## Update on National HOV Developments

*Katherine F. Turnbull*

*Texas Transportation Institute*

It is a pleasure to have the opportunity to provide an update on HOV-related activities in North America. Having been involved in planning the 1988 conference, I have a good idea of the effort that goes into planning and carrying out a national conference. Ron Kirby, Jon Williams, the TRB staff, and the local planning group are to be commended for the great job they have done with the conference this year.

It is appropriate that the conference is being held in Washington, D.C., since the Shirley Highway represents the first major HOV facility in the country. A great deal has happened since the opening of the initial bus-only lane on the Shirley Highway in 1969. As transportation professionals, we have learned a great deal over the past twenty years concerning the role HOV facilities can play in helping to relieve traffic congestion. Obviously, however, we do not have all the answers to dealing with congestion and mobility problems in major metropolitan areas. If we did, there would be no need for conferences like this.

It is important to note that HOV facilities represent just one approach to dealing with urban congestion problems. HOV facilities should not be viewed as the only solution, nor should they be viewed as the most appropriate solution in all cases. However, HOV facilities can be an efficient and effective approach in many situations. Also, implementing HOV facilities does not preclude the need for other improvements.

The number of HOV facilities in operation has increased significantly since the opening of the Shirley Highway exclusive bus lane demonstration project in 1969. In fact, a number of new HOV projects have been implemented since the last HOV conference in 1988. In addition, there are many more in the planning, design, and construction stages.

Currently, there are 40 HOV projects in operation on either separate rights-of-way or within freeway rights-of-way in 20 metropolitan areas in North America. In addition, there are many more applications of HOV projects on arterial streets, bus-only lanes in downtown areas, and HOV by-passes at freeway ramp meters. The Texas Transportation Institute (TTI) has recently completed a survey of HOV projects on either freeways or in separate rights-of-way. The survey represents one element of a multi-year study funded by the Urban Mass Transportation Administration through the Texas State Department of Highways and Public Transportation. I would like to thank all of the individuals with the different agencies around the country who completed the surveys.

I would like to provide a quick overview of the variety of HOV projects currently in operation today and then focus more specifically on recent projects and issues. Appendix 1 provides a summary of the basic characteristics of the 40 HOV facilities.

High-occupancy vehicle lanes are usually classified into four general categories; exclusive HOV facilities on separate rights-of-way, exclusive HOV lanes within freeway rights-of-way, concurrent flow lanes, and contraflow lanes. The Ottawa Transitway system and the East and South Busways in Pittsburgh are the three HOV facilities in operation on separate rights-of-way. There are 11 barrier separated facilities in operation including the Houston Transitways, the San Bernardino Freeway Busway in Los Angeles, the Shirley Highway and I-66 HOV facilities here in Washington, D.C. and northern Virginia areas, I-394 in Minneapolis, and new facilities in San Diego, Pittsburgh, and Hartford.

Concurrent flow HOV facilities represent the largest group of projects, with some 22 facilities currently in operation. They also represent the most diverse group of projects. Concurrent flow HOV lanes are located on the outside lanes or shoulders of freeways or expressways in Seattle, Santa Clara County, Denver, and Vancouver. Concurrent flow HOV facilities also utilize in the inside lane on freeways in Phoenix, Miami, Orlando, Los Angeles, Orange County, Marin County, San Francisco, Seattle, and northern Virginia.

There are 3 contraflow facilities currently in operation, all in the New York City area. These are the Route 495 approach to the Lincoln Tunnel, the Gowanus Expressway and the Long Island Expressway.

A variety of operating characteristics are associated with the different HOV facilities. The exclusive bus-only facilities in Ottawa and Pittsburgh operate over extended periods of the day. Some HOV lanes, such as those in Seattle, Los Angeles, Orange County, and Hartford operate on a 24-hour basis. Many of the exclusive facilities within freeway rights-of-way are reversible. These facilities, such as the Houston transitways operate inbound in the morning, are closed for a period to reverse the direction of operation, and then are open in the afternoon, in the outbound direction. Some HOV facilities are open only during the peak-periods, while others are open only in the peak-direction or the morning peak-period.

The use of these facilities during the non-HOV restricted periods also varies greatly. Some facilities are closed to all traffic. Others revert to general-purpose lanes, while still others revert to emergency shoulders.

Vehicle occupancy requirements on the different HOV facilities are about evenly split between those requiring 3 or more people and those requiring 2 or more people. Only one HOV facility, the Katy Transitway in Houston, uses different occupancy requirements during different times of the day. During the morning from 6:45 a.m. to 8:00 a.m. a 3+ occupancy requirement is in effect. During other times of the day, a 2+ occupancy requirement is used.

The types of vehicles allowed and the occupancy requirements have changed on many HOV facilities over the years. The Katy Transitway again provides a good

example of these changes. The transitway was open initially only to buses. This was expanded to include authorized carpools and vanpools with 3 or more person due to the public perception that the facility was underutilized. When this perception continued to exist, the authorization requirement was removed and the occupancy requirement was lowered to 2+.

Focusing more specifically on activities that have occurred since the last HOV conference, I would like to talk briefly about the new projects, project extensions, support services, enforcement activities, system plans, and related activities that are being pursued around the country. The following five new HOV facilities have opened in the last 1 1/2 years.

| New HOV Projects |
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| San Diego, I-15 |
| Orange County, I-405 |
| Pittsburgh, I-279 |
| Hartford, I-94 |
| Seattle, I-90 |

- I-15 in San Diego. This is an eight-mile 2-lane, reversible, exclusive HOV facility, located in the median of the I-15 freeway. It is open only during the morning and afternoon peak-periods. A 2+ occupancy requirement is used. Initial volumes have been averaging 1,500 vehicles in the peak-hour for the facility. The cost to construct the I-15 HOV facility averaged approximately $4 million a mile.

*I-15, San Diego*

- I-405 in Orange County. Approximately 14 miles of this concurrent flow HOV facility are currently in operation, with another 10 miles scheduled to open in the next month or so. The I-405 facility is open on a 24-hour basis and utilizes a 2+ occupancy requirement. Current volumes average approximately 1,200 to 1,400 vehicles during the morning peak-hour in the northbound direction and some 950 vehicles in the southbound direction.

- I-279 in Pittsburgh. This is a 4-mile, 2-lane, reversible HOV facility located in the median of the I-279 freeway. It separates into two short, one-lane segments, with one going into the downtown area and the other going to Three Rivers Stadium. A 3+ vehicle occupancy requirement is used. The facility is open for HOVs in the inbound direction in the morning and in the outbound direction in the afternoon. From 8:00 p.m. to 3:00 a.m. it is open to general traffic. This period was identified for general use primarily to accommodate traffic leaving sporting and special events at Three

Rivers Stadium. The I-279 HOV project was open in the fall of 1989. Initial peak-hour volumes have averaged between 160-220 vehicles.

- I-84 in Hartford. This is a two directional, 10-mile exclusive facility. It is considered an exclusive HOV facility as the HOV lanes are separated from the general traffic lanes by 12-foot painted buffers. A 3+ vehicle occupancy requirement is utilized on the facility. Initial peak-hour volumes on the I-84 facility, which opened in the fall of 1989, have averaged between 150-200 vehicles.

*I-84, Hartford*

- I-90 in Seattle. In 1989 a 6-mile interim westbound HOV lane was opened on the I-90 facility. The final I-90 HOV facility, scheduled to open in 1992, will include 10 miles of 2-lane reversible HOV lanes.

A number of extensions to existing projects have also been completed recently, including the following facilities.

HOV Project Extensions

Ottawa Transitway System
Houston Transitways
San Bernardino Busway Downtown Extension
Santa Clara County Commuter Lanes
Phoenix, I-10
Minneapolis, Third Avenue Distributor
Downtown Parking Garages

- Ottawa Transitway. An addition segment of the Ottawa Transitway system was opened in 1989, bringing the total length of the operating system to 23 kilometers of a planned 31 kilometer system. Currently, an additional 9 kilometers are under construction and more are in the planning stage.

- Houston Transitways. The Houston transitway system has continued to expand. Currently 47 miles of a 97-mile system are in operation. Six miles of the Gulf Transitway were open in 1988. The initial 9.5-mile segment of the Northwest Transitway was open in 1988 and the final 4 miles were just opened in February, 1990. The completion of the Northwest Transitway has resulted in significant increases in use. In December 1989, the morning peak-hour volumes were averaging approximately 950 vehicles. After the opening of the final 4 miles in February, 1990, the peak-hour volumes increased to approximately 1,200 vehicles, and counts as high as 1,400 have been recorded. In addition, the one-mile eastern extension on the Katy Transitway was completed in January, 1990. This provides an additional 1-to-2 minutes of travel time savings for

vehicles continuing through the I-610 loop. An increase in utilization levels has also been noted from this improvement. The Northwest Transit Station located at the end of the Northwest and Katy Transitways was just opened last week. This facility provides transfer connections between different services.

*Katy Transitway Eastern Extension*

- San Bernardino Busway Downtown Extension. In 1989, the one-mile extension of the San Bernardino Busway into downtown Los Angeles was completed. This extension provides 1-to-2 minutes in travel time savings for HOVs traveling into the downtown area.

- Santa Clara County. Extensions to the San Thomas and I-101 HOV facilities have been opened over the past two years.

- I-10 in Phoenix. An additional 10-mile segment of the I-10 HOV facility in Phoenix opened in early 1990.

- Third Avenue Distributor (TAD) Garages in Minneapolis. The 4th Street Garage, the first of the TAD Garages being constructed as part of the I-394 project, was opened in August, 1989. It contains a total of 1,600 parking spaces. Reduced rates of $10 a month are available for registered carpools and vanpools, compared to $80 for single-occupant vehicles. Currently, carpools account for approximately 30% to 35% of the daily parkers. Thus, the facility, which also includes a bus loading area and a connection into the downtown skyway system, appears to be well received.

A good deal of recent HOV-related activities throughout the country have focused on many of the supporting facilities associated with HOV lanes. The Seattle area often refers to the actual HOV lanes as the "hardware" and the supporting facilities as the "software". The "software" elements include such things as the supporting transit and rideshare services, different travel demand management (TDM) strategies, enforcement, and other activities intended to increase utilization levels and improve operation of the HOV facility. While a number of the workshop sessions will be focusing on many of these topics, I would like to highlight a few of the major activities that have occurred over the past year.


*HERO Program Seattle*

Enforcement continues to be a concern in most areas. A number of new programs, such as the HERO program and the ticket by mail program, have been implemented to try to address enforcement problems. The HERO program, initially implemented in the Seattle area and now being used in the northern Virginia/Washington D.C. area, provides a telephone number for individuals to report apparent HOV lane violators. The ticket by mail program, which allows the Virginia State Police to issue citations for violations of the HOV requirements by mail, was implemented in 1989 based on a change in state law. This program has been successful in increasing the number of citations an officer can write. In addition, a number of areas reported that they are considering the use of electronic surveillance techniques to improve enforcement levels. Insuring that enforcement issues and needs are adequately considered in the planning and design stages continues to be an important element in the development of HOV facilities.

Traffic management systems or central control systems, which monitor both the HOV and freeway facilities, are being considered and developed in many areas. In addition, many areas are examining the role HOV facilities can play in assisting with special events and incident management. For example, some of the highest volumes on the I-394 interim HOV lane in Minneapolis have been recorded when the facility was opened for Minnesota Twins and Vikings games. In addition, two of the Houston transitways, the Gulf and Katy, are now open for weekend use.

Experience continues to be gained with the use of different support services and travel demand management (TDM) strategies. Most of the current bus service and park-and-ride lots associated with HOV lanes are oriented toward serving downtown areas. These serve the traditional transit market that tends to be well known and well established. However, much is still being learned about how to serve other markets, especially the suburban-to-suburban market. There are a number of examples, primarily in California and Houston, where carpools using the HOV lanes are oriented to suburban travel markets. Some areas are also exploring the use of timed-transfer bus service to better serve suburban origins and destinations. It appears that the flexibility offered by HOV facilities may play a significant role in providing a variety of services to these markets.

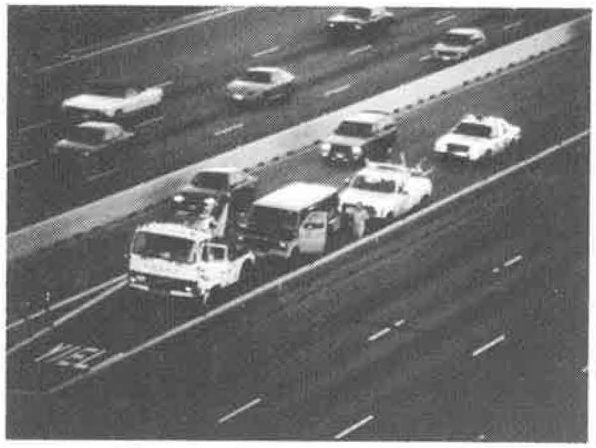
*Addicks Park-and-Ride Lot Houston*

Many areas are also exploring the use of a variety of TDM strategies to encourage the use of HOV facilities. Consideration is being given to the appropriate combination of incentives and disincentives, or "carrots" and "sticks", to use with many of these programs. Experience seems to indicate that we need to go beyond selling bus use and carpooling as a common sense approach. Providing some type of cost savings, through reduced parking fees or subsidized bus fares, travel time savings, and other incentives appear to be important for influencing mode changes.

The role the private sector can and should play is one of key areas many of the TDM strategies are trying to address. Should private sector participation be voluntary or mandatory? How these strategies fit in with many of the local TDM, trip reduction, air quality, and land use ordinances are also being considered.

The marketing and public information programs associated with HOV facilities is other area that is continuing to evolve as more experience is gained. Many of the more traditional approaches, such as opening ceremonies, billboards, and newspaper advertisements, continue to be used. However, new techniques, such as focus groups and more sophisticated survey procedures, are also being tried in many areas. Both Caltrans and the Washington State Department of Transportation are currently developing HOV marketing and public information programs. The I-394 project made use of an extensive marketing program, as have other areas.

Many metropolitan areas are beginning to examine the application of HOV facilities on a systemwide or network basis. Instead of simply focusing on individual projects, these areas are examining the linkage between different types of HOV and support facilities. The intent of these efforts is to provide a unified, coordinated system of HOV facilities on freeways, ramps, and arterial streets. A freeway HOV lane may not be attractive to commuters if they encounter major congestion getting to and from the facility. Many of these approaches tie back into the idea of providing better overall management of the total transportation system.



*Houston Metro Tow Truck*

Last, there is a good deal of interest in many parts of the country with examining different applications of intelligent vehicle highway systems (IVHS) technology to HOV facilities. By offering a real world, but protected, environment, barrier separated HOV lanes have been identified as potential locations for the testing of many of the "smart vehicle" IVHS technologies. For example, the I-15 HOV lanes in San Diego are scheduled to be used to test these types of vehicles being developed as part of the California IVHS program. Other areas are exploring different approaches to using IVHS technologies to encourage transit use. This appears to be an area with a good deal of potential and one which should see variety of activities in the future.

Having examined the past and current status of HOV facilities, it is appropriate to discuss what the future may hold. A good deal of what the future holds will depend on the people in this room and other transportation professionals around the country. The topics that are discussed over the next two days, the issues that you identify as important, as well as the solutions and approaches that are identified, will help set the agenda for the next year. Many of the topics touched on this morning including enforcement, support services, TDM strategies, increasing utilization on some facilities and managing the demand on

others, and IVHS-related research and demonstration projects will all continue to be important.

It appears that the number of HOV facilities will continue to increase. If the facilities currently in the design and construction stage are completed, an addition of approximately by 550 miles of HOV lanes will be in operation by the year 2000. This represents a significant increase from the 332 miles currently in operation.

In conclusion, while we have learned a great deal about the role HOV facilities can play, the challenge still exists to look for new and innovative ways to deal with mobility and congestion problems in our metropolitan areas. HOV facilities will continue to be one approach considered in many areas for addressing these issues.