Additional examples of reserved transit and taxi lanes exist along two major arterial corridors from two mid-city areas to downtown Montreal. Transit service is provided by regular and R-Bus routes. The R-Bus routes provide frequent, rapid, peak-hour bus services. This new service, which was just implemented in September, has been so popular that service levels have already been increased significantly on both routes. Another example is a bus-only lane on a major bridge linking Montreal and Laval, a city to the north. In addition, a number of other transit lanes also exist in the city.

In Quebec City, curb lanes along a major arterial corridor are used for mainline bus service. Frequent bus service provides the backbone of a restructured network, linking downtown with other major traffic generators in the city, including a major university and shopping areas.

Other Canadian cities also have examples of transit and transit-HOV lanes. Halifax in the east and Edmonton in the west have created transit-only throughways, allowing transit to bypass congested points in the street network, or to take shortcuts not available to regular traffic.

In Vancouver, a paved shoulder along a freeway south of the city allows transit vehicles to bypass peak-hour traffic back-ups at a bottleneck where the highway narrows to pass through a tunnel. Another planned example on the west coast is the Barnett Highway link between Vancouver and Coquitlam, a suburb to the east of the city. The highway, which serves as a primary link between the two points, is currently a two-lane facility. It is scheduled to be rebuilt to three lanes, including a center, reversible transit-HOV lane.

In short, the concept of reserved transit and transit-HOV lanes is becoming very widely applied and accepted in Canada. Currently, the majority of this country's examples are indeed transit-only lanes, as opposed to bus, vanpool, and carpool lanes. This is not to be interpreted as an anti-automobile approach. Indeed, we believe that the automobile will be part of the Canadian urban environment for many years to come. However, we also believe that if the world is to survive as we know it, transit must play a larger role. Through the continuing implementation of transit-HOV projects, Canadian cities will thrive in the future.

In these tough economic times, it would be easy to say that we simply cannot afford to implement new highway projects, but Canadians are learning that making more effective use of the existing urban infrastructure is critical. We cannot afford to build a never-ending network of more and wider roads and expressways. We are learning to reevaluate our needs and redirect our resources towards developing an urban structure that is more oriented to persons and to mass transit. This will be accomplished by implementing transit-oriented land use guidelines, and by designing transit priority and high-occupancy vehicle lanes using existing roads and freeways.

In this way, we believe that this country will be able to meet the urban challenges of the future. I hope you find the next few days to be most informative, and may I take this opportunity to again welcome you to Canada and the conference.

Status of HOV Projects and Activities

Katherine F. Turnbull
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A number of people deserve credit for helping organize the conference this year. Rich Cunard and the TRB staff did their normal outstanding job in taking care of the arrangements with the hotel, John Bonsall and his staff have organized the local activities, and Don Capelle and other members of the TRB HOV Systems Committee have assisted in organizing the workshop sessions. The efforts of all these people deserve to be recognized.

It is a pleasure to have the opportunity to provide an overview of recent HOV projects and activities. A great deal has happened since the previous National Conference on HOV Systems in Seattle, which was held in the spring of 1991. I think you will see the continued high level of interest in HOV facilities reflected in the workshops and the general sessions of this conference. The Intermodal Surface Transportation Efficiency Act (ISTEA) and the federal Clean Air Act Amendments (CAAA) have focused a good deal of attention on transportation in general and HOV projects in particular.

I would like to provide a brief summary of recent HOV projects and activities in North America. Further, I want to note how these efforts fit into the workshops you will have the opportunity to attend over the next two days. The workshops have been organized around current topics of interest and should provide you with the opportunity to discuss issues of mutual concern.

Currently, there are some 49 HOV projects in operation on freeways or separate rights-of-way in 22 North American metropolitan areas. Further, HOV lanes have been implemented on arterial streets in numerous cities. Many areas with HOV lanes are expanding existing facilities and developing additional projects. In addition, new HOV facilities are being developed in a number of areas where none currently exist. Finally, planning studies examining HOV alternatives are being conducted in many metropolitan areas that previously have not considered HOV projects.

The continued interest in HOV facilities is reflected in the growing number of lane-miles of HOV projects in operation in North America. Currently, there are approximately 380 lane-miles of HOV lanes in operation on freeways or separate rights-of-way. If all the projects that are in the planning, design, and construction phases are completed, there will be over 1,000 lane-miles of HOV projects in operation by the year 2000.

A quick trip around North America provides an idea of the number and nature of new HOV facilities. On the West Coast, some ten miles of the Route 57 concurrent flow HOV lanes were recently opened in Orange County, California. Initial indications are that the facility is well-utilized with peak-hour volumes of some 1,000 vehicles at a 2+ occupancy requirement. In Seattle, an interim HOV lane has been in operation on I-5 South for almost a year. This facility, which operates with a 3+ vehicle occupancy requirement, has been averaging about 500 vehicles during the morning peak hour, carrying some 2,500 people.

The grand opening of the I-394 project in the Minneapolis area occurs this week. This facility includes a three-mile segment of two-lane, reversible, barrier-separated HOV lanes and eight miles of concurrent flow HOV lanes. In addition, park-and-ride lots and bus transfer stations are located along the corridor. The project also includes three large parking garages on the edge of downtown Minneapolis. A direct connection is provided from the HOV lanes to the garages, which offer reduced parking rates for carpoolers, bus staging and transfer areas, and connections to the downtown skyway system. The different elements of the project have been opening in stages over the last few years, but the total project is now complete.

Another new project in the Minneapolis-St. Paul area is the Intercampus Busway. This facility will ultimately connect the Minneapolis and St. Paul campuses of the University of Minnesota. Approximately 1½ miles of the three-mile exclusive busway have been opened. The full facility will be completed in the summer of 1993.

In the Dallas area, the East R. L. Thornton (I-30E) HOV lane represents the first use of a moveable concrete barrier with an HOV facility. The East R. L. Thornton HOV project is a contraflow lane that operates only during the peak periods. The moveable barrier is used to transform the median lane in the off-peak direction into a peak-direction HOV lane. The project has been very successful, averaging approximately 1,350 vehicles and 4,300 people during the morning peak hour.

Additional information will be provided on the East R. L. Thornton and I-394 HOV lanes in the workshop on new projects. Information on the abbreviated operation of the Dulles Toll Road HOV project in Northern Virginia will also be provided at that workshop. Recent Congressional action has required the removal of the HOV restrictions on that facility for a period of time.

In the southern portion of Virginia, recently opened HOV lanes in the Norfolk/Virginia Beach area have been well-received and are being well-utilized. The I-64 HOV lanes, which use a 2+ vehicle occupancy requirement, have surpassed the preliminary volume projections. In the first few weeks following its opening, some 800 vehicles—carrying approximately 1,520 people—were using the facility during the morning peak hour. This is a much more positive response than the reaction to the initial HOV efforts in that part of Virginia a few years ago.

The vehicle occupancy requirements have been changed on some HOV projects over the past year. A 3+ occupancy requirement during the evening peak hour was implemented on Houston's Katy HOV lane about a year ago. This requirement matches the 3+ designation in the morning peak hour that was implemented in 1988. Both changes were made to address increasing congestion levels that were affecting the travel time savings and reliability offered by the HOV lane. The Katy HOV lane is still the only HOV lane that uses a different vehicle occupancy requirement during the peak hour. Elsewhere, the vehicle occupancy requirement has been lowered from 3+ to 2+ on both the I-5 North HOV lanes in Seattle and I-279 HOV lanes in Pittsburgh. In addition, a similar change is scheduled for the I-84 HOV lanes in Hartford. These changes were made in response to the perception that the facilities were under-utilized with a 3+ requirement. The impacts of the changes in occupancy requirements will be discussed in one of the workshop sessions.

There have been two significant activities in the area of design guidelines since the last HOV conference. Both the Institute of Transportation Engineers (ITE) and the American Association of State Highway and Transportation Officials (AASHTO) have recently published design

guidelines for HOV facilities. These guidelines build on existing publications and further enhance the level of knowledge related to HOV design issues. Both of the guides, as well as recent design-related activities in Canada, will be discussed at a workshop session today.

One of the benefits of having the conference in Ottawa is the ability to focus more on bus applications with HOV facilities. Workshop sessions have been organized to examine bus operating scenarios, bus service orientation, supporting facilities and services, and other elements critical to the success of HOV projects. In addition, the use of supporting policies and programs will also be discussed in one of the workshops.

The interest in arterial street HOV applications, which was evident at the Seattle conference, continues to grow. This interest appears to stem from a number of different perspectives. Arterial street HOV lanes are being considered as stand-alone projects, as links between major activity centers, and as connections between freeway HOV lanes and major destinations. In addition, the use of arterial street HOV facilities by carpools, rather than just the traditional bus-only approach, is being examined. All of these concepts are being considered in many metropolitan areas. Recent projects and studies in Snohomish County, Toronto, and Hartford will be discussed in one of the workshops.

The application of IVHS technologies with HOV facilities has also generated a good deal of interest and enthusiasm over the past year. There are a number of projects currently in operation that combine HOV and IVHS applications and many more are in the planning stage. One example of IVHS technology currently in use with an HOV facility is on the eastbound approach to the Lincoln Tunnel in the New York City area. Buses using this facility are equipped with automatic vehicle identification (AVI) tags. In combination with a reserved bus-only lane, this technology allows commuter buses to move through the congested toll plaza without stopping. The AVI tags are detected by a reader at the toll plaza and the toll charge is electronically deducted from a pre-paid account. This has provided buses with travel time savings in addition to those afforded by the 2½-mile contraflow lane.

As John mentioned, a number of advanced technologies are being implemented in Ottawa to improve bus operations and to enhance passenger information. The development of an automatic vehicle location (AVL) system represents one of these projects. This system is being used to improve the operation and management of the transit system and to provide real-time information on the status of buses to customers. You will be able to see the AVL tags and overhead readers on the tour tomorrow. You will also have the opportunity to see the video monitors currently used for passenger information.

Another project that combines HOV and IVHS technologies is the Houston *Smart Commuter* IVHS Operational Test. This project is moving forward in the Houston area through the joint efforts of the Metropolitan Transit Authority of Harris County (METRO), the Texas Department of Transportation (TxDOT), FTA, FHWA, and TTI. This project will test the provision of real-time traffic and transit information to individuals in their homes and places of work. The impact this information has on encouraging a mode shift from driving alone to carpooling or using transit will be monitored and evaluated. Changes in travel times or travel routes will also be examined. The overall goal of the project focuses on improving the efficiency of the travel corridor.

Another topic that continues to generate a good deal of discussion is the enforcement of HOV lane operating requirements. Advanced technologies may help address some of the issues and concerns related to HOV enforcement. Past studies have indicated limitations with many technologies that could assist in enforcement activities. However, recent advances in numerous technologies may overcome some of these limitations. A demonstration project is being initiated in the Dallas area that will explore potential approaches and will test some of the more promising technologies.

It has also been suggested that barrier-separated HOV lanes provide an ideal environment to test and implement many of the advanced vehicle control and navigation technologies. Currently, the I-15 HOV lane in San Diego is being used by the California Department of Transportation (Caltrans) during the off-peak periods—when it is not open to HOVs—to test some of the advanced vehicle technologies being developed in California. Other HOV facilities around the country may be used for similar purposes in the future.

Air quality issues continue to be a major concern in most metropolitan areas today. As a result, the role HOV facilities can play in improving air quality levels is being examined more closely in many areas. One of the workshops tomorrow will focus on the current understanding of the relationships between air quality and HOV facilities. This is an area that has been identified as a priority for additional research by the TRB HOV Systems Committee.

Another topic the TRB HOV Systems Committee has been exploring is the international experience with HOV facilities. A number of innovative approaches are being used in cities throughout the world. For example, guided busway systems are in operation in Adelaide, Australia and Essen, Germany. Further, a variety of bus-only lanes are in operation in cities in Europe, South America, and

East Asia. Many of these facilities use other priority techniques, such as signal preemption, to provide additional advantages to buses. In addition, a few projects currently include carpools, and bus and carpool lanes are being considered in more areas. One of the workshop sessions focuses on international HOV applications and we are pleased to have people attending this conference from a number of countries around the world.

In summary, traffic congestion continues to be a significant problem for most metropolitan areas in North America and throughout the rest of the world. HOV facilities provide one approach that may be appropriate to help address traffic congestion, mobility, and air quality concerns in these areas. However, HOV facilities are not the only approach, and they may not be appropriate in some situations. Further, HOV projects should not be viewed as the total solution. Other facilities, programs, and services will continue to be needed to adequately address the concerns facing metropolitan areas today.

I hope you will find the general sessions and workshops to be informative. Further, I hope they will challenge you to continue to think creatively about solutions to the transportation issues facing our metropolitan areas today.