many areas. An NCHRP Synthesis on HOV facilities, written by Chuck Fuhs, has been published by TRB. Additional information and guidelines are available from states, the ministries in Canada, and local transit agencies as well. If you are considering an HOV lane, much more information is currently available than was five years ago.

There are still a number of important issues related to HOV facilities that need to be addressed. The first is the air quality impacts of different types of HOV facilities and how HOV lanes can be used to meet the requirements of the Clean Air Act Amendments and other legislation. More areas are discussing the potential of lane conversions. This is related to air quality concerns, but also has cost and public acceptance implications. The vehicle occupancy requirements for HOV facilities are also being discussed in many areas. Capacity is being reached on some lanes which use a two person vehicle-occupancy requirement. Increasing the vehicle occupancy requirement to three persons is an option being seriously considered in many areas. This has the potential of reducing utilization levels, however, and may cause "empty lane syndrome" perception problems. The issue may be that we just do not have enough 2.5 person carpools. I will leave you with the challenge of determining how we generate 2.5 person carpools.

Thank you.

A National and International Status Report

Charles Fuhs, Parsons Brinckerhoff Quade & Douglas, Inc.

I appreciate the opportunity to be here this morning. Summarizing the recent experience with HOV facilities around the country and around the world is a difficult task. This year we thought we would take a little different approach to presenting an update on HOV activities. To accomplish this, a video has been developed with the assistance of individuals responsible for HOV projects throughout the world.

The following projects were highlighted in the video.

- Chicago, Illinois. The Illinois Department of Transportation (IDOT) is currently designing the first HOV lanes in the Chicago area. The selected design for the Stevenson Expressway is a concurrent flow facility with the HOV lanes located in the center median of the freeway. Implementation should occur in the next four years.

- Boston, Massachusetts. By the spring of 1995, two HOV projects will be in operation in the Boston area. These facilities, accounting for 14-lane miles, are located on I-93. In ten years, approximately 25 miles of HOV lanes should be in operation. These are part of a long-range HOV plan developed by a multi-agency planning group. The Massachusetts Highway Department is responsible for developing the I-93 HOV lane. Constraints for designing the contraflow HOV lane included limited rights-of-way and environmental issues.

- Long Island, New York. The HOV lanes on the Long Island Expressway are buffer-separated concurrent flow lanes. A 2+ occupancy requirement is used. Traffic is monitored by the Information for Motorists System (INFORM). Access and egress are by tapered acceleration and deceleration lanes. A 14-foot shoulder is provided on the left for enforcement and incident management. The Long Island Expressway HOV Task Force, which was formed in 1991, assisted in developing the operating guidelines for the facility. The Task Force is comprised of legislative representatives, the county executive, individuals from transportation, enforcement, and transit agencies, and representatives from the business community. The Task Force was instrumental in developing an outreach program to explain and promote use of the lane.

- New Jersey. The Diamond Express lanes on Route 80 in North New Jersey opened in March of 1994. These are IO-mile long concurrent flow HOV lanes. The facilities were developed in response to growing traffic congestion in suburban areas of the state. These lanes were originally intended to be general purpose lanes. Midway through construction, and even after a segment had been opened to general-purpose traffic, it was decided to make them HOV lanes. After six weeks of operations, the lanes appear to be well utilized, with volumes greater than originally estimated. In the morning peak-period, approximately 2,500 vehicles, carrying 6,300 people, are using the lanes. The travel time savings for HOVs using the lanes has been estimated at 10 to 15 minutes. The

violation rate has been relatively low, averaging between five and ten percent. Public response has been mixed while the media has been supportive at times and neutral at other times. The HOV lane on Route 495 on the approach to the Lincoln is still averaging around 700 buses, carrying 34,000 people during the morning peak hour.

- Maryland. In September 1993, the first freeway HOV lane in Maryland opened. To date, the lanes have been well utilized and seem to be accepted by the public. The success can be attributed to the collaborative effort put forth by elected officials, the public, and the press. Informing the public on the purpose and goals of the HOV lane was of critical importance to the overall public acceptance. By 1997 it is expected that Maryland will have 18 miles of concurrent flow HOV lanes on I-270. In addition, a potential network of statewide HOV facilities is also being considered by the Maryland Department of Transportation.

- Nashville, Tennessee. In September of 1993, the first HOV lane in Tennessee opened on I-65 in Nashville. This is an eight mile concurrent flow HOV facility. The HOV lanes were added during the expansion of I-65 from four to eight lanes. The average daily traffic (ADT) on I-65 is about 68,000 vehicles. The HOV lanes operate Monday through Friday from 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Regional transportation agencies are working closely with the Tennessee Department of Transportation to promote the use of the HOV system.

- Charlotte, North Carolina. Currently, construction is under way on a barrier separated, reversible HOV lane in the median of U.S. 74 in Charlotte. This is a major six lane arterial, which carries approximately 97,000 vehicles per weekday. In the 1970s, a freeway was considered, but adequate right-of-way was not available due to the development in the area. A six lane expressway, with a reversible HOV lane in the median, was selected instead. The general purpose lanes have been designed for operating speeds of 45 miles per hour and will include access via auxiliary lanes. The HOV lane was designed for operating speeds of 55 miles per hour with access points at either end. The vehicle occupancy requirement for the HOV lane will be 3 + . The lane will be operated in one direction starting in 1996, and will be fully operational as a reversible facility in 1998.

- Florida. Florida's HOV effort began in November of 1991 when the Florida Department of Transportation (FDOT) issued a new Interstate Highway System Policy. This new policy established five key directives for the Interstate Highway System in the state. These were to maintain air quality consistent with the provisions of the Federal Clean Air Act Amendments; to support the development of viable urban communities by enhancing the viability of public transit; to support regional commerce and long distance trips by allowing high speed movements in dedicated lengths to promote energy conservation: to reduce congestion by designing facilities to promote the use of high occupancy vehicles; and to ensure that the ultimate system is affordable. The policy is also very specific in defining the limits of potential Interstate expansion. Interstate highways in urban areas cannot exceed ten lanes, while those in rural areas cannot exceed six lanes. Other elements identified to help meet the goals are allowing express bus services to use the HOV lanes, operating metropolitan rail service parallel to and within the I-4 right-of-way, frequent park-and-ride lots, expanded regional bus service, high speed intercity rail service operating within the I-4 corridor, and improvements on crossroads to ease bottlenecks at interchanges.

- Houston, Texas. Currently, 63.6 miles of HOV lanes are in operation on freeways in Houston, Texas. The total planned HOV lane system is 104 miles. All of the HOV facilities are barrier separated, reversible lanes located within freeway medians. Currently, HOV lanes are operating in five Houston corridors. The Metropolitan Transit Authority of Harris County (METRO) and the Texas Department of Transportation (TxDOT) have jointly developed the system and share operational responsibilities. The system also includes 22 park-and-ride lots and direct access ramps.

- Santa Clara County, California. The first HOV lane in Santa Clara County was opened on the San Tomas Expressway in 1982. Currently there are seven HOV lanes in operation and two more are under construction. By the end of 1994, there will be approximately 100 miles of HOV lanes in operation in the county. All of the facilities are concurrent flow lanes.

- Sacramento, California. Four miles of concurrent tlow HOV lanes are in operation on Route 99 in Sacramento. The HOV lanes represent lanes added to Route 99. The HOV lanes operate on a 24-hour basis. Plans are underway to extend the lanes, and other HOV projects are being considered.

- Seattle, Washington. The HOV lane system in the Seattle area continues to expand. The ultimate network is anticipated to comprise approximately 288 lane miles. Some 95 lane miles are currently in operation and an

additional 60 miles are under construction. A variety of designs are used with the HOV lanes in the Seattle area. These include concurrent flow HOV lanes using both the insideand outside lanes, barrier-separated reversible lanes, and arterial street HOV lanes. The potential for converting existing general-purpose lanes to HOV lanes is also being considered.

- Amsterdam, Netherlands. An HOV lane was opened in October of 1993 on Highway A-l on the east side of Amsterdam. The lane is a reversible-flow facility and is eight kilometers long. Buses and carpools with three or more occupants can use the lane. The facility is open during the morning and afternoon peak-periods.

Report from the Federal Highway Administration

Jerry W. Emerson, Federal Highway Administration

Over the past 30 years, the vehicle miles of travel (VMT) in the United States has almost doubled from one to two million. The Interstate system was developed over this same period, and a great deal of new capacity was added to the roadway system. Even with this additional capacity, traffic congestion has increased significantly in most metropolitan areas.

The Interstate system is virtually complete now and little new capacity is likely to be added. The demand for travel, however, is expected to double again in the next 30 years. HOV facilities represent one approach to addressing this continued increase in travel demand.

There has been a significant increase in HOV facilities over the past 20 years. Prior to 1980, there: were less than 100 center-line miles of HOV lanes in operation around the country. Currently, there are around 550 miles. By the end of the decade, some 1,000 miles are anticipated to be in operation. Non-radial HOV facilities appear to represent a major portion of the new lanes. This appears to be a growing trend which responds to the movement of both residents and jobs to suburban areas.

There is every indication of continued interest in HOV facilities. The reasons for this include the ability of these facilities to move more people in fewer vehicles, while often staying within the existing freeway right-of-way. Implementation of HOV lanes can be accomplished relatively quickly compared to other alternatives, and joint funding is often available to support the planning, design, operation, and evaluation of HOV lanes. At the federal level, this includes funding from both the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). At the state and local levels, funding may be available from highway, transit, and other agencies.

Many provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 encourage the development of HOV facilities. Four sections address HOV lanes in detail. These are the Congestion Mitigation and Air Quality, the Interstate Maintenance, Metropolitan Planning, and the Statewide Planning sections. A number of subsequent regulations have been issued that implement many of these provisions.

The new joint FHWA/FTA planning regulations were issued in the fall of 1993. These require that the results of the six ISTEA-mandated management systems are included in the ongoing statewide and metropolitan planning processes. Consideration of demand reduction strategies, operation analyses, and other factors must be included in these plans. The six required management systems are pavement management, bridge management, safety management, congestion management, public transportation facilities management, and intermodal management. Each of these management plans has specific requirements and timelines for development and implementation. There are also penalties-such as the withholding of 10 percent of a state's highway funds-for non-compliance.

The congestion management system requires states and Metropolitan Planning Organizations (MPOs) to develop systematic programs to enhance the mobility of people and goods, not just vehicles. The congestion management system should be part of the ongoing planning process and should include consideration of all modes and alternatives. The goal is to reduce traffic congestion where it exists now and prevent it from occurring in places where it does not currently exist. Emphasis should be placed on the operation and performance of the existing system. HOV facilities will represent a significant focus of congestion management systems in many areas.

Congestion management plans should identify specific strategies for the efficient use of transportation facilities. Examples may include transportation demand management