Minnesota UPA, the expansion of the existing HOV lanes to HOT lanes, the construction of new HOT lanes, and the PDSL. Nick covered the following points in his presentation.

- Mn/DOT and the Metropolitan Council are the lead agencies on the Minnesota UPA. Metro Transit is part of the Metropolitan Council. Other participating agencies and jurisdictions include the Minnesota Valley Transit Authority (MVTA), the City of Minneapolis, and Anoka, Dakota, Hennepin, and Ramsey counties. The Center for Transportation Studies and the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota are also partners in the UPA.
- The Minnesota UPA consists of seven highway projects, 14 transit projects, and a major new telecommuting program. It represents a \$183 million investment. The projects include a mix of new concepts to match the UPA focus and accelerating existing innovative projects, which had received consensus through the planning process.
- A key highway component of the Minnesota UPA is the I-35W managed corridor. A 16-mile section of I-35W south of downtown Minneapolis will include expanding existing HOV lanes to HOT lanes, constructing new HOT lanes, and implementing a PDSL. Active traffic management and speed harmonization will also be used. Real-time traffic and transit information will be provided at strategic locations along the I-35W corridor. New auxiliary lanes are being added in two sections to address bottlenecks.
- The HOT lanes area being implemented in different segments. Approximately 10 miles of existing HOV lanes will be expanded to HOT lanes. Four miles of new HOT lanes are being constructed in the Crosstown Commons section. The PDSL will be approximately two miles in length, providing a northbound connection from the HOT lane into downtown Minneapolis. A future two-mile extension of the HOT lanes to the south is also anticipated.
- The concept of the PDSL is based on the use of dynamic shoulder lanes in the United Kingdom, including the project in operation on M42. Active traffic management, including speed harmonization and additional incident response, will be used with the PDSL.

- The HOT lanes on I-35W will use the same general design, tolling technology, and operations as the I-394 MnPASS HOT lanes. The continuous access currently provided on the HOV lanes will be changed to limited access points. Similar to I-394, a double white line will be used to designate the areas where access is not allowed. It is anticipated that there may be more access points on the I-35W HOT lanes than on the I-394 HOT lanes, but the operations plan is still being finalized.
- Similar to the I-394 MnPASS HOT lanes, dynamic pricing will be used on the I-35W HOT lanes and the PDSL. The toll will be based on the level of congestion in the HOT lanes and the PDSL. The toll rates will be updated every three minutes based on data collected by the Mn/DOT loop detectors and a customized set of rate tables.
- The Minnesota State Patrol will be responsible for enforcing vehicle-occupancy levels, toll payments, and operating requirements. The mobile enforcement readers developed for the I-394 HOT lanes will be used on the I-35W HOT lanes and the PDSL.
- State legislation was needed to implement some of the UPA projects. Legislation was approved allowing vehicles to operate on the shoulder and providing Mn/DOT with the authority to toll vehicles for use of the shoulder. This legislation provided Mn/DOT with the ability to implement and operate the PDSL. The legislature also provided the funding needed for the local match and the telecommuting project. Most of the Minnesota UPA projects will be implemented between September and December 2009. Due to the previously established construction schedule, the HOT lanes in the Crosstown Commons section will be completed in October 2010.

Minnesota Urban Partnership Agreement: The Transit “T”
Craig Lamothe, Metro Council/Metro Transit

Craig Lamothe discussed the transit elements of the Minnesota UPA. He described the goal and objectives of the transit component, the various UPA transit projects, and the current status of activities. Craig covered the following points in his presentation.

- The goal of the UPA transit elements is to provide an attractive alternative to paying to use the HOT lane on I-35W or driving alone in the general-purpose freeway lanes. The objectives to accomplish this goal are to improve the speed and the reliability of buses operating in the corridor, to enhance the appeal and convenience of transit, and to increase the capacity of transit.
- The speed and reliability of buses operating in the corridor will be increased through the implementation of a number of elements. An increase in the average operating speed of buses through downtown Minneapolis will be realized by replacing a single bus lane with dual bus lanes on Marquette and Second Avenues. This project, known as MARQ2, will more than double the number of buses that will be able to travel through downtown Minneapolis in the peak periods. Replacing BOSs with HOT lanes and the PDSL will increase the maximum operating speed for buses on freeways from 35 mph to 50 mph.

Reducing delay and daily uncertainty for northbound buses on Hwy 77 will be realized through the implementation of a “Transit Advantage” traffic signal. ITS technologies will be implemented in a lane guidance system for shoulder-running buses and a transit signal priority (TSP) system. The lane guidance system will be deployed on buses operating on Cedar Avenue and the TSP will be implemented on local streets paralleling I-35W to improve local bus travel times and reliability.

- A number of projects will be implemented to enhance the appeal and the convenience of transit. The passenger waiting experience will be improved with new shelters and enclosed stations. New shelters will be located on Marquette and Second Avenues in downtown Minneapolis. Real-time information on bus arrivals, traffic congestion levels, and parking availability will be provided through multiple media. Real-time next bus arrival information will be provided at downtown stops and at park-and-ride lots. Variable message signs with real-time transit travel time, park-and-ride space availability, and vehicle travel time will be provided at key locations along the I-35W corridor. An economic incentive to make trips by transit during the most congested times is also being planned. It is anticipated that this element, which will reduce transit fares for trips taken during congested periods on I-35W South, will occur after the UPA demonstration period, as toll revenues need to be collected first to finance the fare discount.
- Increasing transit capacity in the I-35W corridor is a key element of the Minnesota UPA. New park-and-ride lots will be constructed and spaces will be added to existing lots. Over 1,500 parking spaces will be added at new and existing park-and-ride lots along I-35W North and South of downtown and on Cedar Avenue. A total of 26 new buses will be purchased to provide new and expanded service in the corridor. Expanding the single bus lanes to dual bus lanes on Marquette and Second Avenues in downtown Minneapolis will more than double the number of buses that will be able to travel through the downtown area in the peak periods.
- The total budget for the UPA transit projects is approximately \$107 million, including the federal funds and the 20 percent local match. The MARQ2 project in downtown Minneapolis is the largest transit element, at approximately \$32 million. The Metro Transit budget for park-and-ride facilities, the new buses, the new shelters, and the customer information system is approximately \$54.8 million. The transit projects are scheduled to be completed by December 31, 2009.
- The MARQ2 project includes reconstruction of Marquette and Second Avenues from building face to building face. Dual contraflow bus lanes will replace the single contraflow bus lane. Two general-purpose traffic lanes will be provided. The sidewalks will be widened from 12 feet to 18 feet on the transit side and to 14 feet on the non-transit side. On-street parking will be removed. New lighting and landscaping will be installed and other streetscape improvements will be made.

- Researchers at the University of Minnesota are developing the lane guidance system for shoulder-running buses. The system includes lateral guidance assistance, collision avoidance, and automatic vehicle location (AVL) technology. These elements provide benefits to the bus operator. Lane assistance feedback is provided through a heads up windshield display, a vibrating seat, and an active steering wheel. Collision avoidance is provided through forward and side sensors and an integrated display. The touch control panel allows the driver to choose and modify feedback. Passenger benefits include improved safety and schedule adherence through better utilization of road shoulders. A fleet of 10 MVTA buses equipped with the lane guidance technology will be deployed for operation on Cedar Avenue and I-35W.
- A total of 26 new buses will be purchased as part of the UPA. The new buses will include a mix of standard low floor buses, articulated low floor buses, and coaches. The buses will be used to provide service on new routes and expanded service on existing routes.
- The Transit Advantage project will address an existing bottleneck at the Highway 77/Highway 62 intersection for northbound buses. A new bus-only, left-turn lane will be constructed and special traffic signals installed to provide a transit advantage for buses.

Minnesota Urban Partnership Agreement: Telecommuting

Adeel Lari, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota

Adeel Lari discussed the telecommuting program elements of the Minnesota UPA. He described the telecommuting program objectives, the Results Only Work Environment (ROWE) approach, potential benefits from telecommuting, and future activities. Adeel covered the following points in his presentation.

- Telecommuting is one of the most cost effective and quickest methods to reduce traffic congestion. From available data, it appears that only approximately 3 percent of the Minneapolis workforce currently telecommutes.
- The UPA telecommuting program objective is to secure agreements from major employers in the area to establish or expand telecommuting and flex scheduling programs. The Minnesota UPA telecommuting effort focuses on increasing the use of ROWE, which was developed and implemented by the Best Buy company. The Minnesota UPA telecommute program objectives are to reduce congestion and to increase telecommuting.
- In general, a number of telecommuting options may be used by employers. Traditional telecommuting allows employees to work from home. Internet access is typically used to maintain contact with the office, along with telephones. Traditional telecommuting focuses on maintaining working hours, monitoring performance, and following employer policies.
- ROWE takes a different approach. It represents a change in business culture, operation, and the mindset of management personnel. Under ROWE, there are no set schedules. Rather, employees make choices about where and when work is performed. ROWE focuses on results and results only. It establishes the ultimate

state in work flexibility. ROWE allows every employee the freedom to do their best work the way they work best.

- ROWE provides equal opportunity for all employees to participate, regardless of their job duty or job level. It provides an incentive to work where and when it is best for business and for personal pursuits. ROWE provides the opportunity for sustainable change.
- The ROWE work environment is employee managed, with no supervisory permission needed. ROWE is based on the work to be accomplished and requires accountability. On the other hand, flexible work arrangements require permission from supervisors and are management controlled. It is based on hours and work, and requires policies and guidelines.
- Telecommuting can provide benefits for the transportation system, corporations, and individuals. Examples of universal telecommuting benefits include reducing congestion, energy conservation, environment preservation, enhanced safety, and improved health.
- Examples of corporate telecommuting benefits include cost savings, increased employee productivity and motivation, and retaining employees and skills. Cost savings may be realized through reduced office space needs and overhead expenses. A flexible and independent work environment leads to increased employee productivity, as well as elevated motivation and morale, and lower absenteeism rates. Telecommuting can help retain key employees, including the sandwich segment – baby boomers tasked with caring for both children and aging parents. Telecommuting can provide a career break, allowing employees to work part time. Employees with the option to telecommute may be less motivated to leave. Training costs can be reduced with higher retention rates. Telecommuting also provides flexibility in staffing, as hiring talented staff is not limited to a specific geographic area. Best Buy has experienced benefits from ROWE, including productivity increases and increases in retaining employees.
- Individual benefits from telecommuting include savings in commuting costs and time savings from eliminating commute trips. Telecommuting provides quality-of-life benefits and a better balance between work and family. It can reduce stress associated with commuting and provides more time for health and wellness activities. Better health, plus less stress, equals an improved ability to focus on work.
- Technology is no longer a barrier to telecommuting. The challenge for most corporations is a cultural barrier. Telecommuting requires management by objectives rather than by observation. Corporations need to shift to focus on results. A commitment to better monitoring and measuring results is needed. Telecommuting programs force reliable results measurement.
- Other possible barriers to telecommuting include a perception that telecommuters are loafers and that telecommuting will hinder career advancement. These concerns can be overcome by creating a telecommuting program with support from management and employees.

- Even with all the potential benefits, telecommuting is not for everyone. Employees with poor personal motivation are not good candidates for telecommuting. Young employees just entering the workforce may not be ready for telecommuting. Going to work is an important aspect of life and teaches social skills and corporate values. Also, not all work tasks are best performed or appropriate for a telecommute setting. Some types of work value team synergy and the interaction among team members.
- Telecommute programs are expected to become a viable planning element to reduce congestion and pollution and to preserve and protect the environment. A weaker economy may also help drive support for increased telecommuting programs.
- The telecommuting portion of the Minnesota UPA is funded by the state, with no federal participation. The Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota is responsible for developing and implementing the program. A Telecommute Steering Committee has been formed under the Minnesota UPA Steering Committee.
- The focus of the Minnesota UPA telecommuting program is to promote the adoption of ROWE by employers in the region. The target is to change 500 current commuters on I-35W into telecommuters. The Humphrey Institute will be issuing a request for proposals (RFP) for consulting and marketing assistance to implement and evaluate the program.
- The University of Minnesota is conducting a National Institute of Health (NIH)-funded, two-year study examining the health and well-being affects of ROWE. Preliminary research findings suggest the long-term potential to change work behavior, and in turn affect commuting behavior, by implementing ROWE. In comparison to employees in a control group, employees in a ROWE are less apt to commute.
- A recent article in a Minneapolis newspaper supported telecommuting, noting that putting aside the private benefits and drawbacks, telecommuting is a clear winner from a public policy standpoint. Every worker at home is one fewer worker burdening the roads and public transportation systems. Designing public policies and infrastructure to increase the at-home workforce can have both public and private benefits.

BREAKOUT SESSION – HOV/HOT SUPPORTING ELEMENTS AND BRT

Bill Finger, Presiding

Park-and-Ride, Transit, and ITS for HOV Lanes in California's San Joaquin Valley

William R. Loudon, DKS Associates

Bill Loudon discussed a recent feasibility assessment of HOV lanes in the San Joaquin Valley. The assessment was sponsored by the San Joaquin Council of Governments (SJCOG), with funding from Caltrans. Bill described the issues and concerns with transportation in the San Joaquin Valley, the major elements of the HOV lane feasibility assessment, the support facilities and services needed for successful implementation, and the study recommendations and conclusions. He recognized the contributions of Wil Ridder and Leslie Miller, SJCOG. Bill covered the following points in his presentation.

- Issues in the San Joaquin Valley include significant congestion on the freeways and rapid growth in population, employment, and development. Travel in the area is characterized by long-distance commutes. Over 20 percent of commute trips are made to destinations outside the county. Emission reductions are required, as the county is a severe nonattainment area for Ozone. New freeway lanes are under development, so decisions related to HOV lanes are needed.
- There is no history of HOV lanes in the area, which are viewed as a big city transportation strategy by many residents. Other concerns that have been raised associated with HOV lanes relate to the impact on trucks, which are important in the Valley, and the impact on shorter distance commute trips.
- Most of the HOV lanes in the San Francisco/Bay Area are well used. Surveys taken over the years indicate that the HOV lanes do influence commuters to change from driving alone to carpooling. A total of 69 percent of carpoolers responding to a recent survey reported the HOV lane greatly influenced their decision to carpool, while another 11 percent reported that the HOV lanes somewhat influenced their decision to carpool.
- The HOV lane feasibility assessment included a number of elements. First, HOV lane demand was assessed. Second, freeway corridors were screened to identify priorities. Third, potential benefits and impacts for high-priority corridors were evaluated. Fourth, necessary support facilities and services were identified. Finally, operational parameters were identified.
- The evaluation criteria for HOV lanes included HOV lane use, travel time advantages for HOVs, and the need for a fourth travel lane. Other criteria focused on major commute corridors, the importance of transit in the corridor, and existing park-and-ride lots in the corridor. Two other criteria addressed major truck corridors and connections to other HOV lanes.
- Needed improvements were identified for both 2015 and 2030. Widening some freeway sections to six lanes or eight lanes were identified as needed in 2015 and 2030.

- The HOV plans in surrounding regions were reviewed, including the Bay Area and the Sacramento region. The FREQ model was used to forecast HOV volumes in the three-hour morning and afternoon peak periods. The two forecast years were 2015 and 2030. The FREQ model was calibrated to existing conditions. The effects of HOV lanes were assessed for 2015 and 2030. The 2030 forecast identified HOV lane volumes of 1,000 to 1,800 vehicles per lane per hour (vplph).
- The potential 2030 travel benefits of HOV lanes on I-5 and I-205 were examined. The expected HOV lane usage was 1,000 to 1,800 vehicles per hour in the peak direction of travel. This volume resulted in a reduction of 4,200 person hours of travel of per day, or approximately 6 percent. Further, VMT was reduced by 240,000 miles per day.
- Potential environmental benefits were examined. Possible benefits included a reduction in gasoline consumption of 17,000 gallons per day and a 14 percent reduction in hydrocarbon (HC) and oxides of nitrogen (NOx) emissions.
- The San Joaquin Regional Transit District (SJRTD) provides services in the area, including connecting to the Bay Area Rapid Transit (BART) system, other destinations in the Bay Area, and Sacramento. The SJRTD and City of Stockton have initiated a BRT master planning effort. The SJCOG's Commute Connection facilitates the formation of carpools and vanpools.
- An inventory of park-and-ride lots was conducted. The utilization levels of the 16 major park-and-ride lots vary, with four lots over capacity and eight lots over 50 percent of capacity. A park-and-ride master plan was developed, which identified additional parking spaces and other improvements needed at the various lots.
- Possible ITS supportive strategies were identified and evaluated. The two recommended strategies were using ITS to support park-and-ride security and to provide real-time traveler information. The main components for a security surveillance system were identified. System elements included closed-circuit television (CCTV) cameras, emergency phone boxes, and a communication system. It was recommended that these elements be linked to a local transportation management center (TMC) or dispatch center.
- A number of elements were identified for the real-time information system. These elements included park-and-ride lot occupancy data, real-time bus schedule data, and real-time bus and vehicle travel-time data. Numerous methods were outlined to disseminate information on the elements, including freeway dynamic message signs and next bus information signs at park-and-ride lots and transit stations.
- The HOV implementation recommendations focused on five major elements. These elements included designating all new fourth lanes as HOV lanes, using a 2+ vehicle eligibility requirement, operating the HOV lanes only during the peak-periods, and allowing continuous entry and exit. Another recommendation was to develop and implement support facilities and services, including transit services, park-and-ride lots, and ITS.

- In conclusion, the study results indicate that HOV lanes can be an effective freeway management tool in the San Joaquin Valley. The HOV lanes should be integrated with, and supported by, park-and-ride lots, transit services, and ITS strategies. The HOV lane operations should be tailored to the needs of travelers in the San Joaquin Valley to avoid adverse impacts and to generate public support.

Evolution of the Puget Sound Region HOV Direct Access Ramps

Liz Young, Parsons Brinckerhoff

Liz Young discussed the development and current operation of the HOV direct access ramps in the Puget Sound Region. She described the development of the HOV system in the region, planning and implementing the HOV direct access ramps, use of the existing ramps, and the institutional and political opportunities and challenges. She recognized the assistance of Chris Wellander, Parsons Brinckerhoff, with the preparation of the presentation. Liz covered the following points in her presentation.

- The Puget Sound Region has developed around challenging geography, which includes the Puget Sound, the Cascades Mountains, and Lake Washington. Growth patterns are linear and there is limited ability to expand the roadway network outward with ring roads. Continued growth in population and employment between 2000 and 2030 is forecast.
- Numerous efforts have been taken since the 1960s to plan and develop a regional transit system. The Forward Thrust Regional Rail proposal was rejected by voters in 1968 and again in 1970. In the early 1970's, Metro Transit approved an all bus system and initial freeway HOV projects. The last major general-purpose traffic infrastructure project, the I-90 Bridge expansion, which included a reversible HOV roadway, was completed in 1989. Voters rejected a proposal by the Central Puget Sound Regional Transit Authority (CPSRTA) for a regional rail system in 1995. Voters approved a proposal by CPSRTA for a regional multi-modal transit system in 1996.
- The Washington State Department of Transportation (WSDOT) Core HOV System Plan included a comprehensive network of HOV lanes. The Puget Sound HOV Pre-Design Study provided the foundation for the direct access ramps. Funding for the direct access ramps was included in Sound Transit's Sound Move as part of the regional express bus service.
- Implementation of the WSDOT Core HOV System Plan began in the early 1970's with three transit-focused projects. Projects in the mid 1970's to early 1980's focused on HOV bypass lanes at freeway ramp meters. In the mid 1980's HOV lanes on I-5 were implemented. In the early 1990's, a 310-mile HOV system was identified, focusing on maximizing the efficiency of the existing infrastructure and maximizing the person-carrying capacity of the freeway system.
- The WSDOT Puget Sound HOV Pre-Design Study focused on enhancing the effectiveness of the HOV system by improving access into, and out of freeway HOV lanes at key locations and enhancing the core HOV system to best serve transit. The study recommended 22 direct access facilities and 14 transit freeway

stations, which were typically co-located. A number of freeway-to-freeway connections, HOV system extensions, and enforcement improvements were also recommended

- In 1996, CPSRTA re-focused the plan defeated by voters the previous year into a multi-modal system plan. Elements in the plan included expanded bus service and utilization of the freeway HOV system, in addition to a central LRT line and a commuter rail line. Direct access ramps were integral to the successful operation of the regional express bus service. The plan incorporated a select number of system connections and improvements as identified in the WSDOT Puget Sound HOV study. Approximately 14 of the recommended direct access or flyer-stop projects from the Pre-Design study were included. A partnership was formed between Sound Transit and WSDOT, with Sound Transit becoming the funding agency and WSDOT the implementing agency responsible for design and construction of the recommended projects.
- The HOV direct access facilities use a variety of design treatments, including full and directional access. Only buses and vehicles with two or more persons are eligible to use the ramps, which serve new and existing transit centers and new and expanded park-and-rides lots. Freeway stations and median park-and-ride lots are used in some cases. The direct access ramps are located in downtown and suburban areas. New arterial access over the freeways has also been provided in some cases.
- Six HOV direct access projects have been completed as of August 2008. A seventh will open in September. Additional facilities, including a freeway station/in-line stop and a HOV direct access interchange are scheduled to be completed by 2011.
- The downtown Bellevue direct access ramp provides a connection to the Bellevue Central Business District (CBD) Transit Center, which is the main transit hub on the east side of Lake Washington. The project also includes improvements to the adjacent intersections and local streets.
- The Ash Way ramp provides access to and from the south and is the only facility that has a buses-only restriction. The ramp connects to a 700-stall park-and-ride lot. The Lynwood direct access ramp connects to a park-and-ride lot with 1,300 spaces. The Lynwood ramp provides full access from both directions.
- The direct access ramps at Federal Way provide connections from the I-5 HOV lanes to a transit center and a parking garage with 1,200 spaces. As part of the project, WSDOT also extended the HOV lanes on I-5.
- The Totem Lake direct access ramp includes a new east-west arterial crossing of I-405. A 500-space park-and-ride lot is located on one side of the freeway and a transit center is located on the other side. The facility also includes a freeway bus station and a pedestrian walkway from the park-and-ride lot. The Eastgate direct access ramp connects to a park-and-ride garage with 1,600 spaces. A freeway bus station is located at the top of the ramps.

- The South Everett direct access ramp on I-5 includes the first park-and-ride lot in the region located in the median of a freeway. The park-and-ride lot has 400 spaces. Improvements to arterials in the area were also made as part of the project to provide access to the park-and-ride lot.
- The initial WSDOT safety study showed no significant change in the total number or the types of crashes in areas with the new ramps. The Puget Sound HOV Pre-Design Study estimated that 1,500 to 8,700 vehicles and 40 to 250 buses would use all the ramps by 2030. Recent traffic counts indicate that approximately 2,500 to 8,800 2+ vehicles use the existing direct access ramps on a daily basis.
- The combination of the HOV Pre-Design Study and voter disapproval of the original Sound Transit plan provided the opportunity for the regional HOV system. The projects represent the coordinated efforts of WSDOT and Sound Transit. These agencies have different missions and governing bodies, although the Secretary of Transportation is a member of the Sound Transit Board. There is specific state legislation governing each agency's activities. The two agencies have different funding sources and use different planning, design, and scheduling processes. Another challenge was the fact that there was very little national experience with the development and use of direct access ramps.
- Development and operation of the direct access ramps also faced political challenges. The original HOV system designation was 3+ carpools and transit with a 24/7 operation. In 1991, the vehicle-occupancy requirement was changed from 3+ to 2+. There continues to be ongoing pressure to open the HOV facilities to general-purpose traffic. In 2003, the operating hours of some HOV lanes were changed from 24/7 to 5:00 a.m. to 7:00 p.m. The HOT pilot project opened on SR 167 earlier this year. Expanding other HOV lanes to include a HOT component or a managed lane designation is being evaluated. The remaining direct access ramps are being incorporated into corridor plans.
- A current challenge is the November 2008 ballot initiative to change the HOV lane and ramp designation. The ballot initiative would restrict weekday HOV lane and ramp restrictions to three hours in the morning and three hours in the evening. It would remove the HOV lane and ramp designation on weekends. It would also restrict the ability to change the HOV lane designation from 2+ and would restrict the HOT lanes to the same hours and definition. If the initiative is approved by voters, it will severely limit the ability of WSDOT and Sound Transit to manage the HOV system.

National Update on BRT Projects

Alasdair Cain, Center for Urban Transportation Research, University of South Florida

Alasdair Cain provided an overview of BRT projects in the U.S. He discussed the key elements of BRT, potential benefits, and the general cost of BRT, and other transit modes. He also highlighted the transit projects included in the UPAs. Alasdair covered the following points in his presentation.

- BRT can be considered a system of systems. The seven key elements or characteristics of BRT are the running ways, stations, vehicles, the service and operations plan, fare collection, ITS, and marketing and branding.
- There are a number of reports available to assist in planning, designing, implementing, and operating BRT. The *Characteristics of Bus Rapid Transit for Decision-Making*, published by the US DOT in 2004, represents one of these reports. This document describes the integration of the seven BRT elements, performance measures, and benefits. Performance measures include travel-time savings and reliability, system capacity, accessibility, safety and security, and identity and image. Benefits include ridership increases, capital cost effectiveness, operating cost efficiency, and environmental quality. Other potential benefits support land use decisions and the economy.
- The National BRT Institute at the Center for Urban Transportation Research (CUTR) is updating the *Characteristics of BRT for Decision Making* report. It will remain a high-level document to support sketch planning and alternatives analysis. The update will include the most recent capital and operating cost data for BRT elements. Several topics are being expanded to increase the utility of the document to decision makers. These topics include marketing and branding, land use and economic development, and the Americans with Disability Act (ADA) and accessibility. Other topics include service and network planning, financial and funding strategies, project scheduling and phasing, and organizational issues. A steering committee composed of transit agency representatives and other experts is helping to oversee the update.
- There are upwards of 100 communities seeking federal funding for BRT systems. Currently, approximately 25 BRT systems are in various states of planning and operation. Operating BRT systems are located in Pittsburgh, Las Vegas, Sacramento, Los Angeles, Phoenix, Orlando, Miami, Honolulu, and Boston. BRT systems are in the planning stages in Minneapolis, Orem, Albany, Atlanta, Cleveland, Kansas City, Eugene, and Denver.
- The goal of BRT evaluations is to judge the effectiveness, efficiency, and cost of a BRT system. It is important to collect and analyze before and after data for evaluations to measure ridership changes, return-on-investment, and other performance elements.
- The type of running way used with a BRT system will have a major influence on the capital cost. The capital cost associated with different types of runnings range from approximately \$1 million per mile for modest improvements to upwards of \$25 million for busways operating on separate rights-of-way. On a comparative basis, the capital cost for subways are approximately \$200 to \$350 million per mile. Light rail is \$30 to \$100 million per mile. Busways are \$5 to \$50 million per mile. Median bus lanes are \$5 to \$30 million per mile, and rapid bus applications are approximately \$0.5 to \$1 million per mile.
- It has been suggested that managed lanes can provide a virtual busway for use with BRT systems. BRT and managed lanes take advantage of existing

infrastructure to provide high operating speeds and service reliability. BRT operating on managed lanes provides a modal alternative to the private automobile. It can also raise public support for an overall project. In addition, toll revenues may be used to fund transit services in the corridor.

- The UPA projects include a number of transit elements. The Minnesota UPA project includes the purchase of new buses, the construction of new and expanded park-and-ride lots, and the implementation of new and expanded transit services in the I-35 corridor. It also includes expanding the single bus lane in downtown Minneapolis into dual bus lanes, expanding existing HOV lanes to HOT lanes, and developing new HOT lanes. Other elements include testing lane guidance technologies for shoulder-running buses, real-time transit information, signal priority, and other improvements. Transit elements in the South Florida UPA include new and expanded park-and-ride lots, express bus improvements, and real-time transit information in the I-95 corridor. The HOV lanes on I-95 are being expanded into HOT lanes. The Seattle-Lake Washington UPA includes the purchase of new buses and implementing new transit services, adding park-and-ride facilities, and other transit improvements.
- Experience indicates that transit can assist with addressing traffic congestion issues, but BRT alone cannot eliminate congestion. Studies have shown that BRT, busways, and other transit services can influence people to change from driving alone to riding the bus. For example, 34 percent of bus riders on the Pittsburgh West Busway, 40 percent of riders on the Miami South Busway, and 18 percent of the riders on the Oakland San Pablo Rapid previously drove alone. Surveys of riders on the Los Angeles Orange Line indicate that 18 percent previously used a private vehicle for similar trips and over one-third of current riders have private vehicle available for the trip.
- A number of elements should be considered to help determine the suitability of HOV/HOT lanes for BRT. These elements include the HOV/HOT infrastructure, which may be designed primarily for private vehicle use, access issues, and the placement of stations and park-and-ride lots. The use of HOV/HOT lanes may not be appropriate for corridors exhibiting very high transit demand.
- There may be possible impacts on transit in converting HOV lanes to HOT lanes. Possible issues include significantly increasing traffic volumes on HOT lanes, the potential to encourage transit riders to change to driving alone, and the impact of increasing minimum occupancy requirements from 2+ to 3+.

46th Street BRT Station: A Public Involvement Story

Jill Hentges, Metro Transit

Jill Hentges discussed the public involvement process for the 46th Street BRT station in Minneapolis. She highlighted the importance of public involvement in transit and transportation projects and discussed the experience with the 46th Street BRT Station. She also engaged the audience in brainstorming ideas on facilitating public involvement. Jill covered the following points in her presentation.

- Minnesota is well known for many things. Examples of Minnesota trivia include the Minneapolis' skyway system, which connects 80 blocks or nearly eight miles of the downtown area. Minnesota has approximately 90,000 miles of shoreline, more than California, Florida and Hawaii combined. Minnesota recreational boats/person ratio is 1:6. Minnesota inventions include rollerblades; water skis; Tonka trucks; scotch and masking tape; Post-its; the wearable, external, battery-powered, pacemaker; the snowmobile; Wheaties; Bisquick; and Green Giant vegetables. In 1945, First Lady Eleanor Roosevelt was the best known woman in America. The second was Betty Crocker.
- An important element of public involvement is that people can see their ideas in the outcome of a project. It is critical to be honest about public involvement. Do not engage the public in the process unless there is a true desire to listen to their views and consider their ideas on the project.
- The 46th Street BRT station is located along I-35W to the south of downtown Minneapolis. It involves an online BRT station on I-35W at the 46th Street Bridge. A preliminary design for the station had been completed prior to the beginning of any public involvement. Although a public involvement process would have been initiated, the interests and concerns raised by the state senator, state representative, and city council members from the area accelerated the process.
- The neighborhoods on both sides of I-35W include older residential housing and commercial developments. The neighborhoods are diverse, with median household incomes above those for the city of Minneapolis as a whole. There are active neighborhood organizations.
- A Transit User Group (TUG) was established to facilitate neighborhood participation in the station design process. There are a total of 12 members on the TUG. The members represent the four neighborhoods and three neighborhood associations. Other representatives include two Minneapolis City Council members, an at-large member, and a Metro Transit staff member.
- The first meeting of the TUG was in January 2007. Through meetings and workshops, the group provided input on the station design, the station name, and connections to the neighborhoods. Environmental concerns, safety, station operations, and transit service plans were also discussed. The group made a number of recommendations to Metro Transit related to these elements.
- Metro Transit is considering the recommendations and is also considering reconvening the group, holding a public open house on the project, or doing both. A consultant and a Metro Transit engineer are assisting with examining ways to incorporate some of the recommendations into the project.

BREAKOUT SESSION – WHAT’S NEXT FOR HOT PROJECTS?

Greg Jones, Federal Highway Administration, Presiding

I-394 MnPASS Enhancements: A Vision for the Future

Ken Buckeye, Minnesota Department of Transportation

Ken Buckeye discussed possible enhancements to the I-394 MnPASS project. He described the driving forces, goals, and objectives of Phase II of the MnPASS project. He highlighted the key elements of a recent planning study. Ken covered the following points in his presentation.

- There are a number of factors influencing the consideration of enhancements to the MnPASS project. First, the I-394 MnPASS project is Minnesota’s only road pricing project. Second, it introduced several important innovations, which have proven successful. Third, measurable performance improvements have been realized from the MnPASS project. Fourth, residents in all of the communities in the corridor benefit from the MnPASS HOT lane. Fifth, corridor capacity enhancements will possibly not occur for 25 years. Finally, I-394 has the potential to be a model pricing corridor.
- There are two major goals for Phase II of the I-394 MnPASS project. The first goal is to identify infrastructure enhancements to improve corridor performance. The second goal is to identify short-term and long-term transit, land-use, and operational strategies which optimize the level-of-service in the corridor for all users.
- Specific objectives have been identified to accomplish these goals. MnPASS Phase II objectives include revisiting the original vision for the MnPASS program, examining additional methods to provide advantages for transit and HOVs, and examining facility enhancements, urban design, and land-use alternatives. Other objectives include engaging the corridor communities in planning, designing, and implementing project enhancements, and coordinating these enhancements with community comprehensive plan updates. A final objective is to transfer the experience on I-394 to other projects in the region.
- The MnPASS Phase II Planning Study includes five major elements. These elements are infrastructure, transit, land-use and urban design, telecommuting, and outreach and education.
- A number of elements were examined related to possible infrastructure improvements. A traffic operations analysis was conducted and alternatives were examined for the three-mile reversible section of the I-394 HOT lanes. The alternatives examined were a moveable barrier and a permanent barrier. The interchanges at Highway 100, I-94, and I-494 were also examined. A ConOps plan and an enforcement plan were developed. Finally, recommendations and implementation steps were identified.
- The infrastructure recommendations focused on the ultimate condition scenario, which includes the moveable barrier alternative. The operation of the reversible

section using a moveable barrier would include two lanes eastbound in the morning peak-period with the moveable barrier placed adjacent to the south J-barrier. In the afternoon peak-period, two lanes would be provided in the westbound direction and one lane would be provided in the eastbound direction.

- The alternative includes reconstructing the existing eastbound general-purpose lanes at Highway 100 to add a thru lane and a new entrance to the reversible section. The HOV ramp from northbound Highway 100 would also be reconstructed. An operations analysis of the HOV/HOT ramp operation at Highway 100 was conducted and a third toll zone at I-94 was evaluated. The estimated cost of this alternative ranged from approximately \$31.0 to \$38.5 million.
- Frequent morning and afternoon peak-period express bus service is currently operated in the corridor using the HOT lanes. Existing transit amenities include the MnPASS HOT lanes, bus use of shoulders, HOV ramp meter bypass lanes, and 1,600 parking spaces at park-and-ride lots in the corridor. Local, off-peak service is also provided in the corridor. The opportunities for transit improvements focused on enhancing service on a geographic basis, adding spaces to park-and-ride lots, enhancing mid-day service, and technology applications.
- A station-to-station transit service concept was considered, but rejected due to its high cost and its impact on freeway operations. One transit operating concept focuses on use of the I-394 south frontage road. Transit recommendations focus on establishing direct and frequent limited stop all-day service. Elements include providing additional heated bus shelters, constructing a pedestrian bridge at Hopkins Crossroads, implementing signal priority at Louisiana Avenue, and constructing a grade separated transitway at Park Place and Xenia Avenues. A public/private partnership with the Ridgedale Shopping Center would enhance park-and-ride and transit center facilities. Neighborhood feeder bus service would also be implemented. The cost of the various transit elements was estimated and the lead agency was identified.
- The current land use and urban design conditions in the corridor were examined. The corridor is characterized by a vehicle-dominated land use pattern. A lot of the developed land in the corridor is underutilized. Wetlands, soils, and storm water runoff are important issues to be considered. The study identified locations near transit routes and key crossroads as candidates for redevelopment. These plans should take advantage of the existing and proposed trail systems and connections. Enhanced off-peak transit service may create new development opportunities.
- The Louisiana Avenue and Park Place/Xenia study area design included the cities of Louis Park and Golden Valley. The Ridgedale conceptual design involved the city of Minnetonka. A wide range of land use and urban design concepts were considered in these studies. The efforts were intended to identify possible and desirable alternatives for these communities and the corridor, while keeping with goals of the project. There was a particular desire to identify transit supportive

land uses and to promote strong linkages with the existing and proposed trail systems and connections.

- The assessments of telecommuting focused on potential challenges and opportunities. Identified challenges include a weak economy and employer resistance. In addition, a significant increase in telecommuting is needed to reduce congestion. On the other hand, telecommuting can offer a wide range of benefits to employers, employees, and the environment. Telecommuting may help with employee retention and satisfaction and reduced overhead for employers. Telecommuting may also increase productivity and motivation. The opportunity also exists to build upon Minnesota's UPA telecommuting strategies.
- Mn/DOT will be leading the infrastructure improvements in the corridor. Metro Transit will be leading the transit improvements, some of which are underway. The corridor communities will be leading the land use and urban design elements, which are currently under advisement. Mn/DOT will be leading the telecommuting efforts through the Minnesota UPA project.

HOT Lanes Pilot Project in Washington State

Mark Bandy, Washington State Department of Transportation

Mark Bandy discussed the HOT lane pilot project on SR 167 in the Puget Sound region. He described the background to the pilot project, design and implementation of the HOT elements, initial use of the HOT lanes, and preliminary responses from different user groups. Mark covered the following points in his presentation.

- The WSDOT standard for HOV lane speed and reliability is that vehicles in the HOV lane should be able to maintain an average speed of 45 mph or higher, at least 90 percent of the time during the peak hour. This standard means that just six minutes per day of speeds below 45 mph will result in sub-standard performance. Recurring congestion at a number of locations on the HOV system in the region causes an HOV segment to fall below the WSDOT standard.
- In 1999, the general-purpose freeway lanes on the heavily traveled segment of I-405 between Bellevue and Renton experienced more than five hours of congestion on an average afternoon and brief congestion in the morning. The HOV lanes met the WSDOT performance standard, however. The HOV travel time advantage ranged from approximately five minutes to about 10 minutes during the afternoon peak hours. By 2007, general-purpose freeway lane congestion had grown in duration and intensity, and the HOV lanes were failing to meet the performance standard during the afternoon peak. The HOV travel time advantage increased over much of the day, however and exceeded 12 minutes during parts of the afternoon peak period.
- The SR 167 HOT pilot project converted existing HOV lanes to HOT lanes in a 10-mile corridor. The project includes a single HOT lane in each direction of travel. The HOV lanes allowed unlimited access, while the HOT lanes require users to enter and exit the lanes only at specific access points. The HOT lane is separated from the adjacent general-purpose freeway lane by double white lines. Variable message signs indicate the toll rate at each entry point. A HOT user

pays a single toll to travel any distance on the 10-mile route. Free access continues to be provided to transit vehicles and 2+ carpools. The HOT lanes operate from 5 a.m. to 7 p.m. and are open to all traffic at other times.

- The HOT lanes on SR 167 opened on May 3, 2008. Advance publicity was used to explain the project and the new operating requirements to the public and travelers in the corridor. Examples of approaches included presentations to community and business groups, distributing brochures in public places, work place posters, and booth at fairs and festivals. A mobile *Good To Go!* tent was used to promote transponder purchases and opening accounts. Media personnel were also invited to tour the corridor and the project with Washington State Patrol officers. The opening day event attracted all major media outlets, with good television, radio, newspaper, and Internet coverage. To date, over 15,000 new *Good To Go!* accounts have been opened since the project was implemented.
- Use of the SR 167 HOT lanes increased over the first two months of operation. The average daily number of toll transactions increased from 850 during the first week of operation to 1,140 during the ninth week. The number of peak hour toll customers increased from 120 during the first week to 160 in the ninth week. Overall, drivers paid an average of \$1.50 to save 10 minutes of travel time during peak commutes.
- HOT lanes users save an average of nine minutes in morning peak period and an average of five minutes during the afternoon peak period. On some days, users realize travel-time savings of as much as 34 minutes in the morning and 27 minutes in the afternoon. The HOT lanes have been free flowing.
- Travel times for carpools and transit have been maintained with the HOT operations. Collisions on the facility have not increased. A total of 1,500 enforcement stops were made in the first three months of operation. The stops resulted in 263 citations for HOV violations and 150 citations for crossing the double white line. There continue to be complaints of travelers illegally crossing the double white line to enter or exit the lane. Incident response times have decreased from an average of 13 minutes to five minutes, doubling the numbers of drivers assisted on the roadway. Additional access point guide signs were installed after implementation. At least one of the access points will be adjusted this fall to enhance operations.
- Travelers in the general-purpose freeway lanes are also benefitting from the HOT lanes. The average travel times in the northbound direction have been reduced, especially during the morning commute period.
- Overall response from the general public has been positive, with some concerns noted. A total of 341 comments were received on the SR 167 HOV lanes during the first month of operation. The top three concerns noted in these comments were the change to limit access for transit vehicles and HOVs, the location and length of access points, and general disagreement with the use of HOT lanes to help manage congestion.

- Use of the HOT lanes by toll-paying single-occupant vehicles is growing, but drivers are still getting used to the system. There is capacity in the HOT lanes for more toll-paying customers and use is expected to grow. The *Good to Go!* electronic tolling program allows for the same transponder technology to be used in all toll facilities in the state. The prepaid accounts allow for automatic deduction of tolls. The addition of 15,000 new customers opening *Good To Go!* accounts since the SR 167 HOT lanes were launched provides a total base of more than 100,000 customers and 270,000 transponders in the region.
- As part of the HOT lanes pilot project, the Washington State Patrol is providing additional enforcement on SR 167. Partnering with the Washington State Patrol was key to the HOT lanes success. The partnering supported the heavy media blitz – which included messaging, media ride-alongs, and interviews – before and after opening of the HOT lanes. During the first months of operation, Washington State Patrol officers were very visible in the corridor, warning and ticketing drivers for illegally using the HOT lanes without a transponder and for crossing the double white stripes.
- One issue that has emerged relates to vehicles with transponders using the lane as carpools. The windshield-mounted transponders cannot be turned off. A metal shield must be used to temporarily disable a transponder when carpooling. The use of the shield is difficult to communicate and confusing to some customers. Also, initially, carpools were upset by the new rules that limit access points. Any potential concerns that adding toll-paying, single-occupant vehicles would slow traffic in the HOV lanes have not been realized.
- The WSDOT will report to the legislature and the Transportation Commission annually on a variety of performance measures. These measures include freeway efficiency and safety, effectiveness for transit, and person and vehicle movements by mode. Another measure addresses the ability to finance improvements and transportation services through tolls. The effects on all highway users will be analyzed by use data and surveys, which will provide additional insights into geographic, socioeconomic, and demographic characteristics of users. The results will be used in the development of additional HOT lanes projects in the state.

Update on the I-25 HOT Lanes in Denver

Jack Tone, Parsons Brinckerhoff

Jack Tone discussed the HOT lanes on I-25 in Denver. He described the implementation and operation of the initial HOV lanes, the expansion to HOT lanes, and the current use of the HOT lanes. Jack covered the following points in his presentation.

- The HOV lanes on I-25 in Denver opened to buses and carpools in October 1994. Originally called the “Downtown Express,” the project included a two-lane reversible roadway in the median of I-25. The lanes are 6.6 miles in length, extending from downtown Denver to US 36. The total cost of the HOV lanes was \$228 million. The Regional Transportation District (RTD), FTA, the Colorado Department of Transportation (CDOT), FHWA, and the City and County of Denver (CCD) jointly funded the project.

- The initial ADT in the HOV lanes was approximately 3,800 vehicles per weekday. By 1999, the use of the Downtown Express had grown to 7,400 ADT, including 300 RTD express buses. The Downtown Express included a major bus component, even before the term BRT was coined. Operating out of two downtown off-street bus terminals, RTD buses service a series of park-and-ride lots and garages along US 36 and I-25.
- While traffic in the general-purpose freeway lanes continued to grow and peak period congestion increased, traffic in the HOV lanes showed little growth. By 2003, HOV use reached a plateau, with little traffic growth from year-to-year after that time. The adjacent general-purpose lanes were serving nearly 240,000 vehicles a day, while the two reversible HOV lanes were only used by about 10,000 vehicles per day. Most of the HOV lane use occurred during the morning and afternoon peak periods.
- To better utilize the available infrastructure and to improve mobility, CDOT and the Colorado Tolling Enterprise (CTE) changed the operations of the I-25 HOV facility to HOT lanes on June 1, 2006. The CTE was established by CDOT to finance, build, operate, and maintain toll highways in the state. Single-occupant vehicles are allowed to use the HOV lanes for a fee. Existing HOV users, including carpools, vanpools, and buses, continue to use the facility free-of-charge. Only single-occupant vehicles pay a toll.
- Called the “Express Lanes,” the I-25 HOT lanes are open 20 hours a day, and closed only to reverse the facility direction. The lanes operate southbound to Denver until 10 a.m. The lanes are closed to reverse the operation and reopen at Noon in the northbound direction. The I-25 HOT lanes serve transit, carpools, vanpools, motorcycles, and toll paying single-occupant vehicles between the northern suburbs and Denver. Travelers to other destinations, such as the Denver Technological Center, also use the HOT lanes to shorten their overall travel times.
- For the first six months of 2008, an average of 100,000 toll-paying single-occupant vehicles used the lanes each month, with toll revenues averaging \$200,000. Currently, more than 3,700 toll-paying vehicles are using the HOT lanes in the AM and PM peak periods. Average peak hour traffic is currently about 1,800 vehicles per hour, of which 1,000 to 1,100 are HOVs and 700 to 800 are toll-paying vehicles.
- To manage demand on the facility and to ensure freeflow travel speeds, variable tolls are applied by time-of-day, with higher tolls during more congested time periods. Additionally, all tolls are collected electronically. The toll rates currently vary from \$3.25 in the peak of the peak, to \$0.50 during the late night and on weekends. Toll rates are based on a graduated fixed schedule. Toll rates are posted on a series of variable message signs along the freeway and signs on the downtown streets approaching the entrance ramp.
- Toll rates are collected on I-25 at a location near 58th Avenue with detectors mounted on an overhead gantry. HOV vehicles use the west lane and toll-paying vehicles use the east lane. A wide enforcement area was constructed at this location to

permit visual observation and enforcement of vehicle occupancy. Photo technology is used to identify toll evasion violators without transponders in the toll lanes. This is the only segment of the HOT lanes where HOVs and toll-paying SOV's are separated. Buses are permitted to use either lane.

- By agreement between CDOT, RTD, the Denver Regional Council of Governments (DRCOG), FHWA, and FTA, a series of policies were adopted to guide the implementation of the HOT lanes. These policies address priority use of the lanes, electronic toll collection, and protection of the level-of-service. Buses are the highest priority for the I-25 HOT Lanes. Since construction of the HOV facility was partially funded by FTA, both RTD and FTA were concerned that bus operations not be adversely affected by the added HOT traffic. Other users, in order of priority, include vanpools and 3+ carpools, 2+ carpools, inherently low-emitting vehicles, and toll paying single-occupant vehicles.
- All tolls are collected by ETC technology. The ETC is fully compatible with the E-470 Tollway and the Northwest Parkway, as required by Colorado Statutes. The I-25 HOT lanes must preserve freeflow speeds at all times. This policy corresponds with the hierarchy of use. If free flow speeds are degraded, tolls will have to be increased. Single-occupant vehicles may ultimately have to be excluded from the HOT lanes if freeflow speeds continue to degrade.
- The consideration of expanding the I-25 HOV lanes to HOT lanes began in 1998 with an evaluation and feasibility study of HOT lane options for the I-25 facility. The study was partially funded by the FHWA Value Pricing Pilot Program. The initial study recommended the conversion of the I-25 HOV lanes to HOT lanes, citing considerable and consistent excess capacity in the HOV facility.
- CDOT received \$2.8 million from FHWA under the Value Pricing Pilot Program to implement the HOT Lanes project. Activities conducted as part of the implementation process included developing concept plans, testing operations scenarios, and developing a ConOps plan. Toll rates were evaluated to maintain travel speeds and revenue forecasts were developed. An extensive analysis of public attitudes regarding the proposed HOT project was conducted, including a series of focus groups. Participants in the focus groups expressed concerns about the need for better enforcement as well as concerns about the traffic impacts on pedestrian movements around the downtown access points. Environmental studies were also conducted, including a detailed air quality analysis. In 2004, FHWA approved a documented Categorical Exclusion for the implementation of the HOT lanes on I-25.
- The initial design work for infrastructure improvements included overhead and variable message signs to display toll information, changes in the barriers separating the HOV lanes from the general-purpose lanes for an enforcement area, and the addition of the toll collection gantry. Other elements included adding overhead signs and traffic signal, signing, and striping improvements on the downtown city streets at the exit and entry points. The E-470 Public Highway Authority, which owns and operates the E-470 toll road, designed and installed the electronic toll equipment. Fiber optics links connect with the E-470

operations center, where the toll collection, violations monitoring, and back office operations are handled. The same transponders for E-470 are used on the I-25 Express Lanes. Nearly 400,000 transponders have now been issued to drivers in the region. An information video on the HOT lanes was produced and provided to all the local television stations. The video explained how the HOT lanes would operate and how drivers could obtain transponders. An extensive marketing program was conducted to introduce the HOT lanes.

- The use of the HOT lanes by single-occupant vehicles has greatly exceeded the initial forecasts. HOV monthly traffic has remained stable, ranging between 180,000 and 240,000 while toll-paying traffic has increased from 30,000 in June 2006 to almost 100,000 in June 2008. Weekday daily traffic includes approximately 10,000 HOVs and 5,000 toll-paying vehicles. Since the conversion to HOT, RTD buses have operated on-time better than 99 percent of the time. The primary purpose of the Express Lanes is not to generate revenue, but to cover operations and maintenance expenses, and to better utilize the facility by giving motorists another option to avoid congestion. The RTD's BRT operations are being preserved.
- In February 2008, a primary water main ruptured causing a huge sinkhole in the northbound general-purpose freeway lanes on I-25, just south of the 58th Avenue interchange. To minimize delays to traffic, the HOT lanes were opened to all northbound traffic while the water main was replaced, the hole filled, and the pavement restored. The HOT lanes proved to be a valuable, flexible asset to manage traffic during the disruption.

BREAKOUT SESSION – HOV/HOT PLANNING, DESIGN, AND OPERATION

Janelle Anderson, Minnesota Department of Transportation, Presiding

I-5 HOV Lanes in the Portland/Vancouver Region: One Worked, One Didn't, So What Happened?

Chuck Green, Parsons Brinckerhoff

Chuck Green discussed the experience with the HOV lanes on I-5 in the Portland, Oregon/Vancouver, Washington area. He highlighted the implementation and operation of the northbound and southbound HOV lanes, why one was successful and one was not, and the lessons learned from the projects. He also described the traffic conditions after the southbound HOV lane was opened to general-purpose traffic during all operating hours. Chuck covered the following points in his presentation.

- There are many similarities in the northbound and the southbound HOV lanes on I-5. The HOV lanes in the northbound direction opened 1998. The HOV lanes in the southbound direction opened in 2001. Both HOV lanes were opened as pilot projects. Both were less than four miles in length and by-passed major congestion points on the freeway. Both serve the Vancouver-to-Portland commute market. Finally, both represented a combination of added capacity and converted lanes.
- The HOV lane northbound on I-5 is 3.5 miles in length. It extends from Going Street to Delta Park on the Oregon side of the Columbia River. The lane opened in 1998, operating in the northbound direction out of Portland in the afternoon peak period. There is a bottleneck at the end of the lane where the freeway crosses the Interstate Bridge. The HOV lane saves users approximately two minutes per mile over the general-purpose freeway lanes in the peak hour. Vehicles in the general-purpose freeway lanes are traveling at approximately 10-15 mph, compared to 45 mph for vehicles in the HOV lane. Approximately 800 HOV vehicles use the HOV lane during the peak hour accounting for some 2,300 persons per hour, compared to 1,600 persons per hour in each adjacent general-purpose freeway lane. The I-5 northbound HOV lanes have received consistent 70 percent or higher public support in four opinion surveys conducted since the facility opened. The compliance rate is between 88 and 92 percent.
- The HOV lane southbound on I-5 was approximately four miles in length, operating from 99th Street to Mill Plain in Washington State. The southbound lane was opened in 2001. It operated in the southbound direction into Portland in the morning peak period. It provided travel-time savings of a little less than two minutes a mile over the general-purpose freeway lanes during the peak hour. Approximately 500 vehicles used the lane during the peak hour, moving some 1,400 persons. The general-purpose freeway lanes moved some 1,100 persons in each adjacent lane. The most recent opinion survey indicated approximately 53 percent public opposition to the southbound HOV lane. The compliance rate on the HOV lane was between 90 to 92 percent.

- The Portland/Vancouver metropolitan area, which is separated by the Columbia River, has a population of approximately 1.5 million. The two communities are different in many ways, including perspectives on transportation. Portland is well known for integrating transportation and land use planning, its LRT and bus system, and growth management strategies. Vancouver is more vehicle-oriented. The I-15 corridor serves commuter trips, which are oriented toward Portland.
- Both of the HOV lanes were initially opened for three hours. The southbound HOV lane was initially opened from 6:00 a.m. to 9:00 a.m. The HOV lane was not well utilized from 8:00 a.m. to 9:00 a.m., however. As a result, the operating hours were reduced to 6:00 a.m. to 8:00 a.m. during the pilot.
- The northbound I-5 HOV lane acts as a funnel for commuters leaving Portland in the afternoon peak period. Even commuters living on the east side of I-5, who have to weave across three general-purpose freeway lanes to exit the freeway, realize a travel-time savings from using the HOV lane. These commuters did not realize the same benefits from the southbound HOV lane, as it ended close to the point they entered the freeway. Most of the Vancouver SeaTran buses providing service to Portland also entered the freeway toward the end of the HOV lane. The bus operators were aggressive enough to weave across the general-purpose freeway lanes to use the HOV lane, however. As a result, bus riders and SeaTran did realize benefits from the southbound HOV lane.
- The northbound HOV lane is considered a success, and was made permanent by 2007. The southbound HOV lane was considered unsuccessful, however, due to perceptions of low usage, adding to congestion at the endpoint, and lack of public support. As a result, the southbound HOV lane pilot project was terminated in August 2005 and the HOV operating hours were discontinued. The lane is now open to all traffic on a 24/7 basis.
- A number of lessons can be learned from the experience with the northbound and the southbound I-5 HOV lanes. The experience has set the tone for consideration of HOV lanes in the region. The results from the travel demand modeling conducted as part of the planning process for the southbound HOV lanes indicated lane use would be marginal, especially in the near-term. It was easy to implement the HOV lane, however, because it was part of a freeway widening project. Thus, the experience indicates the importance of carefully selecting the initial HOV lanes to be implemented in a region.
- The project also points out the importance of marketing and public education with HOV lanes. WSDOT did not actively promote use of the southbound I-5 HOV lanes. Given the controversy associated with the project, no marketing or outreach efforts were undertaken.
- The project points out the importance of understanding the HOV markets prior to opening an HOV lane, both the travel markets and the political markets. Due to the interest in alternative transportation in Portland, the northbound HOV lane has both public and political support. This same public and political support were lacking in Vancouver with the southbound HOV lane.

- The projects highlight the need to provide consistent and visible enforcement. Visible and continued enforcement was lacking on both HOV lanes. Finally, there was organized opposition in the Vancouver area to the HOV lane. The experience indicates the need to be prepared to address opposition campaigns directly.
- An evaluation was conducted six months after the southbound HOV lane was opened to general-purpose freeway traffic at all times. The same data collected during the HOV pilot project evaluations was collected and consistent evaluation methods were used. The facility was congested before and after the change. The results of this assessment indicated that 3,700 person trips had been carried in the HOV lane during the peak-hour compared to 3,500 persons with the general-purpose freeway lane operation. The average vehicle occupancy (AVO) during HOV operation was 1.27, compared to 1.22 with the general-purpose freeway lane operation. Bus ridership declined with the change, but a fare increase was implemented during the initial six months of general-purpose freeway lane operation. The fare increases may have influenced ridership levels. The average travel time for users of all lanes was 17 minutes during the HOV operation and 19 minutes with the general-purpose freeway lane designation. No significant diversions to parallel routes were documented under either the HOV lane or the general-purpose freeway lane operation.
- The assistance of the following individuals was acknowledged – Bob Hart, Regional Transportation Council; Marty Jensvold, Oregon Department of Transportation; Chad Hancock, WSDOT; and Mark Garrity, Scott Noel, and Katy Lewis, Parsons Brinckerhoff.

Overview of Curb/Pylon Separation Systems in Dallas *Stephen Ranft, Texas Transportation Institute*

Stephen Ranft discussed the use of curb-pylon separation systems with the US 75 and I-635 East HOV lanes in the Dallas area. He described the HOV lanes in the area, the curb-pylon systems, and benefits and concerns with the HOV lanes. He recognized the contributions of Scott Cooner and Curtis Beatty from TTI in developing the presentation. Stephen covered the following points in his presentation.

- The HOV system in Dallas currently consists of 67 centerline miles of HOV lanes. Elements in the system include a fixed-barrier reversible-flow HOV lane on I-35E south, which connects to the painted-buffer concurrent-flow HOV lanes on US 67. Both I-35E North and I-635 West have concurrent-flow HOV lanes in each direction of travel, which are separated from the general-purpose freeway lanes by a painted buffer. A new HOV lane on I-30 West is operating as a fixed barrier reversible-flow two-lane section to the west of Dallas. Currently, five miles of the HOV lanes are in operation. An additional seven miles are scheduled to open in December, providing a connection to downtown Dallas. This HOV lane will become a managed lane in the future. The I-30 East corridor includes a moveable barrier reversible-flow HOV lane. A new extension was recently opened, doubling the length of the HOV lane to 14 miles.

- The US 75 HOV lanes include 14 miles of single concurrent flow lanes in each direction over three city jurisdictions. The ADT in this corridor ranges from 223,000 vehicles on southern end to 162,000 vehicles on northern end. The HOV lanes were opened in December 2007 at a cost of approximately \$18 million. Access is provided on the northern end, at an intermediate full access slip ramp at Park Boulevard, and a wishbone flyover ramp on the southern end. The HOV lane uses a 24/7 operation. During weekday peak hours a one-lane reversible ramp provides a direct connection between the US 75 HOV lane and the I-635 West HOV lanes. The US 75 HOV lanes use the Filtrona curb and pylon system, which is intended to provide a psychological barrier to motorists.
- The HOV lane on the southern section of US 75 was retrofitted into the existing right-of-way. There are four 11-foot general-purpose freeway lanes in each direction of travel. The HOV lane is approximately 16 feet from the inside barrier to the inside general-purpose freeway lane and includes a three foot buffer between the general-purpose freeway lane and HOV lane. This reduced cross section is one the reasons for the use of the pylon curb system. The cross section on the northern end has the same 16 feet for the HOV lane and three 11-foot general-purpose freeway lanes in each direction.
- The design for the curb pylons uses the Filtrona system, which includes 44-inch long curb section. The height of the base is approximately 2.5 inches. The installed height of the pylons is 36 inches, with one pylon at the front of the curb section. A 100-inch gap was provided for drainage. The spacing between pylons is 12 feet. However, in the field, placement utilizes two pylons per curb with a spacing of about 37 inches between each post on a single curb. This system cost \$260 for each curb and pylon section.
- The I-635 East HOV facility includes 12 miles of single concurrent flow lanes in each direction. It covers three cities. The ADT in this corridor ranges from 207,000 vehicles on northern end to 188,000 vehicles on southern end. This facility opened in January 2008 at a cost of approximately \$50 million. The project included widening bridges at several locations, resulting in a higher cost than the US 75 HOV lane. Access is located on the southern end with two intermediate partial access slip ramps at Northwest Highway and Skillman and a slip ramp near Greenville. There is also a T ramp to TI Boulevard, which is a major destination in the area. This freeway typically has higher directional distribution westbound in the morning and eastbound in the evening. As a result, intermediate accesses were designed to provide westbound entrances and eastbound egresses. The Dura-Curb curb and pylon system is used on the I-635 HOV facility. The HOV lanes operate on a 24/7 basis.
- The I-635 HOV lane was a partial retrofit to the existing corridor with widening to the outside at the intermediate access locations. The higher project costs reflect the bridge widenings and needed traffic control. The general-purpose freeway lanes were reduced to 11 feet. The HOV lane cross section is approximately 18 feet from the median barrier to the inside general-purpose freeway lane. The

HOV lanes are 11-feet wide and there is a five-foot buffer between the HOV lanes and general-purpose freeway lanes.

- The Dura-Curb system is used with the HOV lanes on I-635. This system has a 58-inch long curb section. The height of the base is approximately three inches and the installed height of the pylons is 39 inches. A single pylon is located near the center of the curb section. A nine-foot drainage gap was provided. The pylons are located approximately 14 feet apart. This system costs \$385 for each curb and pylon section.
- The High Five interchange includes the first HOV-to-HOV system connection in Dallas. It utilizes a single reversible-flow lane to connect the US 75 HOV lane to the I-635 HOV lane during weekday peak periods. It operates southbound to westbound in the morning and reverses to eastbound to northbound in the evening.
- The HOV lanes on US 75 provide a number of mobility benefits. Users of the HOV lanes realize a seven minute travel-time savings during the morning peak period and 11 minutes during the evening peak period. Vehicle volumes on the HOV lane have increased 56 percent since the opening month during the morning peak period, with approximately 2,400 vehicles in morning peak period and some 1,050 vehicles in the morning peak hour. Vehicles volumes have increased 44 percent in the evening peak period, with 2,100 vehicles in evening peak period and approximately 950 in the evening peak hour.
- Mobility benefits realized from the I-635 East HOV lanes include travel-time savings of seven minutes during the morning peak period and eight minutes during the evening peak period. Daily HOV lane volumes in the corridor have increased by approximately 21 percent, with an average of 13,800 vehicles currently using the HOV lanes on a daily basis. Approximately 1,300 vehicles use the HOV lane in the morning peak hour in the peak direction of travel. Approximately 1,200 vehicles use the HOV lane in the evening peak hour in the peak direction of travel.
- Crash data provided by the Dallas Area Rapid Transit (DART) supervisor logs covering the time period from 6:00 a.m. to 8:00 p.m. for the first seven months of operation of the US 75 HOV lane were examined. A total of 79 crashes were reported, but only one crash blocked the lane for more than 90 minutes. Of the remaining crashes, 39 blocked the HOV lane for less than 30 minutes and 39 blocked the lane for between 30 to 90 minutes. Over the same seven month period, a total of 103 incidents were reported. Flat tires accounted for 41 percent of the reported incidents.
- Crash data for the first six months of operation on the I-635 East HOV lanes were also examined. A total of 76 total crashes were reported, with two crashes blocking the HOV lanes for more than 90 minutes. Of the remaining crashes, 26 blocked the HOV lanes for less than 30 minutes and 48 blocked the lane for 30 to 90 minutes. A total of 88 incidents were reported on I-635 East over the same six

month period. The majority of those incidents were flat tires or running out of gasoline.

- Approaching the intermediate full access point on US 75, there is a painted gore extending some 200 feet after the pylons end. The access had to be located on a horizontal curve to provide sufficient weaving distances for existing upstream and downstream general purpose lane ramp locations. At the end of the gore, the slip ramp, which is denoted by skip striping, provides 2,500 feet of HOV lane access.
- On the I-635 East HOV lane, partial access design is used at some locations. Vehicles exiting the HOV lanes are provided with their own general-purpose freeway lane. The curb pylon system overlaps at the egress points to discourage general-purpose lane traffic from attempting to enter the HOV lane.
- One problem that has been encountered is the displacement of posts near the ingress gore areas. The curbs remain in place, but the pylons are lost when hit by vehicles. Future research will be examining methods to mitigate this occurrence by enhancing signing and pavement marking on the approach to the ingress, evaluating removing more of the posts in the approach gore, and other measures.
- In most cases there are no inside shoulders on the US 75 corridor due to the limited cross section. As a result, enforcement along most of the US 75 HOV lane is performed using roving enforcement with patrol vehicles traveling in the HOV lanes and the general-purpose freeway lanes. There are also limited shoulders on the I-635 East HOV lane. Roving enforcement is used on this facility.
- There are no truck lane restrictions currently on US 75 or I-635 East. The Dallas/Fort Worth area does utilize truck lane restrictions on I-20 and I-30. Both US 75 and I-635 meet the criteria for implementing truck lane restrictions, which include left exits for the general-purpose freeway lanes and a high percentage of trucks in the corridor. Implementing truck lane restrictions in these corridors would probably assist in ensuring that trucks do not operate in the general-purpose freeway lane adjacent to the HOV lane, thus reducing potential conflicts due to the speed differential in the lanes. It would also reduce the likelihood of trucks hitting the curb-pylon system, reducing maintenance costs.
- Incident management was a concern for the agency responders located along the US 75 and I-635 East HOV lanes. Prior to opening the lanes, incident responders from cities in the corridor met with DART and the Texas Department of Transportation (TxDOT) officials to discuss their concerns with the pylon curb system. Fire personnel wanted to make sure that the pylons would not get caught in the drive shafts of their fire engines and would not melt if a fire engine parked over the pylons. Samples of the curb pylon were provided to incident response personnel, who conducted their own tests. No concerns with the curb pylon system were identified that would affect their incident response procedures.
- DART is responsible for operating the HOV lanes in the Dallas region. DART maintains its own police and courtesy patrol units. DART coordinates with all the local city jurisdictions located along the HOV lane corridors to ensure proper

incident management response. Working with local incident response personnel, DART provides for the safe and efficient removal of vehicles and restoring the facility to normal operation.

- A safety study was conducted on the HOV lanes in the area in 2003. This study will be updated to examine possible maintenance and safety issues in the corridors with the curb-pylon system. The study will be initiated when a full year of data on the operation of the curb-pylon system is available. The other corridors that were previously evaluated in 2003 will also be examined.

The Evolution of Performance Measures as Indicators of HOV/Transit Direct Access Success – A Transit Perspective

James Edwards, Sound Transit

James Edwards discussed the development and use of direct access ramps in the Seattle area. He acknowledged the contributions of Michelle Hudlicky, Sound Transit; Mark Bandy, WSDOT; and Jeanne Acutanza, Richard Storm, and Charlie Wence, CH2M HILL in developing the presentation. James covered the following points in his presentation.

- Sound Transit was established by voters in a 1996 ballot measure. Sound Transit is a three-county regional transit system that includes LRT, commuter rail, and the regional express bus system. Sound Transit is responsible for both fixed facilities and services. The direct access component of the regional express bus system represents an investment to date of approximately \$420 million in fixed facilities, which have been constructed on the WSDOT HOV system in the Seattle area.
- The freeway HOV lane system in the Puget Sound region was initiated in 1970. Currently, 235 miles of a planned 310-mile HOV lane system are in operation. A 2+ vehicle-occupancy requirement is used on the HOV lanes. Until legislative action in 2003 and 2004, the HOV lanes operated on a 24/7 basis. The HOV lanes now operate from 5:00 a.m. to 7:00 p.m. and are open to general-purpose traffic at other times. Initially, some HOV lanes were located on the outside freeway lanes. In the early 1990s, WSDOT policy changed to using the inside freeway lane as the HOV lane. This change created the need for direct access ramps on heavily used HOV lanes. The ramps allow buses, carpools, and vanpools to directly access the HOV lanes at key points.
- The WSDOT Puget Sound HOV Study, which was completed in 1997, identified 22 potential locations for direct access ramps. The plan also included in-line transit stops and freeway-to-freeway HOV connections. The study involved outreach to local cities and counties in the region to help examine possible locations for the direct access ramps. The study examined the opportunity for direct access within the freeway right-of-ways, as well as links to park-and-ride facilities. Equal emphasis was placed on transit and HOVs. The Sound Move Plan included 14 direct access locations. WSDOT has plans to construct additional direct access ramps.
- The Puget Sound HOV Plan followed the growth management approach contained in the Puget Sound Regional Council (PSRC) Vision 2020. Elements of Vision 2020 included facilitating growth in the urban centers, the urban growth

boundary, and in-filling. The direct access plan was initially proposed around urban centers, focusing on park-and-ride lots and transit centers.

- The Sound Move Plan was based on the PSRC Vision 2040, which maintained the urban growth boundary and focused growth in the urban centers. It reflects a change in thinking related to the direct access ramps, however. The direct access facilities were viewed as a way communities could anchor growth and facilitate land use changes. Linking transit to local community growth was an important element of the plan.
- Voters in the three counties approved the Sound Move Plan in 1996. The plan included funding for 14 direct access ramps. The emphasis in the plan was on creating a bus-based regional transit network serving regional transit needs. Carpools and vanpools also benefit from the direct access.
- Implementation of the Sound Move direct access projects represented a collaborative effort with FTA, FHWA, and WSDOT. The direct access facilities are based on locating ramps on the inside lane of the freeway. Design criteria and standards were established to address the unique elements of this approach. The implementation process also involved collaboration with local communities and agencies. This collaboration ensured participation of a broader group of community stakeholders. The local communities were able to advance planned projects and land uses as part of the direct access facilities.
- Performance measures were used to assist in determining general locations for the direct access facilities, to determine use and application, and to set priorities. Performance measures in the Puget Sound HOV Study focused on carpool and transit accessibility, travel-time savings and reliability, transit travel time, impacts on general-purpose lane operations, and land use and environment considerations. Sound Move performance measures focused on transit speed and reliability, serving regional transit needs, HOV travel time, operations and safety, and environmental considerations.
- Use of the direct access ramps have produced a number of indications of success. Two key indicators are transit ridership and ramp use. The ridership trends on Route 511, which operates from the Ash Way park-and-ride lot south of Everett into downtown Seattle provides an example of the impact of the direct access facilities. Ridership levels from 1999, when weekday peak period service on the route was implemented until 2003 was fairly steady. In late 2003, all-day service was added, seven days a week. Ridership increased following this change. Ridership also increased when the Lynwood direct access facility was opened in March, 2005 and again with the opening of the Ash Way direct access facility in September 2005. A sustained annual ridership growth of 15 to 20 percent a year has occurred since 2005 on all Sound Transit express bus routes. A 27 percent increase was recorded in the first quarter of this year over the fourth quarter of last year. The increase in gasoline prices influenced this ridership growth.
- The use of direct access ramps, measured by bus and carpool volumes, represents a second key indicator. The average weekday volumes have been increasing for

all the ramps. Buses account for much of the increase, with carpool volumes reflecting slower growth.

- Other indicators of success include functional linkages, integration with local transit, and integration with local land use. Integration with local land use is dependent on the approaches used by the local communities, including incorporating new transit investments and pedestrian connectivity into land use planning.
- The experience with the five direct access ramps highlights some lessons where other areas can benefit. The five direct access ramps examined include Bellevue CBD, Eastgate, Ash Way, Totem Lake, and Federal Way. A number of points can be identified from the experience with planning, designing, implementing, and operating these direct access ramps. These points address the evolution of regional planning, prioritizing transit in alternative evaluations, and viewing transit benefit as part of a system – not ramp by ramp. The direct access ramps provided an excellent opportunity to work with communities and allowed communities to partner with Sound Transit and WSDOT.
- The Bellevue CBD direct access ramps serve the well-developed urban center of downtown Bellevue. Bellevue is the second largest city in the state. There was an existing transit center and the area has mature TDM policies with employers in place. The new Bellevue Transit Center is the largest transit hub on the east side of the metropolitan area. Approximately 600 buses a day use the facility. The ramps provide full direct HOV access to the I-405 HOV lanes. The ramp was opened 2004.
- The Eastgate direct access ramp connects to the Eastgate Transit Center and park-and-ride lot. It serves the I-90 employment corridor and Bellevue Community College. It also serves as a transfer point for north/south and east/west buses. The Eastgate direct access ramp was initiated as a transit-only ramp due to concern raised by the city that high carpool volumes would overload the 142nd overpass. The Eastgate direct access ramp was opened 2006. It also provides an in-line bus stop.
- The Ash Way direct access ramp is a bus-only facility. It is the sole bus-only ramp in the system. It is located on I-5, approximately halfway between Everett and Seattle. It is very close to the I-405 interchange. As a result, FHWA and WSDOT were concerned about possible weaving from the direct access ramp to the outside ramps on I-405. To address these concerns, only buses are allowed to use the Ash Way direct access ramp. Limiting the ramp to buses, and the resulting low volumes of vehicles, has raised concerns among some groups about the level of investment to provide benefits to transit riders.
- The Totem Lake/Kirkland direct access ramp is located on I-405 approximately 10 miles north of Bellevue. It includes a freeway station, with buses stopping on the ramp. It serves a large park-and-ride lot. A new transit center was constructed as part of the project in a public/private partnership with the Evergreen Hospital Association. Kirkland allowed higher density development

because of the transit connection. The Totem Lake/Kirkland direct access ramp provides an example of Sound Transit's investment in sponsoring a change in the land use the area.

- The Federal Way direct access ramp on I-5 serves an existing park-and-ride lot. The city of Federal Way is using the project to relocate their city center in the area. The city center includes the city hall, police and fire departments, and a new performing arts center. This direct access ramp provides another example of Sound Transit's investments supporting local development.

BREAKOUT SESSION – WHAT’S UNDERWAY IN HOV/HOT FACILITIES?

Robert Benz, Texas Transportation Institute, Presiding

Charlotte Regional Fast Lanes Study

Lynn Purnell, Parsons Brinckerhoff

Lynn Purnell discussed the Regional *Fast Lanes* Study being conducted in Charlotte, North Carolina. He described the study partners and process, existing HOV lanes in the region, and the study feasibility analysis. Lynn covered the following points in his presentation.

- The *Fast Lane* study was initiated in June 2007. The study is co-managed by the North Carolina Department of Transportation (NCDOT) and the City of Charlotte. Parsons Brinckerhoff is providing technical assistance. The study is analyzing the feasibility of managed lanes in 12 corridors in the 10-county region. The 12 corridors cover a total of 340 miles. Both arterial and freeway/express corridors are represented, as are both radial and circumference corridors.
- Numerous organizations are participating in the study. In addition to NCDOT and the City of Charlotte, partnering agencies include the Cabarrus-Rowan MPO, the Gaston Urban Area MPO, the Mecklenburg-Union MPO, and the Lake Norman Rural Planning Organization. The Rock Hill-Fort Mill Area Transportation Study, the Rocky River Rural Planning Organization, the Town of Mooresville, and the South Carolina Department of Transportation (SCDOT) are also participating in the study.
- The existing HOV lanes or *Fast Lanes* on I-77 represent the first HOV facility in North Carolina. They are also the only HOV lanes in North and South Carolina. The I-77 HOV lanes were opened in December 2004. The project took approximately three years from development of the conceptual design to the opening of the lanes. A 2+ vehicle-occupancy requirement is used on the facility, which is reserved for HOVs on a 24/7 basis. There are some access restrictions along the lanes. A wide single white skip line is used in the sections with continuous access. Double-white solid lines are used in sections where access is prohibited.
- *Fast Lanes* are being considered in the Charlotte area for a number of reasons. Travel demand is growing faster than population and rush-hour congestion is lengthening. Travel patterns are diverse and travel distances are increasing. There is a \$65 billion gap between projected needs and future revenues at the state level to the year 2030.
- The purpose of the feasibility study is to assess if there are there any potential corridors where HOV, HOT, or truck-only toll (TOT) lanes are viable, and how these facilities might be connected to form a regional *Fast Lanes* system. Based on similar studies in other parts of the country, a thorough analysis of technical, institutional, and financial elements is being conducted.

- The technical feasibility component is using experienced-based criteria from previous studies to minimize possible delay in reaching decisions. A revenue optimization model is being used to quickly screen toll options for HOT Lanes. State and local conditions and standards are being considered.
- A two-phase study process is being used with the technical feasibility analysis. Phase 1 uses screening criteria designed to quickly identify the most promising corridors. It employs a “Consumer Reports” style for presenting results, which permits easy comparison across multiple evaluation criteria. Phase 2 will involve a more detailed evaluation of the most promising roadways.
- Phase I screening criteria include the presence of congestion, HOV demand, HOT/TOT demand, and physical attributes. Travel speeds and the volume-capacity ratio are used to assess the presence of congestion. HOV demand is examined by persons and vehicles, as well as travel patterns. HOT/TOT demand considers vehicles, travel patterns, and revenue potential. A scale of 1 to 5 is used, with 1 representing “not good” and 5 representing “excellent.”
- The congestion-ranking summary indicates that most corridors will be congested by 2030. Even segments of freeways and arterials planned for widening will experience congested conditions in the future. Only new corridors constructed in the future and exurban portions will be less congested. Much of I-485 will not be congested, but the analysis indicates that this corridor will see the greatest growth in traffic and change beyond 2030.
- The HOV demand-ranking summary indicates good HOV use levels in the radial corridors. HOV demand in the circumferential corridors is low, which is consistent with studies in many other areas. HOV demand is lower where congestion is not present. HOV demand is most favorable on US 74, I-85, and I-77.
- The HOT/TOT demand-ranking summary indicates the same general findings as HOV demand – existing and projected congestion generates demand in both categories. The TOT demand is not high enough to justify two directional lanes.
- The physical attributes-ranking summary indicates that the wider and the newer corridors, which include I-77 North and I-485, provide the best alternatives. The recent widening of sections of I-85 poses a challenge. Implementation in these sections would require narrowing lanes and taking the inside shoulder. Input has been requested from NCDOT and FHWA on these issues. Implementation on I-77 South downtown to I-485 would require a full rebuilding. There is limited opportunity to borrow off-peak direction lanes on I-85, NC-16, and I-77 south of I-485.
- The Phase 1 screening results indicate that approximately 167 miles, or 49 percent of the initial mileage advances to Phase 2 of the study. The HOV and HOT options are feasible on these corridors. Other conditional cases to carry forward include I-85, assuming major design exceptions can be accommodated, I-77 South, assuming the corridor is rebuilt, and NC-16, assuming a reversible lane north of I-85 is constructed.

- The institutional feasibility analysis utilized strategies to measure travelers' perceptions toward more HOV lanes, new HOT lanes, and TOT lanes being added to the freeway system. This element also focused on initiating communication with key stakeholders, and listening to their ideas and reactions to different HOV, HOT, and TOT strategies.
- A regional technical team was established to help guide the study. The team is composed of representatives from the funding partners and other agencies with interest in *Fast Lanes*. The team meets on a regular basis to provide feedback on study findings and recommendations for the Charlotte region. The team also reviews information on HOV, HOT, and managed lane projects throughout the country.
- Educational workshops have been held at key points in the study. These daylong sessions provide opportunities for more focused discussion by the regional technical team and other stakeholders. An initial workshop was held in August 2007 to review U.S. managed lanes experience and to discuss the potential for the concept in Charlotte region. A second workshop was held in February 2008 to present the Phase 1 findings and updates on managed lanes in other cities.
- Stakeholder interviews were conducted with elected officials, business leaders, law enforcement representatives, and special interest groups such as the Sierra Club. These one-on-one interviews with 15 individuals obtained information on perceptions, concerns, and visions for *Fast Lanes* options in the Charlotte area. The Stakeholder Interview Report is posted on the study website.
- A variety of outreach techniques are being used to communicate with the public, policy makers, and special interest groups. A unique, user-friendly study name and logo provide visibility. The study website is being used to disseminate key findings and provides links to other related sites. Business cards with *Fast Lanes* examples, the website address, and study contacts are being widely distributed. A video was produced by City of Charlotte for use on the study website, public television, and at meetings. Press releases are issued at major milestones. Media coverage of the study has been fair and positive.
- Phase 2 will provide a more detailed analysis of the corridors emerging from Phase 1. Phase 2 will examine the type of lane treatment, the type of operational strategy, different HOV and HOT policies, and the potential for truck use. Revenue potential, access, connectivity, and phasing will also be examined.
- The financial feasibility is using the Toll Optimization Model[®] developed by ECONorthwest, which provides revenue forecasts under both "static" and dynamic pricing strategies. The financial feasibility assessment will provide more precise estimates of vehicle volumes and revenues than those provided by the regional travel demand model.

HOV Lanes in the Dallas Area

Koorosh Olyai, Dallas Area Rapid Transit

Koorosh Olyai discussed the HOV lanes in the Dallas area. He described the current HOV lanes, use levels, and other performance indicators. He also summarized the development and implementation of managed lanes projects in the Dallas area. Koorosh covered the following points in his presentation.

- The mission of DART is to build, establish, and operate a safe, efficient and effective transportation system that, within the DART service area, provides mobility, improves the quality of life, and stimulates economic development through the implementation of the DART service plan as adopted by the voters on August 13, 1983, and as amended from time to time.
- The HOV lanes in the Dallas area represent the coordinated effort of DART and TxDOT. The North Central Texas Council of Governments (NCTCOG), FHWA, and FTA are also partners in the HOV program and overall transportation system in the region. DART and TxDOT have different roles and responsibilities related to the HOV facilities. Both agencies share planning and design activities. TxDOT is responsible for construction, DART is responsible for operation and enforcement, and both agencies support maintenance.
- The objectives of the HOV lanes are to increase vehicle-occupancy levels, to increase person-movement capacity, to provide a cost-effective transportation improvement, and to generate public support. Other objectives include improving air quality and reducing fuel consumption. A final objective is that HOV lanes should not adversely impact the freeway general-purpose lanes. These objectives have generally been met. The person-movement capacity of the freeways has been increased. The HOV lanes are cost-effective. Public support for the HOV lanes on I-30 has been quantified through surveys, and NCTCOG estimates indicate decreased fuel consumption. There have been no adverse impacts on freeway speeds.
- The HOV lanes are a key part of the overall transportation system in the Dallas area. Other elements of the system include the TxDOT DalTrans Transportation Management Center (TMC), the motorist assistance program, the DART bus and LRT system, commuter rail, the freeway system, and the toll roads operated by the North Texas Tollway Authority (NTTA).
- The HOV lanes in the Dallas area include a mix of designs and operating strategies. These types include contraflow, reversible, buffer-separated concurrent flow, and barrier-separated concurrent flow. HOV lanes are currently in operation on I-30, I-35E, I-635, I-35E/US 67, US 75, and I-30W. Some 14 percent of the workers in Dallas carpool. The HOV lanes are a key reason for this high level of carpooling.
- The important role HOV lanes play in the Dallas area is evidenced through a number of measures. DART monitors key performance indicators including subsidy per passenger and mode share. The HOV lanes have the lowest subsidy per passenger, \$0.14, of the modes operated by DART. By comparison, the

subsidy per passenger for LRT is \$3.18 and \$3.70 for buses. All of the HOV lanes provide travel-time savings and trip-time reliability compared to driving alone in the adjacent general-purpose freeway lanes.

- HOV lanes and managed lanes are an important part of the future transportation system in the Dallas area. TxDOT, DART, and NTTA are working together on a number of managed lane projects, and NCTCOG has developed policies related to pricing on the managed lanes. For example, a fixed-fee schedule will be used during the first six months of operation, with dynamic pricing used after six months. Transit vehicles will not be charged a toll, and carpools with two or more people will receive a 50 percent discount during the peak periods. This discount will be phased out after the air quality attainment period. HOVs will pay the full toll during off-peak times. A framework for allocating future revenues from managed lane toll projects has also been developed. This framework defines excess revenues and allocates these revenues for use in the TxDOT district where the facility is located. Research on signing for the managed lanes, especially at the entrance points, has also been conducted.

I-495 Capital Beltway HOT Lanes Public/Private Partnership

Declan McManus, KPMG

Declan McManus described the I-495 Capital Beltway HOT lanes public/private partnership in Virginia. He reviewed the project objectives and discussed the financing elements, including contract features to protect the public interest. Declan covered the following points in his presentation.

- The I-495 Capital Beltway HOT lanes project represents the first dynamic pricing HOT lanes public/private partnership in the country. It is the first public/private partnership concession agreement in the U.S. that has reached close to contemplated refinancing gain share by the public sector. It is the first Private Activity Bonds (PABs) transportation public/private partnership project in the U.S.
- The I-495 Capital Beltway HOT lanes will provide a choice for travelers on one of the nation's busiest highways. Travelers will have the option of using dedicated, congestion-free lanes for a fee or using the congested general-purpose lanes for free. Free use of the HOT lanes will be provided to 3+ carpools.
- The Capital Beltway HOT lanes project is intended to accomplish a number of objectives. These objectives include providing the residents of northern Virginia with additional traffic capacity and expanding the regional HOV network. Another objective is to transfer key risks to the private sector, such as construction scheduling and budgeting, and traffic and revenue projections. Increasing transit ridership and HOV use represents another objective. Finally, the Commonwealth is not restricted from advancing surrounding transportation improvement projects.
- The contract on the I-495 Capital Beltway HOT lanes project includes an 80-year concession agreement with a new entity called Capital Beltway Express (CBE), which is sponsored by the Fluor/Transurban Consortium. The CBE's

responsibilities include completion of the \$1.4 billion fixed-price design build contract within five years, providing operations and maintenance for the HOT lanes for 75 years, providing financing for almost \$1.6 billion worth of project costs, and accepting the traffic risk. Transurban has the operations and maintenance contract with CBE, while Fluor/Lane has the construction contract. Debt financing from a TIFIA loan and PABs are also being used. The Commonwealth of Virginia is also using KPMG as financial advisors and Troutman Sanders as legal advisors.

- Financing sources for the I-495 Capital Beltway HOT lane project include income during construction, VDOT funds, TIFIA funds, PABs, and equity. The contract for the I-495 Capital Beltway HOT lanes project contains a number of elements to protect the public interest. These elements include addressing super profits and toll escalation. Other elements address non-compete clauses, the length of the concession, ensuring adequate operating performance, and excessive HOV usage. It is important to consider these types of elements in a concessionaire contract to ensure the public's interest is protected.
- The concession agreement provides mechanisms to mitigate super profits, which might result from traffic volumes above forecast levels or gains from refinancing. The concession agreement requires the concessionaire to share a portion of the total gross annual revenue with VDOT if returns are higher than forecast. If the total return on investment is less than 7.95 percent, VDOT does not receive any share of the revenue. If the total return on investment is within Band One, which is greater than 7.95 percent but less than 8.5 percent, VDOT receives 5 percent of total gross revenues eligible for revenue sharing. If the total return on investment is within Band Two, which is greater than 8.5 percent, but less than 8.97 percent, VDOT receives the Band One's share and 15 percent of the total gross revenue above Band Two. If the total return on investment is within Band Three, which is greater, but not less than 8.97 percent, VDOT receives the Bands One and Two share, plus 30 percent of the total gross revenue above Band Three.
- Capping excessive toll escalation is also addressed in the project. Supply and demand, and the required level-of-service will determine the cap on tolls. Non-compete clauses have been the subject of much debate with public/private partnerships. The Capital Beltway HOT lanes project does not have a non-compete clause because there is no realistic competing route. On HOT lanes projects, the true competing routes are the general-purpose freeway lanes.
- The original proposal for the Capital Beltway HOV lanes project included a 99-year concession. Through negotiation, the final contract was set at 75 years for operation and five years for construction. The length of a concession period is a function of the project economics and public policy goals. It is important to fix the end of the concession date to provide an incentive to the concessionaire, however.
- The Capital Beltway HOT lanes project also ensures operating performance. It is the first public/private partnership in the country to have a performance points regime that leads to a default. For example, if the concessionaire fails to meet

requirements for work zone safety, management, and maintenance of traffic, a maximum of five points per hour may be assessed. Points may also be assessed if other operating, maintenance, and performance criteria are not met. When a total of 245 points is reached, the public sponsor may remove the concessionaire.

- There is a divergence of interests related to HOV use on a HOT project. The public sector's objective is to facilitate growth of HOVs and transit. The private sector's objective is to optimize capacity and maximize toll paying single-occupant vehicles. This divergence led the Commonwealth to provide a shadow toll payment for 3+ HOVs of 30 percent of the toll if certain conditions occur. Examples of these conditions include if the concessionaire has not yet earned a total return of 7.95 percent, if it is within the first 40 years (the term of the PABs and TIFIA debt), if there are more than 3,200 vehicles per lane per hour in the two HOT lanes for more than 30 minutes at a time, and if 3+ HOVs comprise more than 24 percent of the total vehicles for a specified period. Currently, HOVs on the Capital Beltway comprise about 2.5 percent of the total traffic.

Cars, Buses, and Trucks, Oh My! The Atlanta I-75/I-575 Managed Lane Project Experience

Jonathan Reid, Parsons Brinckerhoff and John Orr, Atlanta Regional Commission

Jonathan Reid and John Orr discussed the I-75/I-575 managed lane project in Atlanta. They described the various regional and corridor plans and studies, as well as the implementation process for the managed lanes. The following points were covered in their presentation.

- The Atlanta region is the transportation hub of the southeastern U.S. The I-75/I-575 corridor is one of the most heavily congested corridors in the region. The corridor includes 10 to 15 lanes and carries more than 300,000 ADT. The corridor is important for interstate and intrastate travel and economic development. Future growth in truck traffic is anticipated.
- Project planning objectives in the 2000 Regional Transportation Plan include supporting regional express bus expansion, creating carpooling incentives, and supporting air quality conformity strategies. The I-75/I-575 improvement was initially envisioned as one HOV lane each direction of travel. The total cost estimate was approximately \$770 million. The expectation was created that the facility would be open to traffic in 2005.
- In 2001, the Georgia Department of Transportation (GDOT) commissioned a study to consider extending an existing HOV system on I-75 from I-285 on the perimeter beltway to the I-75/I-575 split. The study also examined the feasibility of interim HOV solutions, the desired minimum HOV lane travel time, and environmental impacts. The study found that there is no simple interim solution to meet future corridor demands. Geometric constraints were also identified as an issue. Moving toward the ultimate solution and focusing on an expanded HOV facility that could better support the transit system was identified as important.
- The GDOT HOV Strategic Implementation Plan, completed in 2003, provides guidance for considering HOV facilities in the area. The policy guidance for barrier-separated lanes includes improved corridor safety, trip reliability,

enforcement, and the potential to manage the lanes. The policy guidance for exclusive HOV interchanges includes simplicity with fewer driver decisions needed, better trip dispersion to the local arterial system, and providing drivers with an alternative to using congested general-purpose interchanges.

- A number of alternatives were carried forward in the Draft Environmental Impact Statement (DEIS) in 2007. These alternatives included different combinations of HOV, truck-only, BRT, and tolling facilities. These alternatives represented a microcosm of all forms of managed lanes. Design options considered locating the lanes both the inside and the outside of the freeway.
- The 2008 Regional Transportation Plan includes the managed lanes concept. A public/private partnership is recommended to construct the project. An estimated completion date, with the facility open to traffic, is between 2011 and 2015.
- The advantages and drawbacks of a barrier-separated alternative were examined. Advantages include enhanced safety and simplified tolling and enforcement. More difficult emergency access and the significant right-of-way required to allow trucks to pass are possible drawbacks to this alternative. There are also potential issues regarding truck tolling.
- Advantages of the buffer-separated alternative include a reduced cross-section or freeway footprint and simplifying the ramps needed at the I-285 Interchange. The alternative provides easier emergency access to trucks. Safety concerns due to no barrier between HOV/BRT and the truck-only lanes represent one drawback.
- Possible advantages of the managed lanes concept include additional tolling capacity and reducing the freeway footprint, impacts, and costs. This approach eliminates the potential of an empty-lane syndrome with the truck-only lanes and balances the peak travel of automobile and truck use. Possible drawbacks include safety concerns with automobiles and trucks operating in the same lanes, and making tolling and enforcement more difficult.
- Toll collection and enforcement will be electronic and will be consistent with the Georgia-400 Toll Road. Enforcement will be more challenging if 3+ HOVs are allowed to use the lanes. Tolling provides needed revenue for the project.
- There is a need for consistent signing, guidance, and lane designations. The project will possibly set a precedent for facilities in other corridors in the area. Issues related to truck access, variable toll signs, left entrances and exits, system trailblazing, lane restrictions, and user eligibility will need to be addressed.
- The dual system urban interchange will replace the outdated and deficient cloverleaf interchange. This design reduces the interchange footprint and results in potential right-of-way cost savings. It also addresses comments in the DEIS to reduce community, right-of-way, and environmental impacts. The potential for off-line BRT stations also exists.
- The initial project cost was approximately \$1.8 billion. The cost has escalated to approximately \$4 billion due to increasing costs for steel, concrete, the substantial BRT investment, and addressing all corridor design deficiencies. Limited local

funds are available. A number of alternative financial options were examined, but none are close to being cost solvent.

- GDOT is in the midst of a Strategic Improvement Plan Study. This study is considering the funding needs for the entire region. I-75 is one of four public/private initiatives on hold until this study is completed. While it is still an important strategic corridor for improvements, the timing of the managed lanes project may be shifted based on other regional priorities. The study is scheduled to resume in October 2008, including identifying alternative, cost-feasible solutions. A supplemental EIS will possibly be required, as the current EIS expires in 2009.

BREAKOUT SESSION – HOVs, HOTs, AND OTHER USER GROUPS

Scott Cooner, Texas Transportation Institute, Presiding

What's Happening to the HOV Lanes: A National Examination of Changes in Operating Policies

Chuck Fuhs, Parsons Brinckerhoff

Chuck Fuhs described changes in HOV policies and operating requirements over the past 35 years. He discussed current operating policies, possible future trends, and research needs. Chuck covered the following points in his presentation.

- Many of the initial HOV lanes, including the Shirley Highway and the El Monte Busway, began as bus-only demonstration projects. Prior to 1987, the FHWA policy focused on a 3+ vehicle-occupancy level for HOV lanes. There were approximately 125 lane miles of HOV facilities in 1987. By 1995, a 2+ vehicle-occupancy requirement was used on most HOV projects, reflecting a change in FHWA policy. There were some 2,400 lane miles of HOV facilities in 1995.
- Interest in expanding HOV lanes to include toll paying single-occupancy or lower-occupancy vehicles emerged during the late 1990s as one approach to maximize the use of facilities with available capacity. The managed lanes concept and the potential for generating revenue also influenced consideration of HOT projects. In some areas, HOT operations were considered as one approach to address HOV lanes that were over-utilized at the 2+ vehicle-occupancy levels, but would be under-utilized at the 3+ level.
- HOV projects are currently located in metropolitan areas with high levels of traffic congestion in major travel corridors. Only six HOV projects have been terminated for various reasons since 1976. HOT projects are currently in operation in San Diego, Denver, Houston, Minneapolis, Salt Lake City, and Seattle. HOT projects in Miami, Los Angeles, and other areas are in various stages of planning and implementation. The I-95 HOT project in Miami, which is part of the UPA, will include increasing the vehicle-occupancy level from 2+ to 3+, and requiring carpools to register to use the lanes. Single-occupant vehicles and 2-person carpools will be required to pay a toll to use the HOT lanes.
- Based on HOT projects in various stages of planning and implementation, it appears that operating HOT lane miles will double by 2012 and double again by 2015. Approximately half of these projects are expanding existing HOV lanes to include a HOT component, and half are new projects, which include a HOT element. It appears that most of these projects will continue to provide free travel for HOVs, and that increasing vehicle-occupancy levels when necessary to maintain desired travel speeds and travel-time savings will be considered on most projects. The exceptions to these trends are some new capacity projects, including those involving public/private partnerships, which may not provide free travel to HOVs.

- There appears to be a shift in some areas from a focus on person movement to a focus on goals related to revenue generation or revenue augmentation, while also expanding investments in BRT and express bus services. Current trends indicate that HOV 2+ requirements may be increased to 3+ on both new and congested managed-lane projects, with a potential loss in person movement in those corridors. Obtaining public acceptance and support for major operational changes will continue to be important.
- The operating strategies from 1969 to the present have focused primarily on vehicle eligibility, vehicle-occupancy levels, and access. Pricing and HOT operations emerged during in the late 1990s. Recently, emphasis is being placed on ATM in many areas. HOV and HOT lanes may become the logical facilities to test and implement the first automated highways in the future.
- The experience with HOV and HOT projects continues to evolve. A better understanding of the impacts of pricing on different user groups and on operations is emerging. There continues to be a need to share information on the experiences with different HOV and HOT strategies and projects. There is also a need to document best practices, including the use of incremental steps to achieve agency and area goals and objectives.
- The TRB HOV Systems Committee and other groups have identified research needs related to HOV and HOT facilities. One research need is identifying common HOV and HOT performance measures and performance data. Developing and conducting surveys of all user and non-user groups represents another ongoing research need. Developing techniques to estimate the possible impacts of different strategies on various segments of the population, evaluating mode shifts resulting from operational changes, and developing tools to support regional travel demand models and sketch planning techniques represent still other research needs.

Carpool Preferences in New Managed Lanes: Addressing the Question “HOT or Not?”
Ginger Goodin, Texas Transportation Institute

Ginger Goodin discussed a recent study conducted by TTI for TxDOT examining carpool preferences with managed lanes. She described the research objectives, the study process, the preliminary findings, and the next steps. She recognized the assistance of Matthew MacGregor, TxDOT; Casey Dusza, TTI; and Mark Burris, TTI and Texas A&M University, with the study and presentation. Ginger covered the following points in her presentation.

- The major research objective was to evaluate the tradeoffs associated with carpool preferences in managed lanes. This objective was accomplished by exploring the causal relationship between carpool pricing incentives and the propensity to carpool, documenting the state-of-the-practice in carpool preferences, and identifying the tradeoffs associated with preferential treatment.
- The research process included a number of tasks. A state-of-the-practice review was conducted first. The results of this review were used to help design the survey instrument and to develop the impact analysis tool. The surveys were conducted and the results were used in the development of the impact analysis

tool. Observational conclusions were also drawn from the survey results. The state-of-the-practice review, the impact analysis tool, and the observational conclusions from the survey were used in the development of the study implementation products, which included a decision framework, a webinar, a PowerPoint presentation, and a brochure.

- The state-of-the-practice review identified a number of interesting points. First, the results revealed there is limited information about carpool incentives in priced managed lanes. Second, existing managed lanes or HOT lanes in Texas provide free access to HOV 3+. Projects in other parts of the country offer free access to HOV 2. Factors identified for consideration in setting managed lane carpool policy include enforcement of vehicle-occupancy requirements, maximizing vehicular throughput, and uniformity and equity considerations. The review also indicated a disconnect between regional carpool program objectives and managed lanes policies in many areas.
- Surveys were conducted in Houston and Dallas in May through July 2006. Survey questions addressed personal travel patterns, opinions on managed lanes, stated preference on mode choice, and demographic information. The surveys were primarily Internet based, with responses collected on-line. The surveys were provided in both English and Spanish. The availability of the survey was widely advertised. Many organizations provided Internet links to the survey to help encourage participation. A total of 4,257 valid responses were recorded through the Internet survey. Minority and low-income respondents were not adequately represented, however.
- To increase the number of responses from low-income and minority individuals, additional surveys were conducted at selected community centers and drivers license offices in Houston and Dallas. Individuals at these locations could complete the surveys in writing or using laptop computers. In addition to the 4,257 surveys completed through the Internet, 220 paper and 134 electronic surveys were completed at the sites.
- Even with the additional surveys, minority and low-income travelers were under-represented in the final sample. At the same time, toll road users were over-represented in the sample. To address this issue, the results were weighed to better represent Houston and Dallas travelers. The weighing characteristics reflected four income groups, four ethnic groups, and toll versus non-toll road travelers.
- The ability to access to HOV lanes was the highest rated reason for carpooling among respondents. Other reasons rated high included relaxation while traveling, enjoying travel with others, helping the environment and society, travel-time savings, and sharing vehicle expenses. The most frequently noted reasons for not carpooling include location/schedule limitations, lack of travel flexibility, the need for a vehicle during the day, and the need to make other stops during the commute trip.

- Carpooling with an adult family member was the most frequently reported type of ridesharing arrangements. Approximately 44 percent of individuals in two-person carpools and 54 percent of individuals in three-person carpools reported traveling with an adult family member. Carpooling with co-workers or individuals in the same building or nearby building was the second more reported ridesharing arrangement, with approximately 25 to 28 percent. Other ridesharing arrangements reported included traveling with a child, casual carpooling, and commuting with a neighbor.
- The managed lanes concept was explained prior to the questions on interest in using managed lanes. A cross-section diagram and a narrative description were provided to explain the design and operation of managed lanes.
- The response to the question on interest in using managed lanes was examined by different user groups and socio-economic characteristics. Approximately 76 percent of toll road travelers reported interest in using managed lanes, compared to 69 percent of non-toll road travelers. Caucasians reported slightly more interest in using managed lanes than African-Americans and Hispanics. Individuals in higher income brackets reported higher interest in use than individuals with lower-income levels.
- The reasons travelers gave for preferring or not preferring managed lanes were examined. The top ranked reasons given were traveling faster than in the general-purpose freeway lanes and travel-time reliability. Not wanting to pay a toll was the top ranked reason respondents identified why they would use the general-purpose freeway lanes over managed lanes. A dominant theme in many responses was that taxes already pay for the roads.
- Stated preference questions provided respondents options between managed lanes and general-purpose freeway lanes based on different occupancy levels, different toll levels, and different travel times. The results from these questions were used in tradeoff analyses.
- The impact analysis modeling was conducted to develop quantitative values for various measures of effectiveness. Researchers at the University of Texas, Arlington developed the modeling tool. The stated preference survey data was used to develop the model for predicting mode choice in priced lanes. The I-30 corridor in Dallas was used in the analysis, which focused on the peak hour.
- Different carpool policy scenarios were examined. Examples of these carpool policies included requiring all HOVs to pay a toll, allowing all HOVs to travel for free, and different combinations of varying the toll by vehicle-occupancy levels. A total of six different carpool scenarios were examined. The four toll levels for single-occupant vehicles were \$0.10 a mile, 0.25 a mile, \$0.50 a mile, and \$0.37 to \$0.45 a mile to optimize for 60 mph in the managed lanes.
- The average speeds in the managed lanes and the general-purpose freeway lanes were analyzed at the different pricing levels for the six carpool policy scenarios. Speeds in the managed lanes were higher with higher toll levels and with some or all HOVs paying the full toll or a partial toll. Speeds in the general-purpose

freeway lanes were lower under these conditions, as fewer travelers would be willing to change to the managed lanes due to the higher tolls.

- The revenue impacts of the different toll levels on the six scenarios were also examined using the model. Revenue as a percentage of the base case, which tolled all vehicles using the managed lanes, was examined. Only three carpool policy scenarios at the \$0.50 per mile rate were above the base case. These carpool policy scenarios were HOV 3+ paying a 50 percent toll and HOV 2 paying full toll, all HOVs paying a 50 percent toll, and HOV 3+ traveling for free and HOV 2 paying a 50 percent toll.
- The percent increase in person throughput from the base case was examined using the model. The carpool policy scenarios of all HOVs traveling for free and the \$0.50 toll rate resulted in the highest throughput due to the higher number of vehicles in the managed lane.
- The carpool policy scenarios were analyzed by six managed lanes performance objectives. The objectives were person throughput, revenue generation, emissions reduction, operational performance, enforcement and operational simplicity, and public perception and support. The relative success of each scenario in achieving the performance objective was rated as high, medium/neutral, or low.
- A number of findings emerged from the study. First, HOV preferences in managed lanes can influence carpooling behavior. Second, family member carpools make up the majority of carpools in Texas, and HOV access rates high in the responses from these carpools. Support for managed lanes is high in Dallas and Houston. Faster travel and travel-time reliability were the most important reasons for support among respondents. Carpool preferences can offer advantages in increasing person-moving capacity in congested travel corridors. Policies that emphasize peak periods may be more effective in targeting commuter/ acquaintance carpools. The determination of the appropriate carpool policy in managed lanes depends upon individual project objectives.

HOT and HOTTER Lanes

Don Samdahl, Fehr & Peers/Mirai

Don Samdahl discussed the consideration of HOT lanes and pricing strategies in the Puget Sound Region. He summarized the results of the Urban Areas Congestion Relief Analysis study conducted for WSDOT. He highlighted factors influencing the consideration of HOT lanes and pricing in the region, the HOT and pricing scenarios examined in the study, and some of the study results. Don covered the following points in his presentation.

- A number of factors are influencing consideration of HOT lanes and pricing in the Puget Sound Region. These factors include increasing traffic congestion and growth pressures, limited funding for new capacity and operations, and concerns about climate change. There are specific needs associated with funding key transportation infrastructure elements in the region, including the SR 520 floating bridge across Lake Washington.
- Population, employment, and person trips per day are all projected to increase in the region. The existing vehicle hours-of-delay is 285,500 per day. The vehicles

hours-of-delay projected for 2025 is 1.1 million a day. From 1994 to 2005, HOV volumes grew faster than general-purpose freeway lane volumes on I-5. As a result, the HOV lanes on I-5 and HOV lanes on other freeways in the area are experiencing congestion.

- One option to address this concern is to raise the vehicle-occupancy requirement from 2+ to 3+. While this change might increase the speeds on the HOV lanes, modeling results indicate that HOV demand would decline. HOT lanes represent another option for addressing congestion in the HOV lanes.
- Three scenarios were examined in the study. The HOT 1 scenario included converting the existing HOV lanes to HOT lanes. The HOT 2 scenario included converting the existing HOV lanes to HOT lanes and adding 366 lane miles of HOT lanes in heavily congested freeway segments. The hybrid HOT lane scenario included two HOT lanes in the peak direction of travel and one reversible lane in the peak direction. It also included fully-managed freeway corridors through Seattle and crossing Lake Washington. Further, direct HOT access at key interchange locations would be provided. The hybrid scenario was developed to address the imbalanced directional flows that occur in the peak-periods.
- A number of challenges were encountered in conducting the study. These challenges included determining the value of time and the toll rates to be used. Other challenges focused on time-of-day travel, mode splits, and trip rates.
- Four evaluation matrices were used in the study. These matrices were total delay and delay per trip, travel time along frequent commutes, potential throughput gain, and potential cost.
- The analysis indicated that the HOT lanes should improve person throughput. Person throughput increases by allowing HOT users to fill the remaining capacity of an existing HOV lane using a 3+ vehicle-occupancy requirement. Congestion is reduced in the general-purpose freeway lanes resulting in more efficient use of general-purpose freeway lanes.
- The capital costs associated with the different scenarios were developed. The capital cost of the HOT 1 scenario was estimated at \$320 to \$430 million, assuming a two-foot inside shoulder and a two-foot striped buffer. The capital cost of HOT 2 scenario was in the \$15 to \$22 billion range, assuming 10-foot inside shoulder and a four-foot buffer. The capital cost of the hybrid scenario was in the \$10 billion range, assuming a 2 to 10 foot inside shoulder and two-to-four foot buffer.
- The influence of region-wide pricing was also examined in the study. Two general pricing scenarios were tested. The first scenario used fixed tolls, with a constant price throughout the day. The toll rates examined were \$0.10, \$0.20, and \$0.30 per mile. The second scenario used variable tolls. The two options were varying the price based on congestion levels on each roadway segment and varying the price by time period. The toll rates examined in the variable pricing options ranged from \$0.05 to \$0.20 per mile.

- The analysis results indicated that conversion of the HOV lanes to HOT lanes improves travel-time reliability, but the total reduction in delay is small. The two-lane HOT lane network offers more benefits but the cost is very high. Region-wide congestion pricing is most effective in reducing congestion, but there are policy and public acceptance implications with this option.
- A number of other studies and projects in the area will contribute to the discussion underway concerning HOT lanes and pricing, including the SR 167 HOT lane pilot study and the Transportation 2040 Plan. Further, a decision on SR 520 may be made soon. The Transportation 2040 Plan includes five tolling scenarios as part of each regional alternative. The scenarios were a one-lane HOT facility with a 3+ vehicle-occupancy requirement or a two-lane HOT facility with a 2+ vehicle-occupancy requirement, selected facility tolling, area pricing and parking, freeway system tolling, and full system tolling. A number of factors are being considered with the need for tolls to fund the SR 520 Bridge. These considerations include beginning tolling in 2010 or in 2016, tolling just SR 520 or tolling both SR 520 and I-90, and the tolling rate to use. Tolls of up to \$4.00 in each direction of travel were tested.

The Life Cycle of Managed Lanes: Impacts of Multiple User Groups
Myron Swisher, AECOM

Myron Swisher discussed the life cycles of HOV lanes and HOT lanes. He described possible variations in the life cycle based on flat HOV growth, revenue generation as a priority, and hybrid vehicle access. He recognized the assistance of David Ungemah, Ginger Goodin, and Bill Eisele from TTI with the preparation of the presentation. Myron covered the following points in his presentation.

- User groups of traditional HOV lanes typically include transit riders, carpools, and vanpools. In most cases, 2+ carpools represent the majority of vehicles using an HOV lane, which would be underutilized with only buses and 3+ carpools. With significant growth in 2+ carpools over time, however, demand will at some point exceed capacity. One option to address this problem and to maintain freeflow conditions in the HOV lane is to raise the vehicle-occupancy level to 3+ and restrict use by two-person carpools.
- In the traditional HOT lane application, single-occupant vehicles are allowed to use an HOV lane for a fee while buses and 2+ carpools travel for free. HOT lanes may experience the same growth in 2+ carpools as HOV lanes, with demand exceeding capacity in the lane. One approach to address this problem and to maintain freeflow conditions in the HOT lanes is to toll two-person carpools, as well as single-occupant vehicles, while allowing 3+ carpools and buses to travel for free.
- HOV lanes may also be expanded to HOT lanes to address a scenario of flat HOV growth. In this scenario, HOV 2+ demand never reaches capacity. Tolloed single-occupant vehicles are allowed to use the available capacity created by this situation. In this scenario, the growth in tollod vehicles may also be flat, allowing tollod vehicles and 2+ HOVs to use the lane into perpetuity.

- Another possible scenario focuses on revenue generation as a priority. In this scenario, providing access to toll-paying vehicles is a higher priority than providing access to HOVs. As the HOT lane reaches capacity, two-person HOVs are required to pay the toll similar to single-occupant vehicles. If the facility reaches capacity under this operation, 3+ carpools would also be required to pay a toll.
- A final scenario allows low emission and energy-efficient vehicles, including qualifying hybrid vehicles, to use the HOT lanes without paying a toll. Currently, the growth rate for hybrid vehicles is not well understood. A number of options might be considered as HOT lanes allowing hybrid vehicles reach capacity. These options include terminating hybrid vehicle use, tolling hybrid vehicles, and tolling two-person HOVs. This scenario has more user groups than other scenarios. The HOV lane on I-95 in northern Virginia provides one example of hybrid vehicle use of an HOV lane. In 2005, approximately 1,760 3+ HOVs and 300 hybrid vehicles were using the lane in the peak hour. A significant growth in hybrid vehicle use would degrade the level-of-service in the HOV lane.

BREAKOUT SESSION – URBAN PARTNERSHIP AGREEMENTS AND THE CONGESTION-REDUCTION DEMONSTRATION PROGRAM

Jessie Yung, Federal Highway Administration, Presiding

USDOT Initiatives: Urban Partnership Agreement Congestion-Reduction Demonstration Initiative

Jessie Yung, Federal Highway Administration

Jessie Yung provided an introduction to the breakout session. She described the USDOT's Congestion Initiative, the UPA, and the CRD. Jessie covered the following points in her presentation.

- USDOT's Congestion Initiative focuses on a six-point plan. The first element is to relieve urban congestion. The UPA and the CRD address this element. The second element is to unleash private sector investment resources. The third element focuses on promoting operational and technological improvements. A "Corridors of the Future" competition was established as part of the fourth element. Targeting major freight bottlenecks and expanding freight policy outreach represents the fifth element. The final element is to accelerate major aviation capacity projects and to provide a future funding framework for aviation.
- A number of approaches are being used throughout the country to address traffic congestion. These approaches include shaping demand, investing in new capacity, operating the system at peak performance, and bringing supply and demand into alignment through congestion pricing.
- Congestion pricing is a key component of the USDOT Congestion Initiative element focusing on relieving urban congestion. The UPA targets strategies that integrate the four "Ts" of tolling, transit, telecommuting/TDM, and technology. Tolling is a key element of the UPA. Tolling focuses on direct user charges based on use of a facility. The charge varies based on the level of congestion. Toll collection is by electronic methods, with no toll booths. Approximately \$850 million in USDOT discretionary funds were made available for the program. Five urban areas were initially selected through a competitive process. The urban areas were New York, Miami and South Florida, Minnesota focusing on the Minneapolis area, Seattle-Lake Washington, and San Francisco. The state legislation needed to implement the pricing component of the New York UPA was not approved. As a result, New York did not meet the requirements to participate in the program.
- The CRD represents a follow-on to the UPA, but is a separate and distinct program. Applications for the CRD were due in November, 2007. In April, 2008, the USDOT announced the selection of Los Angeles and Chicago for funding through the program. Thus, there are six metropolitan areas participating in the programs. Chicago and Los Angeles are receiving funding through the CRD. The Seattle-Lake Washington Corridor, South Florida, Minnesota, and San Francisco are receiving funding through the UPA.

- The congestion-pricing projects in South Florida, Minnesota, and Los Angeles involve the conversion of existing HOV lanes to HOT lanes. The Seattle-Lake Washington UPA includes tolling in the SR 520 corridor. The San Francisco UPA involves parking pricing, and the Chicago CRD includes peak-period parking pricing for goods movement delivery.
- Future USDOT and FHWA activities include promoting HOV-to-HOT conversions through tailored technical assistance, called the HOV-to- HOT Initiative, and continuing to provide direct support to the UPA and CRD projects. The agencies will also harness and share experiences from the UPA and CRD projects with other areas. Providing general resource materials, including tailored workshops, seminars, and reference materials represent other activities. USDOT and FHWA are also supporting research to better quantify the impacts of the different strategies implemented in the UPA and CRD areas.

South Florida’s Urban Partnership: Travel Choices and Strategies to Relieve Congestion
Debora Rivera, Florida Department of Transportation

Debora Rivera discussed the Miami UPA projects. She described the UPA partners, the UPA project elements, and the experience to date with the implementation of the 95 Express. Debora covered the following points in her presentation.

- The Florida Department of Transportation (FDOT) is the lead agency on the Miami UPA. Other partnering agencies include the Miami-Dade MPO, the Broward MPO, Miami-Dade Transit, Broward County Transit, the Miami-Dade Expressway Authority (MDX), and the Florida Turnpike Enterprise. The UPA projects focus on the I-95 corridor.
- The UPA focuses on multimodal, demand-management projects, which combine added capacity, value-priced express lanes, transit improvements, bottleneck removal, and complementary operating strategies. The value-priced express lanes, called the 95 Express, will help reduce, combine, shift or eliminate trips, and regulate traffic flow. Transit elements include BRT, carpools, and vanpools.
- The projects focus on long-distance trips. The 21-mile I-95 corridor connects numerous regional facilities. The HOT conversion includes two express lanes. Variable-priced tolls will be used to optimize traffic flow. The BRT element will enhance reliable public transportation in the I-95 corridor.
- The freeway cross-section included four general-purpose lanes and one HOV lane in each direction of travel. The new cross-section includes four general-purpose lanes and two express lanes in each direction of travel. To accommodate the additional express lanes, all travel lanes are 11 feet wide. Delineators are being used to separate the express lanes from the adjacent general-purpose lanes.
- The BRT element will eliminate the county line transfer and will expand or extend transit services in the corridor. Miami-Dade 95 Express bus service will be enhanced. Bus service into Miami will be provided on US 441 and University Drive in Broward County. Additional new bus routes and extensions to existing routes may be implemented in the future.

- The implementation schedule includes three phases. Phase 1A, which includes the northbound lanes on I-95 from SR 112 to the Golden Glades Interchange is almost completed. Phase 1B, which includes the full system northbound and southbound from I-395 to the Golden Glades Interchange, is scheduled to be completed in the fall of 2009. Phase 2, which includes the full system northbound and southbound from the Golden Glades Interchange to I-595/Broward Park-n-Ride, is scheduled to be completed in the winter of 2011. Lane closures are currently restricted to nighttime and weekend hours to minimize negative impacts on travelers in the corridor.
- The express lanes are separated from the general-purpose lanes by delineators. The toll rates customers will pay will be based on the level of congestion or demand. The rates will be displayed before the beginning of the express lanes. The existing SunPass electronic toll collection will be used. Toll-free customers include registered 3+ carpools and vanpools, transit buses, hybrid vehicles, and motorcycles. There will be a significant Florida Highway Patrol (FHP) presence during the initial phases, with citations issued to carpools with less than three persons and trucks.
- The project is estimated to have a number of benefits. A 50 percent travel time reduction from using the express lanes from the Golden Glades Interchange to SR 112 is projected. The transit transfer delay will be eliminated at the Golden Glades Interchange. No additional right-of-way is needed for the project and minimal construction is necessary. The project allows rapid delivery of improved mobility in the corridor. It also offers benefits that traditional freeway widening alone cannot provide, including encouraging ridesharing, providing incentives for transit use, implementing demand management, and reducing or eliminating trips.
- Some issues were encountered with the opening of the initial section of the 95 Express, which does not yet include the tolling element. These issues included driver confusion and crashes, resulting in negative publicity for the project. A number of measures were taken to quickly address these issues. Physical improvements implemented included extending the delineators along I-95, reducing the spacing between delineators, and replacing white delineators with orange delineators to improve visibility. Other changes included adding warning signs advising drivers of the distance to the next exit, pavement markings advising “express only,” and removing references to I-595. Enhanced public information is also being provided through additional electronic message boards, highway advisory radio, billboards, public service announcements, and press releases.
- The experience with the implementation of the initial segment of the 95 Express highlights a number of important lessons. These lessons include performing an operational analysis early in the process to identify potential problems, anticipating needs in contract documents, and conducting more public outreach than normal with an emphasis on operation not construction. Developing a strong, simple, and consistent communication plan is important. The signing and marking plans should consider signing for build-out and intermediate phases. It is

important not to sign for elements that do not yet exist. Developing a risk management plan for opening day and beyond is important.

The Minnesota UPA

Nick Thompson, Minnesota Department of Transportation

Nick Thompson discussed the Minnesota UPA. He described the agencies and jurisdictions participating in the UPA, the different projects, and the implementation activities underway. He noted that more detailed information had been presented in an earlier session. Nick covered the following points in his presentation.

- The Minnesota UPA team includes a number of partners. The lead agencies are Mn/DOT and the Metropolitan Council, which also operates Metro Transit. The City of Minneapolis, MVTA, and Anoka, Dakota, Hennepin, and Ramsey counties are participating in different projects. The Center for Transportation Studies and the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota are also partners.
- The Minnesota UPA consists of 14 transit projects, seven highway projects, and a major new telecommuting program. It represents a \$183 million investment. The projects represent a mix of new concepts to match the UPA focus and accelerating innovative strategies, which had received consensus through the planning process.
- A key highway component of the Minnesota UPA is the I-35W managed corridor. A 16-mile section of I-35W south of downtown Minneapolis will include expanding existing HOV lanes to HOT lanes, constructing new HOT lanes, and implementing a PDSL. There is also a commitment to future extension of the HOT lanes. Active traffic management and speed harmonization will also be used. New auxiliary lanes are being added in two sections to address bottlenecks.
- The HOT lanes area being implemented in different segments. Approximately 10 miles of existing HOV lanes will be expanded to HOT lanes. Four miles of new HOT lanes are being constructed in the Crosstown Commons section. The PDSL will be approximately two miles in length, providing a northbound connection from the HOT lane into downtown Minneapolis. A future two-mile extension of the HOT lanes to the south is also anticipated.
- The concept of the PDSL is based on the use of dynamic shoulder lanes in the United Kingdom, including the project in operation on M42. Active traffic management, including speed harmonization and additional incident response, will be used with the PDSL.
- The transit elements include adding parking spaces to existing park-and-ride lots, constructing new park-and-ride lots, and purchasing 26 buses. New and expanded bus service will be provided in the I-35W corridor. The MARQ2 dual bus lanes in downtown Minneapolis represent a major component of the UPA. A lane guidance system for shoulder-running buses is being developed and will be deployed on Cedar Avenue. Transit signal priority will be implemented along Central Avenue. Real-time transit information signs will be installed at park-and-ride lots and in downtown Minneapolis. Real-time traffic and transit information will be provided at strategic locations along the I-35W corridor.

- The state legislature provided funding for the telecommuting component of the UPA. The telecommuting elements focused on expanding the use of the ROWE, telecommuting, and alternative work arrangements. While these alternative work schedules and arrangements will be promoted throughout the region, a target of 500 new telecommuters in the I-35W corridor has been set.
- State legislation was needed to implement the PDSL. Legislation was approved allowing vehicles to operate on the shoulder and providing Mn/DOT with the authority to toll vehicles for use of the shoulder. The legislature also provided the funding needed for the local match and the telecommuting project. Most of the Minnesota UPA projects will be implemented between September and December 2009. Due to the previously established construction schedule, the HOT lanes in the Crosstown Commons section will be completed in October 2010.

The Seattle-Lake Washington Corridor UPA

Mark Bandy, Washington State Department of Transportation

Mark Bandy discussed the major elements of the Seattle-Lake Washington UPA. He highlighted the participating agencies and communities, the various projects, and related activities underway in the area. Mark covered the following points in his presentation.

- The USDOT awarded \$154.5 million to apply innovative approaches using transit, technology, tolling, and telecommuting to reduce congestion in the SR 520 corridor in the Puget Sound Region. The three major agencies involved in the UPA are WSDOT, the PSRC, and King County. Local communities and other transit agencies are also participating in the UPA.
- The SR 520 corridor is located in the northeastern portion of the Seattle metropolitan area. SR 520 includes a floating bridge across Lake Washington. The University of Washington is located on the western side of the bridge. The community of Kirkland and other smaller cities are located on the eastern side of the bridge. SR 520 is one of two routes crossing Lake Washington. I-90, located to the south of SR 520 is the second crossing. I-90 connects Seattle, Mercer Island, and Bellevue.
- The UPA technology elements will build on those already deployed in the Puget Sound Region. The current system includes 135 ramp meters, real-time traveler information, 475 traffic cameras, 179 electronic message boards, seven traffic management centers, 55 incident response trucks, and 884 timed traffic signals. There are also approximately 200 miles of HOV lanes and 20 miles of HOT lanes in the region.
- New elements to be funded through the UPA include overhead signs, variable lane control signs, and travel-time signs. The variable speed limit and lane-control signs on SR 520 will be used to alert drivers of traffic congestion ahead. The variable lane control signal will alert drivers of problems and close lanes to provide emergency vehicle access when needed. Travel-time signs will allow drivers to make trip decisions based on real-time information. The UPA will build on existing commute trip reduction programs to encourage telecommuting

and flexible schedules, educational campaigns, employer subsidies, and carpooling and vanpooling.

- The UPA includes the use of variable tolling on the existing SR 520 Bridge. The existing highway would be tolled, with no new highway lanes added. All electronic tolling and variable tolls will be used. The tolls will be lower in non-peak periods and higher in the peak periods. Revenue will be invested in the SR 520 corridor for replacement of the bridge and other improvements.
- Funding from the UPA will be used to purchase 45 additional buses, make improvements to park-and-ride facilities, enhance passenger facilities, and install real-time transit information signs. New passenger waiting shelters and improved lighting represent examples of enhancements that will be made to existing transit facilities.
- A number of activities are currently underway. A Request for Interest (RFI) on the tolling technology has been issued. The RFI focused on assessing the state-of-the-industry for a complete electronic toll collection system the size and scope foreseen on SR 520. Responses to the RFI have been received and are being analyzed. An RFI for the ATM components has also been issued to assess the state-of-the-industry. Responses to this RFI were due in early September. Contract developments for toll back office services, toll in-lane systems, ATM gantries, and ATM components have begun. Toll authorization on SR 520 will be the top transportation-related issue in the state's upcoming legislative session.

The Los Angeles CRD

Stephanie Wiggins, Los Angeles Metropolitan Transportation Authority

Stephanie Wiggins discussed the Los Angeles CRD. She described the background to the CRD, the project elements, and the outreach activities conducted to date. She noted that more detailed information on the different projects was presented in an earlier session. Stephanie covered the following points in her presentation.

- Los Angeles Metro is the lead agency on the CRD, with support from Caltrans. The agency had initially submitted an application under the UPA program. The UPA proposal did not include a tolling component. As a result, the proposal was not selected for funding by the USDOT. Based on this experience, the Metro Board supported the tolling elements of the CRD proposal. The application was selected for funding by the USDOT. A press conference with Governor Schwarzenegger and USDOT Secretary Peters was held to announce the award. This press conference was important because it showed support for the project, including the tolling elements, by top officials.
- Outreach activities have been a major focus over the first five months of the project. Under the terms of the CRD, state legislative authority for the toll elements must be in place by October 15, 2008. The amount of the federal award, which is \$210 million, helped focus the attention of the legislature. This deadline highlights the importance of the outreach activities.

- The I-10 and I-210 corridors were initially considered for the pricing elements of the project. The I-110 corridor was added in place of the I-210 corridor, however, due to the need to increase the vehicle-occupancy requirements from 2+ to 3+ on the I-110 HOV lanes. The pricing component focuses on expanding the HOV lanes on I-10 and I-110 to HOT lanes.
- Transit is an important component of the CRD. Los Angeles has a very active environmental justice (EJ) community. Both the I-10 corridor and the I-110 corridor are EJ corridors. As a result, equity and EJ are important concerns, and it is anticipated that consultants with expertise in assessing EJ issues will be added to the team assisting with the UPA projects. Information on HOT projects in other areas is not enough for this analysis. Additional work will be needed to identify possible EJ concerns and to develop and implement strategies to mitigate these concerns.
- The bill approved by the legislature providing the needed authority for the tolling elements of the project also requires Los Angeles Metro to study the impact of the projects on low-income groups and to provide mitigation measures. The legislation requires the development and implementation of a formal outreach plan. The governor has until September 30 to sign or veto the legislation. The bill becomes law after September 30 if he takes no action.

The National UPA/CRD Evaluation

Katie Turnbull, Texas Transportation Institute

Katie Turnbull discussed the national UPA/CRD evaluation being conducted by the USDOT. She summarized the purpose and focus of the evaluation, the team conducting the evaluation, and the current status of activities. Katie covered the following points in her presentation.

- The national UPA/CRD evaluation has three main purposes. First, the national evaluation will assess the impacts of UPA/CRD strategies in a comprehensive and systematic manner across all UPA/CRD sites. The second purpose of the national evaluation is to generate information and technology transfer materials to support the deployment of similar strategies in other metropolitan areas. Third, the national evaluation will generate findings for future federal policy and program development related to mobility, congestion, and facility pricing.
- The focus of the UPA/CRD national evaluation is on assessing the congestion reduction impacts from tolling, transit, technology, and telework strategies. The associated impacts and contributions of each strategy to reducing congestion will be examined. Lessons learned related to outreach activities, political and community support, institutional arrangements, and technology deployment will be documented. The overall cost/benefit of the deployed strategies will also be analyzed.
- The UPA/CRD national evaluation is using a partnership/team approach involving USDOT, the local agencies, and the national evaluation team. The participation of representatives from the local agencies throughout the process is a

key element, as is ongoing communication through workshops, meetings, conference calls, and e-mails.

- The national evaluation is covering all the UPA/CRD sites – Minnesota, the Seattle-Lake Washington Corridor, San Francisco, South Florida, Los Angeles, and Chicago. The national evaluation team’s role is slightly different with the South Florida UPA. The schedule for deployment of the South Florida UPA projects preceded the national evaluation schedule. As a result, the national evaluation team is providing review, monitoring, and technical assistance to the local evaluation in South Florida.
- Battelle Memorial Institute is the lead contractor on the UPA/CRD national evaluation. Other team members include TTI and CUTR. The Hubert H. Humphrey Institute of Public Policy and Center for Transportation Studies at the University of Minnesota are also on the team. Eric Schreffler, Transportation Consultant, and Susan Shaheen and Caroline Rodier from the University of California, Berkley are the final team members.
- Brian Cronin from the USDOT ITS Joint Program Office is the manager of the national evaluation. There is a USDOT Evaluation Team, with representatives from different agencies, offices, and groups. There is a national evaluation team for each site. Each team includes a site leader and an expert on tolling, transit, telecommuting/TDM, and technology. The national evaluation team also includes individuals with expertise in statistics, economics, and public policy. Each site team is working closely with representatives from the local participating agencies and the USDOT.
- The work plan for the national evaluation includes five major tasks. The first task, evaluation planning and project kick-off, has been completed. The second task, development of the evaluation framework, is underway and will be completed in early 2009. This task includes the development of the national evaluation framework, site-specific evaluation strategies, site-specific evaluation plans, and site-specific evaluation test plans. The third task, evaluation monitoring, and support, is scheduled to occur during 2009 to 2010. The fourth task focuses on data analysis and reporting. This task will be accomplished from 2009 to 2011. The fifth task is technology transfer. Activities in this task are ongoing throughout the evaluation.
- A number of activities have been completed on the national evaluation. A kick-off meeting with representatives from the USDOT was held on May 8, 2008. Kick-off conferences calls were conducted with representatives of the Minnesota UPA and the Seattle-Lake Washington Corridor UPA. The national evaluation framework site visits and workshops have been held in Minnesota and Seattle. The draft evaluation strategies for these two sites are being developed.
- The national evaluation analyses focuses on the four questions posed by the USDOT. How much congestion was reduced? What are the associated impacts of the congestion reduction strategies? What are the lessons learned? What is the overall cost/benefit of the strategies? The evaluation analyses areas include

congestion, the specific strategy performance (tolling, transit, telecommuting, and technology), equity, environmental, goods movement, business impacts, safety, lessons learned, and cost/benefit.

- The analysis approach includes identifying hypotheses or questions for each of the evaluation areas. Associated measures of effectiveness and the data needed to assess the measures of effectiveness are also being identified. An example of a safety-related hypothesis is that congestion-reduction strategies, including strategies that reduce the width of travel lanes and/or shoulders and introduce unfamiliar signage, will not adversely affect highway safety. One possible measure of effectiveness with this hypothesis is the percent change in the crash rate by type and severity. Data needed to assess this measure include the number of crashes by type and severity.
- Next steps in the national evaluation include scheduling and conducting the kick-off calls and workshops in San Francisco, Chicago, and Los Angeles. The national evaluation framework will be finalized and work on the site-specific evaluation plans will be initiated. Development of the detailed test plans will follow. The national evaluation team will also be monitoring the implementation of the projects, providing technical evaluation support, and assisting with technology transfer activities.

LUNCHEON — EXCELLENCE IN INNOVATION AND TRANSPORTATION

*Lee Munnich, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota,
Presiding*

A Policy Maker's Perspective on Excellence in Innovation and Transportation *Senator Scott Dibble, Chair-Minnesota Senate Transit Subcommittee*

Thank you and welcome to Minnesota.

I understand Minnesota hosted this event 20 years ago. I see from a review of your conference offerings that you have had a chance to reflect on the wide array of transportation innovations that have occurred in what may seem to you to be a long time, but to policy makers contemplating such dramatic paradigm shifts, is actually a very short time.

I'd like to give you a little bit of background about what brought me to be so passionate about transportation.

I first got my start in politics, "community organizing," around basic issues of justice, fairness, access and civil and human rights. That quickly led me to fighting for basic common sense approaches in the drive to expand I-35W through south Minneapolis and the southern suburbs at a time when transit and LRT were dirty four letter words and likened to the great social engineering experiments of the Soviet regime.

Thousands of homes and dozens of small businesses were on the chopping block, all to save just a few minutes of commuter travel by automobiles during the peak periods, which would have evaporated by the time the road was opened. All of the pollution and social impacts were to be borne by Minneapolis residents, with no access and no benefit. Downtown Minneapolis, which was supposed to benefit, could not fit one more car on its streets, and the project was going to cost approximately \$1 billion, which represented the majority of Mn/DOT's budget for a whole year.

Surely, there had to be a better way. Expensive new highways, congested as soon as they are open, thousands of cars spewing out choking exhaust, people having to buy second and third cars for the family, old people and young people being stranded – something wasn't working. We knew that people wanted transportation to be a net benefit, to serve much larger goals and aspirations. Transportation engineers building monuments to themselves was not good enough.

But what did people want? To get into buses and trains (even pay to do so) and give up the freedom and convenience of a "free" car trip? To pay a toll on a road between their home and work or school or the store? To move into the city, out of the gorgeous and inexpensive 1.5 acre, four-bedroom home they bought for \$150,000?

People running around with all of these great ideas, transit, demand management, and congestion pricing, seemed like pointy-headed Debbie Downers.

To be sure, the concepts and ideas that support the innovations you are all working on and trying to advance are compelling, are vital to solving vexing transportation and mobility challenges. Better use of existing investments in infrastructure, driving the external costs from society to the user, creating a more rational set of economic choices for individuals and

businesses, making transportation subordinate to our greater goals, rather than have the transportation tail wag the dog.

Along the way we have spin off benefits, including raising additional resources for transportation alternatives, better use of land and redevelopment, more livable communities, and mobility for those stranded seniors, low wage workers, the disabled, and youth. Who could be against that?

But, for better or for worse, having the best idea around is, in my estimation, only about 15 percent of the equation.

Elected officials are really not dunderheads, craven seekers of adulation, power and control over vast sums of money. Most are actually earnest, hard working, wanting to do right by their constituents, wanting to both lead on ideas that are ahead of the curve and to represent the interests of constituents. Most have a different focus and expertise than the one you have, so you are competing for their time and attention. And when you are bringing an idea that might seem to be ahead of its time, upsetting the proverbial apple cart, it is up to you to be sure that the ground has been prepared so the idea can be planted, grown, and ripened.

Some might think that my role as a legislator is fairly straightforward – get a good idea, introduce a bill, present it through the committee process, bring it up on the floor for a vote, send it to the governor for signature. Along the way have a few conversations with my colleagues and ask some regular people to show up and testify. Voila, good things happen, justice prevails!

As the sophisticated people in this room well know, my role actually comes somewhere near the end of a very long, very complicated and iterative chain of events. Before we are ever ready for the prime time at the Capitol, squadrons of regular people have been asked to join the cause, other levels of government have made important policy shifts, private interests and businesses have made changes to their internal policies, the media has been engaged, your mom and dad have decided the idea is great, or at least worth trying out. Every sector of Minnesota life has been touched, organized, and affected in some way – education, legal, social services, business, faith community, media, government, political parties, and other groups. You need to decide where you come in, what part you play – as a convener, a leader, do you implement the new activity?

If we profess to really be for something – a high-minded ideal or principle – we actually have a moral imperative to go about all of the practical steps to bring about its realization. It is not good enough to be right on the facts and own the so-called moral high ground and sit up there sneering or complaining about all of the know nothings who do not get it. That approach is actually pretty lazy and a cop out.

Keys to change are all of the tasks and activities involved in influencing the large systems that permeate our lives, our culture, our society, our political climate and our government. Extremely complex and varied, those actions involve a lot of people, a lot of expertise and a lot of money. It also requires untold quantities of persistence, diligence, and coordination. No one person, no one organization can solely take on that challenge. There is much to be done, plenty to go around.

One of the best examples I can think of is the work that has been done right here in Minnesota by none other than our own Lee Munnich and the Hubert H. Humphrey Institute for Public Affairs and the Center for Transportation Studies at the University of Minnesota. Lee, of

course, has the benefit of having been a practitioner of the finer arts of policy implementation as an elected official.

Converting the I-394 HOV lanes to HOT lanes, which has now given rise to the Urban Partnership Agreement innovations on I-35W and Cedar Avenue, was the result of research, conversation, persuasion, patience, collaboration. Public opinion was well researched, best practices were identified, a community-based steering committee was formed, and earned and paid media was employed. It took patience and diligence over a number of years. It is a great story to tell and I hope you have had time to really examine it as a case study during this conference.

By the way, I believe all of this is not a bad thing, and in fact, makes our work more fun and more interesting. Creating change in this way causes more buy in, allows for the improvement of an idea, forces the setting of priorities, increases the level of accountability for results, ensures that larger principles are in play, builds in greater sustainability, and creates a climate for broader application of the larger ideas.

Again, thank you for giving me the honor of sharing some of my thoughts with you. Let me take this opportunity to commend you on a great conference and to thank you for all of the hard work you do to help make our communities better.

TRB HOV Systems Committee Awards

Ginger Goodin, Chair, TRB HOV Systems Committee

Ginger Goodin presented the following awards from the TRB HOV Systems Committee:

Outstanding Achievement in Project Planning and Development – Koorosh Olyai, DART

Outstanding Achievement in Project Management – Debora Rivera, FDOT

Excellence in Applied HOV Research – Kitae Jang, University of California, Berkeley

Excellence in Research Support – Tim Henkel, Mn/DOT

Excellence in HOV/HOT Communication and Outreach – Patricia Rubstello, WSDOT

HOV Leadership Awards – Two awards were presented in this category. San Diego Association of Governments, and Agencies and Jurisdictions in the Minnesota-St. Paul Metropolitan Area (Mn/DOT, Metropolitan Council, Metro Transit, other transit agencies, the Minnesota State Patrol, the Minnesota Legislature, cities, and counties)

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APPENDIX B – CONFERENCE PROGRAM

Sunday, September 7

- 4:00 p.m. – 6:00 p.m. Conference Registration, Ballroom Foyer**
- 4:00 p.m. – 5:45 p.m. Joint Managed Lanes Subcommittee Mid-Year Meeting, Presidents Room**
- 5:45 p.m. – 7:30 p.m. HOV Systems Committee Mid-Year Meeting, Presidents Room**

Monday, September 8

- 7:00 a.m. – 8:00 a.m. Continental Breakfast, Ballroom Foyer**
Breakfast Partner – AECOM
- 8:00 a.m. – 4:00 p.m. Conference Registration, Ballroom Foyer**
- 8:30 a.m. – 9:45 p.m. Opening Session, Ballroom A&B**
Katie Turnbull, Texas Transportation Institute and Conference Chair, Presiding
Welcome from the TRB HOV Systems Committee, Ginger Goodin, Texas Transportation Institute and Committee Chair
Innovation and Partnerships at the Minnesota Department of Transportation, Tom Sorel, Commissioner, Minnesota Department of Transportation
That Was Then/This Is Now – Changes Since the 1988 HOV Conference in Minneapolis, Katie Turnbull, Texas Transportation Institute
- 9:45 a.m. – 10:15 p.m. Break, Ballroom Foyer**
- 10:15 a.m. – 11:40 p.m. General Session – Innovative Transportation Partnerships– Minnesota Style, Ballroom A&B**
Arlene McCarthy, Metropolitan Council of the Twin Cities, Presiding
Innovation Partnerships to Improve Transportation in the Minneapolis/St. Paul Metropolitan Area, Bernie Arseneau, Minnesota Department of Transportation
Innovative Partnerships to Improve Public Transportation, Brian Lamb, Metro Transit
The MnPASS Partnership and Experience on I-394, Ken Buckeye, Minnesota Department of Transportation

11:45 a.m. – 1:15 p.m. Luncheon – Recognizing Innovative Partnerships in Minnesota, Ballroom B&C

Katie Turnbull, Texas Transportation Institute, Presiding

Speaker – Peter Bell, Chairman, Metropolitan Council of the Twin Cities

Luncheon Partner – SRF Consulting Group, Inc.

1:30 p.m. – 2:45 p.m. Tour of I-394, MnPASS Project and I-35W Bridge

2:45 p.m. – 3:00 p.m. Break, Ballroom Foyer

3:00 p.m. – 4:45 p.m. Breakout Sessions

**What’s the HOV/HOT News Across North America?, Ballroom A
John Doán, SRF Consulting Group, Inc., Presiding**

- *I-95 HOT Lanes in Miami/Ft. Lauderdale*, Debora Rivera, Florida Department of Transportation
- *HOT Activities in Los Angeles*, Darren Henderson, Parsons Brinckerhoff and Stephanie Wiggins, Los Angeles Metro
- *Freeway HOV Lanes in the Toronto Area: A Case Study in Successful Planning and Operation*, Stephen Schijns and Mick Oliveria, McCormick Rankin Corporation
- *MnPASS Users – Who Are They?*, Lee Munnich, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota

Minnesota’s Urban Partnership Agreement – HOT, Priced Dynamic Shoulder Lanes, Transit, Telecommuting, and More, Ballroom B

Connie Kozlak, Metropolitan Council, Presiding

- *Minnesota Urban Partnership Agreement, I-35W HOV to HOT Conversion and Priced Dynamic Shoulders*, Nick Thompson, Minnesota Department of Transportation
- *Minnesota Urban Partnership Agreement: The Transit “T,”* Craig Lamothe, Metro Council/Metro Transit
- *Minnesota Urban Partnership Agreement: Telecommuting*, Adeel Lari, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota

**5:00 p.m. – 6:30 p.m. Reception, A.I. Johnson Room, University of Minnesota
McNamara Alumni Center (next to the Radisson)**

Reception Partner – Barrier Systems

Dinner on Own

Tuesday, September 9

7:00 a.m. – 8:00 a.m. Continental Breakfast, Ballroom Foyer

Breakfast Partner – Fehr & Peers

7:00 a.m. – 12:00 p.m. Continental Registration, Ballroom Foyer

8:00 a.m. – 9:30 a.m. Breakout Sessions

HOV/HOT Supporting Elements and BRT, Ballroom A

Bill Finger, Presiding

- *Park-and-Ride, Transit, and ITS for HOV Lanes*, William R. Loudon, DKS Associates and Leslie Miller and William Ridder, San Joaquin Council of Governments
- *Evolution of the Puget Sound Region HOV Direct Access Ramps*, Chris Wellander and Liz Young, Parsons Brinckerhoff
- *National Update on BRT Projects*, Alasdair Cain, Center for Urban Transportation Research, University of South Florida
- *46th Street BRT Station: A Public Involvement Story*, Jill Hentges, Metro Transit

What's Next for HOT Projects?, Ballroom B

Greg Jones, Federal Highway Administration, Presiding

- *Optimizing Optional Toll Lane Performance in Minnesota: I-394 MnPASS Phase II Planning*, Ken Buckeye, Minnesota Department of Transportation
- *SR 167 HOT Lanes in Seattle*, Mark Bandy, Washington State Department of Transportation
- *Update on I-25 HOT Lanes in Denver*, Jack Tone, Parsons Brinckerhoff

HOV/HOT Planning, Design, and Operation, Faculty Room

Janelle Anderson, Minnesota Department of Transportation, Presiding

- *I-5 HOV Lanes in the Portland/Vancouver Region: One Worked, One Didn't, So What Happened?*, Chuck Green, Parsons Brinckerhoff
- *Overview of Curb/Pylon Separation Systems in Dallas*, Scott Cooner and Stephen Ranft, Texas Transportation Institute
- *Direct Access HOV Performance – Retrospective*, James Edwards, Sound Transit and Jeanne Acutanza, CH2M Hill

9:30 a.m. – 10:00 a.m. Break, Ballroom Foyer

10:00 a.m. – 11:45 a.m. Breakout Sessions

What's Underway in HOV/HOT Facilities?, Ballroom A

Robert Benz, Texas Transportation Institute, Presiding

- *Charlotte Regional Fast Lanes Study*, Lynn Purnell, Parsons Brinckerhoff and Tim Gibbs, Charlotte Department of Transportation

- *HOV Lanes in the Dallas Area*, Koorosh Olyai, Dallas Area Rapid Transit
- *Capital Beltway HOT Lanes*, Declan McManus, KPMG
- *Update on HOV, HOT, and TOT Lanes in Atlanta*, Jonathan Reid, Parsons Brinckerhoff and John Orr, Atlanta Regional Commission

HOVs, HOTs, and Other User Groups, Ballroom B

Scott Cooner, Texas Transportation Institute, Presiding

- *What's Happening to the HOV Lanes: A National Examination of Changes in Operating Policies*, Chuck Fuhs and George Walton, Parsons Brinckerhoff
- *Carpool Preferences in New Managed Lanes: Addressing the Question "HOT or Not?"*, Ginger Goodin, Texas Transportation Institute, Matthew MacGregor, Texas Department of Transportation, and Casey Dusza, Texas Transportation Institute
- *HOT and HOTTER Lanes*, Don Samdahl, Fehr & Peers/Mirai
- *Geographical Representation of Hybrid Vehicle Impacts on HOV Lane and Managed Lane Facilities*, Myron Swisher, AECOM and David Ungemah, Texas Transportation Institute

Urban Partnership Agreements and the Congestion-Reduction Demonstration Program, Faculty Room

Jessie Yung, Federal Highway Administration, Presiding

- *Overview of the Urban Partnership Agreements*, Jessie Yung, Federal Highway Administration
- *The Miami UPA*, Debora Rivera, Florida Department of Transportation
- *The Minnesota UPA*, Nick Thompson, Minnesota Department of Transportation
- *The Seattle-Lake Washington Corridor UPA*, Mark Bandy, Washington State Department of Transportation
- *The Los Angeles CRD*, Stephanie Wiggins, Los Angeles Metro
- *The National UPA Evaluation*, Katie Turnbull, Texas Transportation Institute

Speakers will highlight the organizational approaches and major projects of the different UPA sites, as well as the overall UPA program and the national evaluation. Time will be available for open discussion and questions/answers.

12:00 p.m. – 1:30 p.m.

Luncheon – Excellence in Innovation and Transportation, Ballroom C&D

Lee Munnich, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, Presiding

Speaker – State Senator Scott Dibble, Minnesota Senate

HOV Systems Committee Awards, Ginger Goodin, Texas Transportation Institute

Luncheon Partner – Parsons Brinckerhoff

2:00 p.m. – 5:30 p.m. **FHWA HOT Lane Workshop, Presidents Room**

Wednesday, September 10

8:00 a.m. – 11:00 a.m. **FHWA HOT Lane Workshop, Presidents Room**

