

everyday, normal conditions. This investigation is justified on the basis of improving the development of safety regulations and design competence affecting the safety of human beings using stairways.

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Publication of this paper sponsored by Committee on Pedestrians.

Seattle Area HOV Lanes: Innovations in Enforcement and Eligibility

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ABSTRACT

Preferential high occupancy vehicle facilities such as lanes restricted for transit and carpools are playing an increasingly important role in urban transportation systems. The preferential treatment poses, however, new operational problems for state and local transportation departments and enforcement officials. The minimum occupancy requirement for carpools must be set and effective enforcement of the facility must be maintained. A demonstration project in Seattle, Washington, tested the use of a public telephone hotline to reduce transit and carpool lane violations and also introduced the use of a variable carpool definition in order to maximize transit and carpool lane effectiveness. The variable carpool definition was tested by lowering the occupancy requirements from three to two persons per vehicle at selected locations in an Interstate corridor. Project data showed a 33 percent reduction in transit and carpool violation rates attributable to the public hotline. The change in carpool definition occurred smoothly. Vehicle volumes increased at locations where the occupancy requirement was lowered. Violation rates did not increase at locations where the requirement remained at three or more persons per vehicle. The key to the success of both elements of the project was an extensive, well-orchestrated public information campaign.

During the last decade an increasing number of preferential high occupancy vehicle (HOV) roadway facilities have been built on the nation's urban freeways. These include designated HOV freeway lanes and on-ramp bypass lanes for vehicles with minimum occupancy requirements of two, three, or four persons per vehicle. HOV facilities are expected to play a greater role in the future in the more effective management of the urban transportation system. They offer a time savings that complements a wide range of other transportation services and incentives designed to encourage commuters to leave their cars at home; increase the use of carpools, vanpools, and transit; and raise the person-carrying capacity of urban freeways.

Preferential HOV facilities, however, pose new operational problems for state transportation departments and enforcement officials. The integrity and effectiveness of HOV facilities are threatened as more commuters ignore the lane restrictions. There is also a dilemma posed by opening an HOV facility and setting minimum occupancy requirements so high that relatively few vehicles use the facility or so low that the roadway soon reaches capacity. Variable minimum occupancy requirements are politically sensitive and call into question the traveling public's ability to understand vehicle occupancy requirements that change with time and geographic location within an urban area.

Both problems were the subject of an FHWA-funded HOV demonstration project conducted in Seattle, Washington. During 1983-1984, the Washington State Department of Transportation (WSDOT) together with the Washington State Patrol (WSP) and the Municipality of Metropolitan Seattle's Commuter Pool Division (Metro), tested some innovative, low-cost enforcement techniques and evaluated the effects of varying the minimum carpool occupancy requirement along different portions of the same Interstate corridor.

The results should be of particular interest to state transportation departments, enforcement agencies, regional planning agencies, local jurisdictions, and transportation agencies.

BACKGROUND

Interstate 5 (I-5) is Seattle's major north-south freeway. HOV lanes and metered ramp bypass lanes operate along a 12-mi stretch of I-5 to and from downtown Seattle (Table 1 and Figure 1). The HOV lanes are restricted to buses, vanpools, carpools, and motorcycles.

In 1981 six freeway on-ramps southbound and one northbound were reconstructed to provide a lane for vehicles with three or more occupants to bypass the signal controlling access to the freeway. A WSDOT evaluation of the system in March 1982 showed that between 9 and 38 percent of the vehicles traveling in the HOV bypass lanes carried fewer than the required three people.

The concurrent flow HOV lanes in north Seattle were constructed in 1983. The additional northbound lane extends 4 mi from the exit of the express lanes in the Northgate area to northeast 185th Street. The additional southbound lane extends 5 mi from 236th Street Southwest in Snohomish County to the Northgate entrance of the express lanes. In each case the lane is built on the far left, or inside lane, of the freeway.

The WSDOT's evaluation of the first 3 months of HOV lane operation (August 29 to December 6, 1983) showed that vehicles in the HOV lane save about 3 min and 20 sec southbound over the length of the HOV lane compared to general purpose traffic. The evaluation also showed that between 6 and 30 percent of

the vehicles traveling in the HOV lane were violators carrying fewer than the required three people. During that same period the HOV lanes carried between 400 and 450 vehicles per hour during the peak commute periods. These volumes reflected only a 20 to 25 percent utilization rate of HOV lanes. The analysis also indicated that the number of people traveling in the HOV lane on I-95 during peak periods met or exceeded the number of people traveling in a general purpose lane:

	HOV Lane a.m. Peak Period (southbound)	HOV Lane p.m. Peak Period (northbound)	General Purpose Lane
Person trips	Up to 2,800	Up to 2,200	2,220- 2,400

Continued monitoring by the WSDOT indicated that HOV violation rates were increasing. Surveys conducted in December 1983 and January 1984 showed that vehicles carrying fewer than three people comprised from 19 to 63 percent of traffic on the HOV ramp bypass lanes and from 13 to 50 percent on the concurrent flow HOV lane. The gradual deterioration in the system's integrity and perceived effectiveness led to a demonstration project to test new techniques to reduce violation rates. It also provided an opportunity to test the effects of varying the definition of minimum carpool occupancy.

METHODOLOGY

Enforcement

The enforcement element of the project tested alternatives to the high-cost approach of hiring additional law enforcement officers or paying overtime for special emphasis patrols to enforce HOV lane restrictions. The two alternatives tested were the 764-HERO public hotline and deployment of paraprofessional WSDOT observers.

Public Hotline

Before implementing this pilot project the WSDOT had received calls from the general public expressing concern about HOV lane violations. Although these

TABLE 1 HOV Facilities in I-5 Corridor

Direction	Description
I-5 Concurrent Flow HOV Lane	
Northbound	From express lanes' exit near Northgate to Northeast 185th Street
Southbound	From 236th Street Southwest in Snohomish County to the Northgate express lane entrance at Northeast 110th Street Express lane from Roanoke Street to downtown Seattle (Cherry/Columbia)
I-5 Metered Ramp HOV Bypass Lane	
Northbound	Northeast 45th Street
Southbound	236th Street Southwest (Snohomish County) Northeast 205th Street Northeast 175th Street Northeast 130th Street Northeast 85th Street Northeast 45th Street
Exclusive HOV Ramps	
Northbound and Southbound	Cherry/Columbia to and from the express lanes
Southbound	Pike/Pine to and from the express lanes

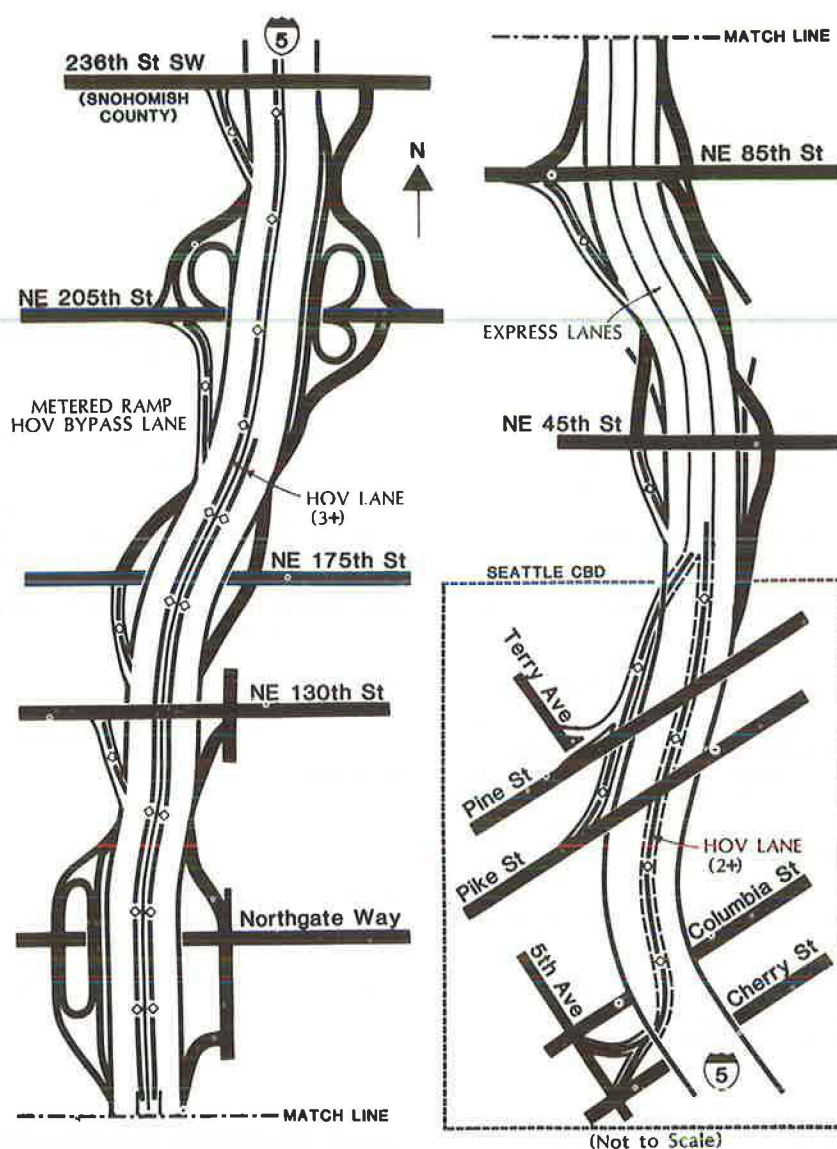


FIGURE 1 HOV facilities.

calls were infrequent, they demonstrated the commuting public's ability and willingness to share in the responsibility for enforcing the occupancy requirements of the HOV lanes. Before the pilot enforcement project, the WSDOT had not established a formal policy for handling reports of violations from the general public. WSDOT staff, however, did record information from the caller and transmitted that information to the WSP on an informal basis. This informal mechanism for handling citizen reports was the foundation for the HERO program.

HERO was patterned after the locally successful "Rat on a Rat" campaign aimed at apprehending bank robbers. The letters H, E, R, and O represent the last four digits of the phone number used by the general public to report HOV lane violations. Signs (Figure 2) announcing 764-HERO were installed, and an extensive public information campaign was undertaken to inform the public of the new program. WSDOT staff manned the HERO line from 6:30 a.m. to 6:30 p.m. (an answering machine was used from 6:30 p.m. to 6:30 a.m.) to obtain information on vehicles violating the HOV lane minimum occupancy requirements. Each caller was asked to supply the following information:

- Location of violation;
- Time, day, and date;
- Vehicle license number;
- Vehicle description (make, model, year, color, etc.);
- Number of persons in violating vehicle; and
- Other comments.

The caller was not required to provide his or her name when reporting violations. No record was kept of the caller's identity. The brochure, "Thanks For Being a HERO," however, was mailed to callers who desired more information about the program. The brochure briefly described the many transportation system management elements such as HERO, metered on-ramps, park-and-ride and pool lots, and vanpooling. Three hundred thirty-seven brochures were mailed during the study period.

DOT Observers

WSDOT staff also collected information on violations through field observations. Observation teams of one or two persons were assigned to specific ramps during



FIGURE 2 HERO sign.

peak periods. The teams observed vehicles using the HOV lanes and recorded information, identical to that asked of HERO callers, on vehicles that violated the minimum occupancy requirements of the HOV lanes.

When a violation report had been recorded from either the hotline or WSDOT observer, the accuracy of the license number and vehicle description were verified by comparing information from the violation report with the Washington State Department of Licensing (state DOL) vehicle registration files. Through interactive computing with the state DOL files, WSDOT staff obtained the registered owner's name and address as well as the make, model, and year of the vehicle. The vehicle description was then checked against the description provided by the HERO caller or WSDOT observer. If the descriptions matched, WSDOT staff proceeded to the first of four actions targeted at violators.

Owners of vehicles reported for the first time were mailed a "Signs of the Times" brochure. This brochure explained HOV enforcement and briefly described how the HERO project related to other transportation system management (TSM) activities that the WSDOT, Metro, and the city of Seattle were involved in, such as freeway on-ramp meters, park-and-ride lots, and destination carpool parking in downtown Seattle. The brochure also included a self-addressed, postage-paid rideshare application that could be completed and returned to Metro Commuter Pool for free computerized ridematching. During the 4 1/2-month project, 113 rideshare applications were returned for matching.

The WSDOT staff required approximately 3 days to process a reported vehicle's license number and to mail a brochure. One week was allowed to elapse before any further action was taken to make sure the brochure reached the registered owner and the driver had time to change behavior.

Owners of vehicles reported for a second time were mailed a second "Signs of the Times" brochure with a letter from the WSDOT. The letter detailed the time, date, and location of the violation and the license number of the violating vehicle. This personalized letter reinforced the brochure by

emphasizing the need to comply with the HOV lane occupancy requirements.

Owners of vehicles reported for a third time received a letter from the WSP. This letter stated that WSDOT had notified the WSP that the owner's vehicle had been reported as repeatedly violating the HOV lane occupancy requirements. The letter also explained that if violators were apprehended they might be issued a summons that could result in a fine. During the study period the fine for an HOV lane violation was \$37.

If continued violations were reported, the vehicle description, license number, and typical time and place of violation were forwarded to WSP. At WSP discretion, a trooper attempted to contact the registered owner of the vehicle.

The WSDOT used an in-house minicomputer for HERO data management. Three programs were developed. Program 1 allowed the operator to create a file for each reported license number. Data could then be entered on new violators and old violator files could be updated. Program 2, the statistics program, yielded detailed statistical data on various violation characteristics and patterns. Summaries could be compiled for the full HERO study period or for a specific period of time. Program 3, the purge program, extracted old violation records not needed to establish a pattern of specific violators. For this project, files that remained inactive for 6 months were purged.

Variable Carpool Definition

This project element had three primary objectives:

- Maximize the efficiency of the HOV facilities by increasing the number of vehicles traveling in the lane or ramp bypass,
- Attract more commuters to ridesharing, and
- Demonstrate that an HOV facility can operate under flexible carpool definitions with a high degree of public acceptability and without adversely affecting violation rates.

Three criteria were used to determine which sections of HOV lanes and metered ramps with HOV bypass lanes could have the minimum vehicle occupancy requirement lowered from three or more to two or more occupants per vehicle.

1. Peak period level of service (LOS) in the HOV lane had to remain at least two levels better than the LOS in the adjacent general purpose lane;
2. Increased HOV volumes, bypassing freeway on-ramp meters, could not impair the metering process by creating substantially longer queues and wait times for single-occupant vehicles; and
3. A main-line HOV lane and a metered on-ramp HOV bypass at the same location and in the same direction had to have the same minimum occupancy requirement; an HOV on-ramp bypass lane designated for two or more occupants per vehicle could not feed into an HOV lane on the adjacent main line with a carpool definition of three or more occupants per vehicle.

By using these criteria, the change from three to two occupants in carpool definition was implemented along a 7-mi stretch of I-5 north at five metered on-ramps and the southbound HOV lane in the express lanes leading into downtown Seattle (Table 2).

Study Design and Data Collection

The project was designed to isolate and compare the effects of the two enforcement techniques and to

TABLE 2 Study Locations and Activities

Location	Direction	764-HERO Sign ^a	DOT Observer	Change in Definition of Carpool From 3 to 2	Counts
Ramps					
SW 236th Street	SB		Control ramp, no changes		X
NE 205th Street	SB	X			X
N 175th Street	SB		X		X
N 130th Street	SB		X		X
N 85th Street	SB			X	X
NE 45th Street	SB			X	X
NE 45th Street	NB	X	X		X
Pike/Pine Street	SB			X	X
Cherry/Columbia Street	SB			X	X
Cherry/Columbia Street	NB			X	X
Main Line					
N 110th Street	NB/SB				X
N 175th Street	NB/SB				X
NE 120th Street		X			
North of 145th		X			
South of 175th		X			
Between 236th and 205th		X			
NE 195th Street		X			
South of 185th Street		X			
South of Roanoke Street	SB ^b			X	

^aAll HERO signs on main line are located in median.
^bReversible express lanes.

detect any negative impacts of varying the carpool definition. Table 2 gives the enforcement activities conducted at each study location. HERO signs were posted on two ramps and at six main-line locations. WSDOT observers recorded violations at three ramp locations, one of which also had a HERO sign. The Southwest 236th Street ramp was designated as the control ramp; no enforcement activities were conducted at this location.

Field data were collected during a 9-month period from September 29, 1983, to June 30, 1984. The HERO line and changing the definition of a carpool from three to two persons at selected ramps and portions of the express lanes became effective February 14, 1984.

Peak-period ramp data were collected from 6:30 a.m. to 8:30 a.m. and from 4:00 p.m. to 6:00 p.m. Data on the main-line HOV lane were collected from 6:45 a.m. to 7:45 a.m. and from 4:45 p.m. to 5:45 p.m. Ramp data were collected on both the general traffic (if applicable) and metered ramp bypass lanes. Main-line data were collected only for the HOV lane. The WSDOT's routine monitoring of I-5 provided supplementary occupancy, volume, and speed data for all main-line lanes. These data were also used for evaluation.

Field data were organized on a spreadsheet. Calculations were made to determine vehicle volumes, number of person trips, average vehicle occupancy, number of violations, violation rates, compliance rates, and so forth.

Enforcement activity by WSP troopers along the I-5 north corridor remained constant. The number of troopers assigned to the corridor did not increase during the study period, November 1983 through June 1984.

Marketing and Program Information

The project team undertook and sustained an extensive public information campaign throughout the project. In preparation for the implementation of the enforcement activities and the change from three to two occupants, groups such as the Downtown Seattle

Association (a local organization of more than 400 downtown business persons), various community organizations, the regional commuter pool network of more than 300 employee transportation coordinators, and pilots providing traffic reports, among others, received briefings, letters, posters, and news releases regarding the upcoming project. The team also undertook a direct mail campaign to 60,000 households near the freeway entrances with ramp designations to be changed from three to two occupants. The direct mail brochure alerted residents that beginning February 14, 1984, "two is all it takes" to use selected metered bypass lanes. This direct mail brochure included a postage-paid ride-match application. The project team also worked closely with local news media. Feature stories on HOV enforcement were aired on local television and radio news broadcasts. Prime time interviews with project team members were aired on radio, and feature stories, news releases, and public service announcements appeared in daily newspapers.

A letter was also sent to the Seattle District Court informing judges of the pilot enforcement project, its activities, and changes in carpool definition at selected locations. The project team anticipated some public confusion about the carpool definition that might potentially reach the district courts. For this reason the district court judges received the letter and a follow-up telephone call to answer questions about the project.

RESULTS

Violation Reports

From February 14 to June 30, 1984, 4,150 HOV lane violations were reported. The 764-HERO public hotline accounted for 89.5 percent of all reported violations. WSDOT observers accounted for 8 percent, and the remaining 2.5 percent were recorded by other sources.

First time violations accounted for 90 percent of all reports and resulted in distribution of 3,740 "Signs of the Times" brochures. Second time viola-

tion reports numbered 310, representing 7.5 percent of all violations reported. Three or more violation reports on the same vehicle accounted for the remaining 2.5 percent, and these were turned over to WSP to contact at their discretion.

Peak-period violation reports accounted for 63 percent of all reports, 44 percent representing violations in the morning (6:30 a.m. to 9:00 a.m.) and 19 percent representing afternoon violations (4:00 p.m. to 6:30 p.m.)

Single-occupant and two-occupant vehicles accounted for 64 percent and 30 percent, respectively, of all reported violations. The remaining 6 percent of the reports did not specify the occupancy of violating vehicles.

A majority of reported violations were for vehicles traveling on the I-5 main-line HOV lane. These reports totaled 3,360 or 81 percent of all violation reports.

I-5 metered on-ramp HOV bypass lanes accounted for 7 percent (300 reports), 5 percent (210) of all violation reports were for unspecified locations, and 7 percent (280) referred to violations that occurred in an HOV facility outside the project area.

Violation Rates

An HOV lane violation was defined as any vehicle, excluding motorcycles, traveling in the HOV lane with fewer than the required two or three persons.

Violation rates were determined by dividing the number of violations by the HOV lane volume and multiplying by 100. Compliance rates, calculated for ramps only, equaled the percentage of vehicles using both lanes of the ramp and adhering to the occupancy restrictions of the HOV lane. The compliance rates were calculated as follows:

$$\text{Compliance rate} = 100 - (\text{HOV lane violations} \div \text{Total volume})$$

To evaluate the project's effectiveness in reducing HOV lane and metered ramp bypass lane violations, data gathered by field observers before February 14, 1984, were compared to those recorded by the observers after the HERO program and changes from three to two occupants were implemented. The overall violation rate, which includes all ramps and main-line study locations, decreased 38 percent from 28.1 to 17.4 percent. Several HOV locations, however, recorded fewer violations by virtue of the change from

three to two occupants, which increased the number of commuting vehicles eligible to use the HOV facility. A more accurate account of the reduced violation rate would exclude data from those locations. When locations where the change from three to two occupants was made were omitted, the violation rate went from 28.5 percent before the enforcement project to 19.0 percent after, a 33.3 percent decrease. The difference was significant at the 95 percent confidence level (Table 3).

I-5 HOV Lane

I-5 HOV lane data were gathered at four locations, northbound and southbound at Northgate and at Northeast 175th Street. Northgate is the beginning of the southbound express lanes and the termination of the northbound express lanes. Likewise, the northbound HOV lane begins and the southbound HOV lane ends at Northgate.

Overall violation rates at the four observed main-line locations went from 28.3 to 19.1 percent, a 32.5 percent decrease in HOV violations. The project team conducted a statistical test on several categories to determine if the reduction in violation rates was significant. The results are summarized in Table 3.

As the data given in Table 3 indicate, two of the four observed main-line HOV lane locations showed significant reductions in violation rates. The Northeast 175th Street southbound violation rate went from 17.4 to 8.5 percent (a 51.1 percent decrease) and the Northeast 175th Street northbound violation rate went from 38.5 to 22.9 percent (a 40.5 percent decrease). The decrease in violations occurred even though overall volumes on I-5 (general traffic and HOV lanes) at 175th Street had increased by 13.7 percent southbound and 5.1 percent northbound over the average traffic volumes recorded before the enforcement activities began.

Violation rates of both southbound and northbound HOV lanes at Northgate showed no significant change. The southbound violation rate was 30.4 percent before and 28.2 percent after enforcement activities began, and the northbound violation rate was 15.4 percent before and 14.8 percent after. The ineffectiveness of the enforcement techniques at Northgate indicates how design and continuity of HOV roadway facilities affect commuter driving characteristics and compliance rates. In the southbound direction the commuter wanting to travel in the express lanes needs

TABLE 3 Before and After Violation Rates

Category	Before Violation Rate (%)	After Violation Rate (%)	Confidence Level (%)	Significant Reduction
All ramps and all main-line locations	28.1	17.4	95	Yes
Non-3-to-2 ramps and all main-line locations	28.5	18.9	95	Yes
All main-line locations	28.3	19.1	95	Yes
Northgate SB	30.4	28.2	95	No
Northgate NB	15.4	14.8	95	No
175th SB	17.4	8.5	95	Yes
175th NB	38.5	23.9	95	Yes
All ramps	27.3	12.3	95	Yes
Non-3-to-2 ramps	30.1	17.9	95	Yes

Note: Equation for testing a significant difference between the means of before and after HOV lane violations: If $\bar{X}_1 - \bar{X}_2 > K_{\sigma_D}$, then the difference is significant.

$$\sigma_D = (\sigma_1^2/N_1 + \sigma_2^2/N_2)^{1/2}$$

where

\bar{X} = mean,
 K = critical value of t distribution,
 σ = standard deviation, and
 N = sample size.

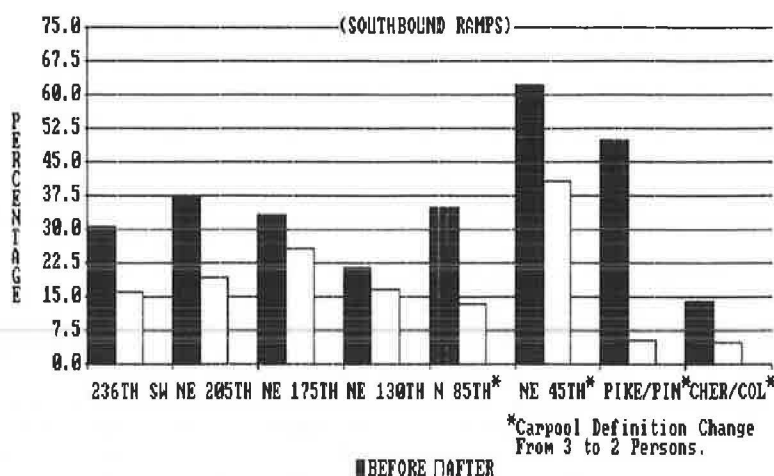


FIGURE 3 Before and after violation rates.

to position his vehicle in one of the two left (inside) freeway lanes, the furthest inside lane reserved for HOVs. To avoid missing the express lane entrance and possible accidents, the maneuver must be performed at a safe distance before entering the express lanes.

The consistent southbound HOV lane violation rates at Northgate indicate that the top priority for some commuters is to gain access to the express lanes. Adhering to the minimum occupancy requirements at this location appears to be less important and relatively inelastic with regard to enforcement.

In the northbound direction the HOV lane begins at Northgate where the general traffic express lanes end. Violation rates at this location were relatively low and remained unaffected by the enforcement actions. A plausible explanation for this is that these violators were not conscious that the HOV lane designation had begun and represented a core group that cannot be influenced initially by enforcement activities.

HOV On-Ramp Bypass Lanes

Overall ramp violation rates fell from 27.3 to 12.3 percent (a 55 percent decrease) after the pilot project enforcement activities were implemented. Again, the change from three to two occupants contributed to this reduction. The violation rate at

ramps that had no change in occupancy restriction decreased 40.5 percent from 30.1 to 17.9 percent, and violations at the ramps for which the occupancy restriction was reduced from three to two decreased 61 percent from 24.1 to 9.4 percent. Figure 3 shows the before and after violation rates observed at each ramp included in the study.

Average automobile occupancy on the ramp HOV bypass lanes also changed after the project was initiated. Figure 4 shows how all southbound ramps north of Northgate registered an increase in average vehicle occupancy as a result of lower violation rates. South of Northgate, three of the four southbound ramps the carpool definition for which changed from three to two occupants showed decreases in automobile occupancy. This was caused by the addition of two-occupant vehicles to the HOV lane. Only the Northeast 45th Street on-ramp registered an increase in automobile occupancy. This occurred because the enforcement program reduced the ramp's high, 60 percent, single-occupant vehicle violation rate proportionately more than the increase in the two-occupant vehicles that used the HOV bypass as a result of the change from three to two occupants.

Comparison of Enforcement Techniques

As the project unfolded it became impossible to compare empirically the relative effectiveness of the

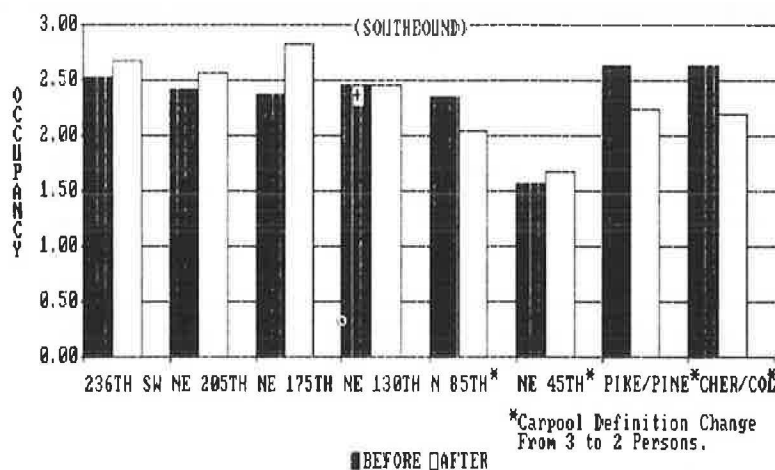


FIGURE 4 HOV lane average vehicle occupancy, without buses.

two enforcement techniques in reducing HOV lane violations. Media coverage and commuter familiarity with HERO signs resulted in hotline reports on violations for all the HOV facilities on I-5 and even on some HOV lanes outside the corridor.

For example, the southbound ramp at 236th South-west in Snohomish County was the most northerly ramp included in the study. It was considered the study's control ramp. No enforcement activities (i.e., HERO signs or WSDOT observers) were implemented on this ramp. Eighty-five of the 300 reported ramp HOV bypass lane violations, however, referred to this location. The southbound ramp at 175th also had no HERO sign but had the greatest number of reported violations of any ramp.

The HERO hotline proved more accurate and cost-effective than the use of WSDOT observers. Of the HERO reports received, 84 percent provided license numbers and vehicle descriptions that matched the State Department of Licensing registration records. WSDOT observers provided accurate information in 77 percent of their reports. Project staff concluded that this difference occurred because the WSDOT observers were stationary whereas HERO reports came from motorists, including many carpools, traveling behind the violating vehicle.

The HERO element of the pilot project cost approximately \$16,150 from February 14 to June 30:

Postage, materials	\$ 1,500
Computer programming	4,000
State DOT staff (2 positions for 5 months)	10,500
Answering machine	150
Total	\$16,150

The HERO line received approximately 50 calls per working day for a total of 3,715 calls providing correct information on violating vehicles. The cost was \$4.35 per HERO violation report.

Public Opinion

In general, public opinion about the enforcement project was positive. Many HERO line callers were pleased that the WSDOT was taking steps to enforce the HOV lane regulations. WSDOT staff manning the HERO line noted that commuters were acutely aware of their commuting environment and eager to share experiences they encountered during their commute. HERO provided a mechanism for the public to participate in the enforcement of the HOV lanes and an out-

let for commuter frustration generated by a feeling of helplessness when witnessing HOV lane violations.

During the course of the project, WSDOT staff noted that HERO line callers perceived a decrease in the number of HOV lane violations. Although no attempt was made to quantify the change in commuter perception, it nonetheless was an important indicator of the project's effectiveness. On the average, the WSDOT received one negative call or letter per day about the HERO program.

The media covered the pilot enforcement project extensively, particularly the 764-HERO hotline. Local newspapers carried several feature stories. Some articles raised a "Big Brother" image of the hotline, but the media attitude was positive and never branded the program as invasive.

Variable Carpool Definition

Each of the ramps for which the restriction was changed from three to two occupants showed an increase in HOV bypass lane volume as shown in Figure 5. This increase was due primarily to the addition of large numbers of two-occupant vehicles, as shown in Figure 6 for the southbound Cherry-Columbia ramp. Data were not available to determine how much of the increase in two-occupant vehicles came from existing two-occupant carpools shifting from other ramps and how many were new carpools.

Motorist confusion and higher violation rates did not occur in the corridor after the change from three to two occupants. The absolute number of two-occupant vehicles violating the HOV restrictions north of Northgate did not increase after the change from three to two occupants for the HOV facilities south of Northgate.

The project team held meetings with Seattle and Shoreline district court representatives. The Seattle District Court's jurisdiction extends north to Northeast 145th Street. The Seattle court handles between 600 and 700 traffic violation cases per month. Typically 5 to 10 percent of these cases are for HOV lane violations and this percentage did not change after implementation of the change from three to two occupants. Of the HOV lane violators requesting hearings after the change, 90 percent represented violations that occurred while passing another vehicle.

Shoreline District Court has jurisdiction over the project area from Northeast 145th Street to the King-Snohomish County Line and handles about 800 traffic-related cases per month. The Shoreline Dis-

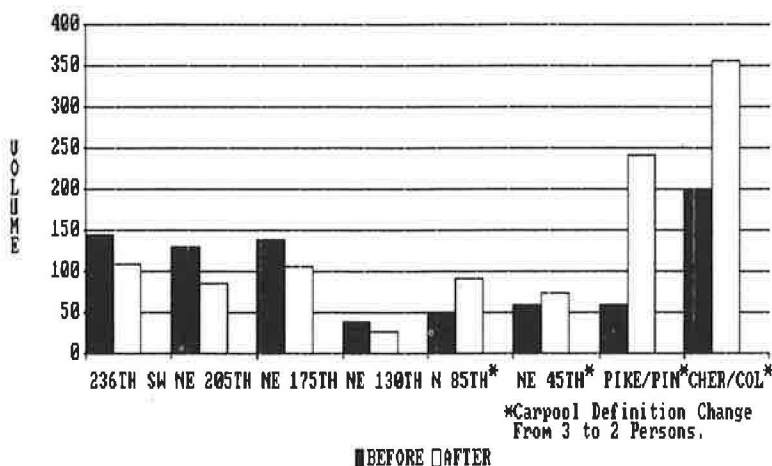


FIGURE 5 HOV lane volume, southbound.

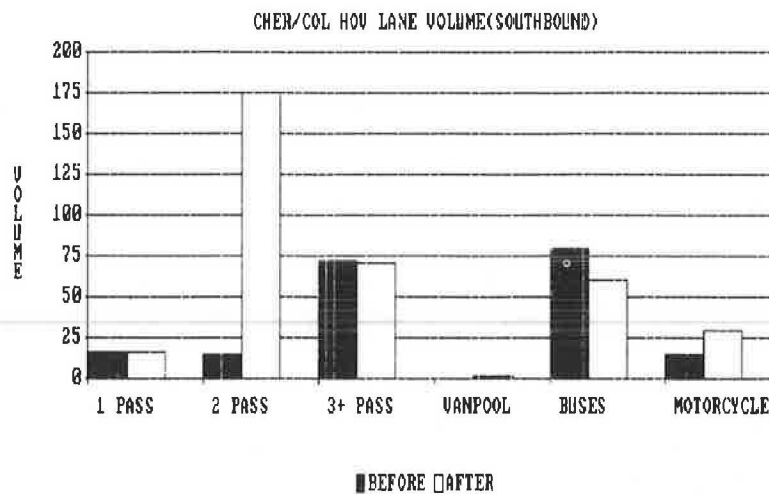


FIGURE 6 Cherry-Columbia HOV lane volume, southbound.

trict Court representative indicated that the variable carpool definition caused negligible confusion among those cited for HOV lane violations. The total number of HOV lane violations in January, 1 month before the pilot project was implemented, was 46. During May there were 44 HOV lane violations.

CONCLUSION

Overall HOV lane violations decreased by 33 percent and have remained low since the beginning of the project. Plans are for the WSDOT and Metro to expand the HERO program to all HOV lanes and ramps in the Seattle area.

The changes from three to two occupants in the I-5 corridor continue to operate smoothly. The WSDOT will analyze all future HOV facilities to determine if they can be designated for vehicles with two or more occupants.

The Seattle HOV enforcement and carpool eligibility project demonstrated that the commuting public can play an important role in directly improving compliance with roadway restrictions that give preference to high occupancy vehicles. The project also showed that motorists can adapt to changing carpool requirements within the same corridor.

The key to the success of both elements of the

project was an extensive, well-orchestrated public information campaign. HERO was presented in a positive and upbeat manner, overcoming early skepticism about its "Big Brother" connotation. Extensive home-end marketing, advanced warning, and good signage succeeded in educating and informing the public about the change to a variable carpool definition in the corridor.

ACKNOWLEDGMENTS

The work of Lewis and Hamm at the Commuter Pool Division of the Municipality of Metropolitan Seattle (Metro) Transit Department was supported in part by funds from FHWA's TSM Assistance Grant Program. The analysis, findings, and conclusions expressed or implied in this study are the sole responsibility of the authors and do not necessarily represent those of the United States Department of Transportation, the Washington State Department of Transportation, Metro, or the city of Seattle.

Publication of this paper sponsored by Committee on Traffic Law Enforcement.