

## **Erfahrungen in den USA mit Sonderfahrstreifen für Fahrzeuge mit hohem Besetzungsgrad (HOV-Spuren)**

### **Kurzfassung der Vertieferarbeit von Christoph Loos**

Increasing traffic congestion, declining mobility levels, as well as air Quality and environmental concerns are major transportation issues metropolitan areas are facing all over the world. Moreover, limited financial resources and right-of-way availability prevent construction of additional roadways to accommodate increasing commute peak volumes. Realizing that there is no single solution, transportation professionals and decision makers have been pursuing variety of techniques and approaches to address those problems. One promising concept to respond these concerns realized in many urban and suburban areas in the U.S. is offering preferential treatment to high-occupancy vehicles (HOVs).

The primary purpose of this paper is to describe and assess the HOV concept as it has been implemented throughout the U.S. and to examine the concept's transferability to Germany.

HOV facilities focus on increasing the person-movement- rather than the vehicle-movement-capacity of a roadway. This is done by restricting a specific lane or an entire facility to the use of buses, vanpools and carpools. Thus, Commuters Choosing to go by HOV can bypass congested adjacent general purpose lanes, which provides them with time savings as well as with more predictable travel times. Both serves as an incentive for shifting commute mode to a higher-occupied mode. By increasing average vehicle occupancy vehicular volumes can be reduced. This, in turn, might help to preserve person-movement capacity of a roadway, improve air quality, and enhance bus transit operation, which are the primary goals of most HOV projects.

However, in recent years the performance of HOV lanes, which with respect to the diamond-shaped sign are often called diamond lanes or just carpool lanes, has come into question. Several reports doubt the ability of HOV lanes to reduce congestion, improve air quality, or enhance bus transit operation, others question the basic concept itself.

In addition to these fundamental issues, some operational concerns have to be considered. Especially enforcement of HOV requirement turns out to be a major problem. On the one hand enforcement is crucial for obtaining public support of the project, on the other hand it is difficult, time consuming, expensive, and often dangerous for enforcement officers. Attempts to use electronic or other advanced technologies for enforcement so far failed, because determination of the number of occupants is made difficult for example by small children, people in the rear, tinted windows or darkness. So enforcement has to be provided by enforcement officers.

Furthermore, experience shows that HOV lanes to be successful need vital support by different programs and policies. E.g. park-and-ride or park-and-pool lots give users the opportunity to change between low and high occupancy vehicles. Rideshare programs like rideshare matching offer assistance to form carpools with other commuters. Guaranteed ride home programs provide commuters who carpool or take transit with a back-up means of transportation in case of an emergency or an change in schedule. In some metropolitan areas like the San Francisco Bay Area HOVs do not need to pay a toll for the use of the bridges, which might have a significant impact on individual commute costs. Several other programs can be found with all kind of HOV projects.

After describing the basis of the HOV concept the paper gives an overview of all HOV facilities in North America and Europe. Since the 1969 opening of the Shirley Highway exclusive bus lanes in Washington, D.C., numerous metropolitan areas in the United States have developed, or are proposing to develop, priority facilities for High-occupancy vehicles. Currently, 162 HOV lanes are in operation on freeways or separate rights-of-way in 22 metropolitan areas throughout North America, covering approximately 2,330 miles of the freeway system. Many more HOV projects are in stage of planning, design or construction.

In contrast to the U.S. HOV lanes are almost unknown in Europe and especially in Germany. Only 3 HOV facilities are in operation all over Europe, none of them in Germany. The first approach to introduce an HOV lane in Europe took place in the Netherlands in 1993, when an HOV lane was constructed on Freeway A1 near Amsterdam. However, due to legal problems this project failed only one year later. In 1994 the attempt to open an existing bus lane to HOVs in Berlin, Germany failed too, when the German Department of Transportation denied permission due to legal restraints. Only one year later an HOV Facility was opened in Madrid, Spain, which is still in operation successfully. In 1998 two more successful European HOV lanes were introduced: one in Leeds, UK and another in Linz, Austria, where an existing bus lane was opened to vehicles with 3 or more occupants.

The main focus of this paper is to illustrate the HOV concept with the help of a case study: Interstate 80 is historically one of the most traveled and the most congested freeway in the San Francisco Bay Area. To reduce congestion during commute peak periods, in 1997 HOV lanes were introduced between Carquinez Bridge in the east and the approach to the San Francisco/Oakland Bay Bridge in the west. Evaluation showed, that during peak-periods in peak-direction I-80 was very effective, especially with regard of person-movement: during peak-period in peak-direction I-80 HOV lanes carried significantly more people with less vehicles than adjacent general purpose lanes. However, I-80 HOV lanes were not very effective during peak-periods in off-peak-direction. In fact, they failed to fulfill several measures of effectiveness of the California Department of Transportation.

The technical assessment revealed that adding a concurrent lane within the existing right-of-way was an inexpensive and fast solution, however, because a physical barrier is missing, affected enforcement and safety negatively. In a transportation planning point of view it is not clear if I-80 HOV lanes are successful. On the one hand, by adding a new lane, additional solo drivers were attracted, so that I-80 is still the most congested freeway in the Bay area. But on the other hand, I-80 succeeded in offering considerable time and commute cost savings to the user of HOV lanes and enhanced bus transit operation significantly. According to the economical assessment I-80 HOV lanes tend to be a failure. A cost-benefit-analysis showed that the costs exceeded the benefits by more than \$10 million.

Addressing the transferability of HOV lanes to Germany it can be said that HOV facilities might indeed be usable to improve German traffic systems and to relieve commute peak volumes as the basic goals and preconditions are similar to the U.S. However, implementation of HOV lanes in Germany fails due to German laws. According to §6 (1) No. 18 Straßenverkehrsgesetz (StVG, German Highway Code) it is not possible to restrict roadways to the use only of specific vehicles other than buses and/or taxis. However, §6 (1) No. 16 StVG enables the Department of Transportation with approval of the Upper House (Bundesrat) to enact a regulation to implement and operate an HOV lane on an experimental basis for a certain period of time for scientific reason. All other alternatives such as preferential treatment of marked vehicles are dismissed by the Department of Transportation.

Even if German laws were changed to permit discrimination of vehicles only by the number of occupants, the success of HOV lanes would strongly depend on the way of implementation. Opening bus lanes to HOVs, as it is discussed by many German transportation planners, does not seem to be an appropriate way to improve transportation systems, because of missing right-of-way conversion of a general purpose lane seems to be the most promising approach of implementation.

In summary, if implemented in the right way and in appropriate corridors HOV facilities can be a cost effective improvement to metropolitan transportation systems. They may increase the roadway efficiency and make a significant contribution to those who choose to take transit or to carpool. However, the success of an HOV project strongly depends on local preconditions, the specific goals, as well as on the implementation strategy. And even if the approach seems promising they cannot succeed on their own, but can be only a part of more complex solution to the transportation challenge of congested metropolitan areas.