6. HOV SAFETY AND ENFORCEMENT

Sometimes HOV lanes have been built at the expense of sacrificing full breakdown shoulders to squeeze new HOV lanes into tight places, or to implement HOV lanes quickly and inexpensively. Because of these constraints, it is occasionally difficult for the State Patrol to safely enforce the use of the HOV lanes. Effective enforcement areas require enough room adjacent to an HOV lane for an enforcement officer to be stationed in a vehicle and enough room for violators to be pulled over on the shoulder out of the way of traffic.

The purpose of this task was to identify safety improvements to the HOV lanes which would benefit both HOV and GP users, and to recommend measures for further study that would improve the enforceability of HOV lane restrictions.

6.1. STUDY PROCESS

A Stakeholder committee was formed to assure that all project staff, agencies, jurisdictions, and subconsultants affected by the recommendations would be involved in the formulation and evaluation of those recommendations. A list was compiled of all factors which affect HOV safety or enforcement. Existing safety and enforcement conditions were determined through a combination of field surveys, data compilation, and interviews. Conceptual solutions were formulated based on the result of the existing conditions compilation and suggestions from interviews conducted with members of the affected public as well as with members of the Stakeholder Committee. This information was then applied to a general feasibility screening. The remaining conceptual solutions were presented in *Working Paper #2, Conceptual Solutions,* and then further screened by MOE application presented in *Working Paper #3, conceptual Solutions Evaluation.*

Throughout the study, WSDOT and Washington State Patrol related policies were analyzed, along with the safely and enforcement policies of CalTrans and the Virginia DOT. A summary of the final comprehensive evaluation of the alternatives and resulting recommendations is summarized here. For further detail, the reader is referred to *Safety and Enforcement Improvements Assessment, Draft Task Report,* JHK & Associates, Seattle, WA, April 1995.

6.2. EVALUATION OF PHYSICAL ALTERNATIVES

Several basic types of conceptual physical solutions were identified for this effort. These types, listed below, are described in Working Paper #2.

- Signing and Striping
- Detection/Observation Areas
- Buffer Zones
- Shoulder Widening
- Enforcement Areas

After the release of Working Paper #3, the enforcement areas proposed by this study were separated into three types, based on the width of the median where they would be implemented. These three types are described below, and sketches of their basic layout and dimensions are shown in Figure 6-1.

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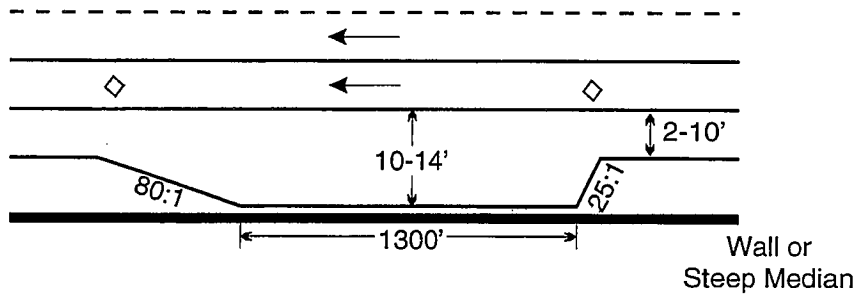
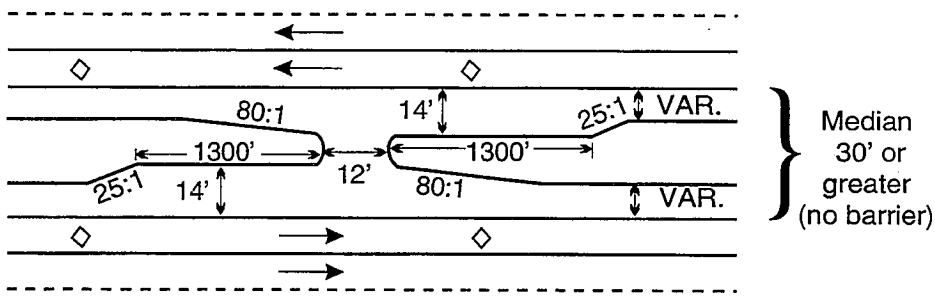
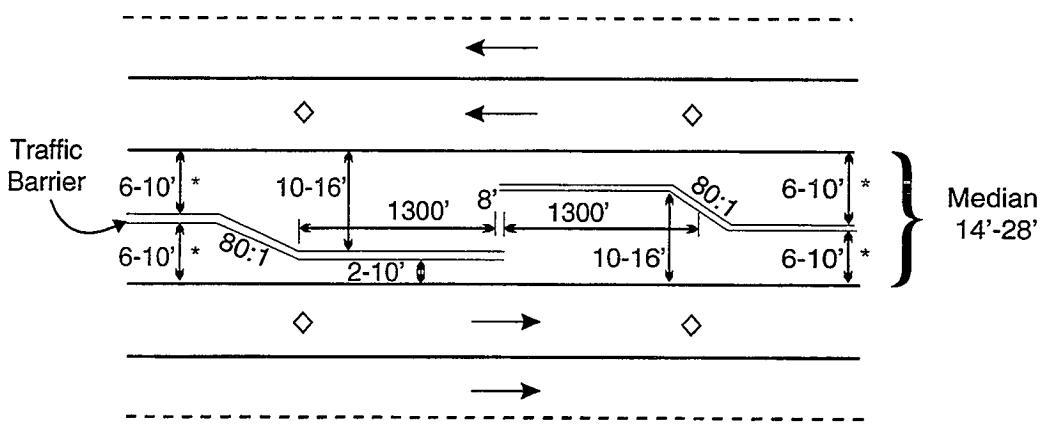


Type 1 Enforcement Area



Type 2 Enforcement Area



Type 3 Enforcement Area

* or revert back to previous shoulder alignment if less than 6 feet

Enforcement Area Types
Puget Sound HOV Pre-Design Studies
Final Report
FIGURE 6-1

Type 1 enforcement areas are applied where median crossovers are not possible, due to extreme grade separation of the two main roadways. A Type 1 enforcement area is identical to the "Enforcement Area (One Direction Only)" shown in Figure 1050-7a of the WSDOT Design Manual (section currently under review).

Type 2 enforcement areas are applied where median widths exceed thirty feet (30'). A Type 2 enforcement area consists of a single median crossover, and one single-direction enforcement area (WSDOT 1050-7a) in each direction. These are positioned such that the median crossover is accessible from the downstream end of either the northbound or southbound portion of the enforcement area.

Type 3 enforcement areas are applied where median widths are 14 to 28 feet. A Type 3 enforcement area is identical to the "Median Enforcement Area" shown in Figure 1050-7a of the WSDOT Design Manual (section currently under review).

Median widths less than 14 feet wide would require roadway widening to install any of these enforcement areas.

The conceptual solutions considered address site site-specific safety concerns on existing HOV segments, and individual solutions required for safe, effective HOV lane enforcement, in the Puget Sound region. Some of the enforcement solutions call for changes to design plans for future HOV segments, or to segments currently under construction as of this writing. Many of the enforcement improvements shown represent parts of a system of HOV enforcement facilities.

Tables 6-1 and 6-2 summarize the results of the evaluation of the conceptual safety solutions and enforcement solutions respectively.

6.3. PHYSICAL SOLUTION RECOMMENDATIONS

The following describes the recommended safety and enforcement solutions from the Phase I evaluation. Any modifications made to the recommendations during Phase II are also noted. Table 6-3 lists the final Phase II safety and enforcement recommendations and Figure 6-2 shows the general location of each recommendation. Safety projects are numbered with "S-" numbers, and enforcement projects with "E-" numbers.

Table 6-1
Safety Solutions Evaluation Summary

Safety Solutions												
#	Location	Action	Safety-HOV's	Safety-General Traffic	Safety/Efficiency of Enforcement Operations	Enforcement Effectiveness	Geometric Feasibility	Traffic Operations	Cost	Public Acceptability	Comment
S 1	I-5 SB at Northgate	Realign Interchange	◕	◔	◔	◔	◕	○	◑	◑	Traffic operations impacts
S 2	I-5 SB at Cherry (Express Lanes)	Realign Interchange	4	●	○	◔	○	◑	○	◔	Not geometrically feasible
S 3	I-5 SB, Stewart to Cherry (Express Lanes	Separate HOV Lane	4	◔	○	○	◔	○	◑	◔	Traffic operations impacts; Width
S 4	I-5 SB, Stewart to Cherry (Express Lanes	Restrict to HOV only	3	◔	●	●	●	◔	○	◔	Add ramp structure
S 5	I-5 SB at S Nevada	Restripe Lane Drop	2	○	○	○	●	◑	○	◑	Minimal benefit
S 6	I-5 NB, NE 92nd (Express Lanes) to NE 1	Signing/Pavement Marki	4	◕	◑	◔	●	◑	●	◑	RPM Substitution Gore, 1 Sign
S 7	I-5 NB, NE130th to NE145th	Signing/Pavement Marki	3	◔	◔	◔	◑	◑	◑	◑	Minimal benefit
S 8	I-405 at S-curves	Signing	1	○	○	◔	●	◑	●	◕	Minimal benefit
S 9	I-405 SB Exits to I-5 (Tukwila)	Signing/Pave Shoulder	3	◑	◑	◔	●	◑	◕	◑	Need to replace 1 sign bridge
S 10	I-90 EB at Rainier	Lengthen Merge	4	◑	◔	○	○	◑	○	◑	Minimal benefit
S 11	I-405 SB, SE 8th to I-90	Signing	2	◔	○	○	●	◑	●	◑	Minimal benefit
S 12	I-5, NE 165th to NE 185th	Median Glare Screens	4	◑	◔	○	◑	◑	◕	◕	Or use taller Jersey Barrier
S 13	I-5, Northgate to Mountlake Terrace	Install Buffer	4	◕	◕	◑	◔	◑	○	◑	Widening Northgate to 155th
S 14	I-5, Northgate to Mountlake Terrace	Widen Inside Shoulder	4	◕	◕	◑	◔	◑	◔	●	Sight distance
S 15	I-5 NB at NE 195th	Remove Sign	3	◔	○	○	●	○	●	◑	"Left Lane Now Open to All Traffic"
S 16	I-5 NB at 130th	Relocate Stop Sign	3	◔	○	○	◕	○	●	◔	Traffic operations impacts
S 17	I-5, Mercer to Cherry (Express Lanes)	Raise Transit Speed Lim	2	○	○	○	●	◕	●	◑	Transit policy
S 18	I-5, 45th to Cherry (Express Lanes)	Improve Lighting, Signi	3	◑	◔	◔	●	◑	◑	●	

LEGEND

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Least <----------> Most Effective

= Alternatives Not Recommended for Further Study

Table 6-2
Enforcement Solutions Evaluation Summary

Enforcement Solutions											
#	Location	Action	Safety-HOV's	Safety-General Traffic	Safety/Efficiency of Enforcement Operations	Enforcement Effectiveness	Geometric Feasibility	Traffic Operations	Cost	Public Acceptability	Comment
E- 1	I-5, NE 185th to 164th SW	Various Enforcement Areas	◕	◔	◕	◕	◕	◑	◔	◑	Existing turnarounds not used
E- 2	I-5 NB, Northgate to NE 145t	2 Type 1 Enforcement Areas	◑	◔	◕	◕	◔	◑	◑	◑	Widening required
E- 3a	I-5 SB at Seneca	Observation Area (SB)	○	○	●	◑	◑	◑	◕	◑	Motorcycle only
E- 3b	I-5 SB, Yesler to I-90	Enforcement Area (SB)	◔	○	◕	◑	●	◑	●	◑	Usable in PM only; No paving needed
E- 4	I-5 SB, I-90 to Lucile	Enforcement Area (SB)	◔	○	◕	◕	◔	◑	○	◑	Include in E-10
E- 5	I-5 at SR 599	Turnaround	○	○	◑	◔	●	◑	◕	◑	Include in E-8
E- 6	I-5 at Tukwila Interchange	Observation Areas (NB & SB)	◔	◔	◕	◕	◑	◑	●	◑	Before planned "Sliver Lanes"
E- 7	I-5, Pierce County to Tukwila	Various Enforcement Areas	◕	◔	●	◕	◕	◑	○	◑	
E- 8	I-5, Tukwila to Lucile	Various Enforcement Areas	◕	◔	◕	◕	◑	◑	◑	◑	
E- 9	I-5 NB at Boeing Access Rd	Turnaround	○	○	◑	◔	◕	◑	◕	◑	Include in E-8
E- 10	I-5 NB, Lucile to I-90	2 Type 1 Enforcement Areas	◔	○	◕	◕	◔	◑	◕	◑	South end of segment
E- 11	I-405, Tukwila to S Renton	Type 3 Enforcement Area	◔	○	◕	◕	◑	◑	◑	◑	Relocate median luminaires, buried cable
E- 12	I-405, 112th SE to I-90	1 Type 2 Enforcement Area	◔	○	◕	◕	◕	◑	◑	◑	When lanes move inside
E- 13	I-90 EB at 5th & Dearborn	Signing Improvements	◔	◔	◔	◔	●	◕	◕	◕	Trailblazers needed for carpools
E- 14	I-90, Rainier to Bellevue Way	Signing Improvements	◕	◑	◕	◕	●	◕	◕	◕	Facility name, Westbound at Rainier
E- 15	SR 520 WB, 108th to 76th	2 Observation Areas (WB)	◑	○	◕	◕	◔	◑	●	◕	Outside shoulder widening
E- 16	SR 520 WB at 76th	Motorcycle Turnaround	◔	○	◕	◑	◔	◑	●	◔	Separate from ped. Flyer stop access
E- 17	SR 167, Kent to I-405	Bi-directional Enf. Area	◔	○	◑	◑	◕	◑	◑	◑	Existing is adequate (WSP)
E- 18	I-405, I-90 to SE 8th	2 Type 1 Enforcement Areas	◔	○	◕	◑	◑	◑	◕	◑	
E- 19	I-5 SB, Olive to Yesler	Restripe for Inside Shoulder	○	○	◕	◑	◔	◔	◑	◑	Potential safety hazard
E- 20	I-90, Richards Rd to SR 900	3 Type 2 Enforcement Areas	◕	○	◕	◕	◕	◑	◕	◑	
E- 21	I-405, Northup to Bothell	Various Enforcement Areas	◕	○	◕	◕	◕	◑	◑	◑	When lanes move inside

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Least <——> Most Effective

= Alternatives Not Recommended for Further Study

Table 6-3
Summary of Safety and Enforcement Recommendations

No.	*Facility / Location*	*Safety Recommendation*
S-6	I-5 NB NE 92nd to Mainline (Express)	Signing/Pavement Marking
S-9	I-405 SB Exits to I-5 (Tukwila)	Signing/Pave Shoulder
S-12	I-5, NE 165th to NE 185th	Install Glare Screens on Barrier
S-13	I-5, Northgate to 175th	Install 3-foot Buffer
S-14	I-5, Northgate to Mountlake Terrace	Widen Inside Shoulder
S-18	I-5, Cherry to NE 45th (Express)	Improve Lighting, Signing
	Estimated Cost of Safety Recommendations: $3,414,000	
No.	*Facility / Location*	*Enforcement Recommendation*
E-1	I-5, NE 185th to 164th SW	Various Enforcement Areas
E-2	I-5 NB, 130th to NE 145th	Type 1 Enforcement Areas
E-3a	I-5 SB at Seneca	Observation Area on Inside Shoulder
E-3b	I-5 SB, Yesler to I-90	Type 1 Enforcement Area
E-6	I-5 at Tukwila Interchange	Observation Areas on Inside Shoulder
E-7	I-5, Pierce County Line to Tukwila	Various Enforcement Areas
E-8	I-5, Tukwila to Lucile	Various Enforcement Areas
E-10	I-5 NB, Lucile to I-90	Type 1 Enforcement Area
E-11	I-405, Tukwila to S Renton	Type 3 Enforcement Area
E-12	I-405, 112th to I-90	Type 1 Enforcement Areas (Inside)
E-13	I-90 EB at 5th and Dearborn	Signing Improvements
E-14	I-90, Rainier to Bellevue Way	Signing Improvements
E-15	SR 520 WB, 84th NE to 76th NE	Motorcycle-only Turnaround
E-16	SR 520 WB, 108th NE to 76th NE	Observation Areas on Outside Shoulder
E-18	I-405, I-90 to SE 8th	Type 1 Enforcement Areas (Inside)
E-20	I-90, Richards Rd to SR 900	Type 2 Enforcement Areas
E-21	I-405, Northup to Bothell	Various Enforcement Areas (Inside)
	Estimated Cost of Enforcement Recommendations: $8,950,500	

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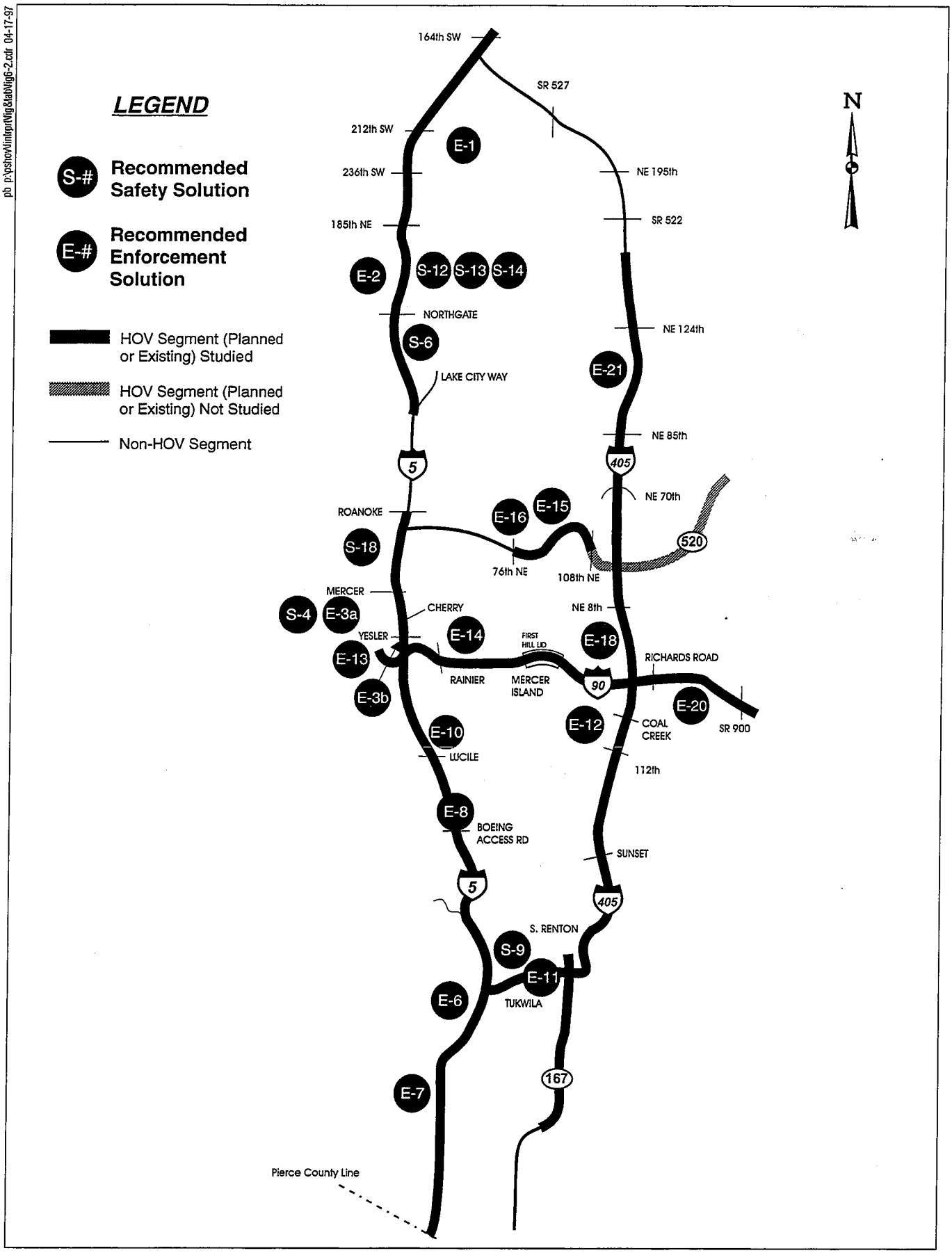

Location of Recommended Safety of Enforcement Solutions

Puget Sound HOV Pre-Design Studies

Final Report

FIGURE 6-2

6.3.1. Safety Recommendations

I-5 HOV-ONLY SOUTHBOUND EXPRESS LANES, MERCER TO CHERRY

This safety solution would restrict the I-5 southbound express lanes to HOV-only south of Stewart Street. General purpose traffic to exit express lanes via a cross-over ramp from the southbound express lanes to the collector-distributor roadway at Mercer Street.

Features

- Construction of single-lane cross-over ramp.
- Addresses the existing safety and operational problems at the southern terminus of the express lanes.
- Cost: $30.2 M.

Trade-Offs and Considerations

- Will degrade mainline LOS under the Convention Center.
- Further evaluation of this alternative should include a detailed operational analysis.
- Construction impacts.

Phase II Refinements and Final Recommendations

- An operational analysis of the impacts of this alternative was conducted in Phase II and is presented in the Phase II Evaluation for Central Seattle HOV Alternatives Technical Memorandum, December 1985. The results indicated that moving the general purpose traffic to the mainline Mercer Street on-ramp would cause severe congestion and queues backing up from that ramp onto the Express Lanes. This would likely pose a safety problem as bad or worse than the existing one. Hence, this alternative is not recommended.

I-5 NORTHBOUND EXPRESS LANE SIGNING / STRIPING, NE 92ND TO NORTHGATE

This safety solution would provide the application of pavement markings and signs to discourage lane changes and encourage caution between NE 92nd and Northgate, and also includes extension of "exit only" signing and striping from 103rd NE to NE 85th Street.

Features

- Addresses the high number of rear-end collisions in the HOV lane and adjacent lane through this area.
- Cost: $9,400.

Trade-Offs and Considerations

- Construction impacts only.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

SIGNING/PAVING FOR I-405 SB HOV EXIT TO NB I-5, TUKWILA

This safety solution provides an extension of shoulder width beyond the HOV-only exit to allow recovery re-merging for HOVs not wishing to exit. It also includes clarification of HOV-only exit signage.

Features

- Addresses the perceived high safety hazard and moderate number of HOV accidents due to confusion over the dual exits at this location.
- Possible relocation of existing sign bridge in proposed paving area.
- Cost: $127,000.

Trade-Offs and Considerations

- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

GLARE SCREEN ON I-5 MEDIAN, NE 84TH TO NE 92ND

This safety solution provides installation of a glare screen on the I-5 median barrier between NE 84th and NE 92th.

Features

- Addresses the problem of headlight glare from on-coming traffic due to horizontal curves.
- Cost: not available.

Trade-Offs and Considerations

- Stopping sight distance may be impaired in some locations.
- Alternative treatment would involve the installation of Jersey barriers with an additional 1.5 to 2.5 foot height.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 BUFFER, NORTHGATE TO NE 175TH

This safety solution would install a three foot roadway buffer between the HOV lane and adjacent general purpose lane.

Features

- Buffer treatments could include paint, pavement texture, and / or markers.
- Addresses high accident rate through this segment caused by weaving in and out of HOV lane.
- Cost: $2.1 M.

Trade-Offs and Considerations

- May also serve as a deterrent to HOV lane violators.
- Buffer zone may cause a shift in the accustomed blind spot location, reducing safety.
- Environmental and construction impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 INSIDE SHOULDER WIDENING, NORTHGATE TO NE 175TH

This safety solution would widen the inside shoulder at several curve locations.

Features

- Addresses high rate of accidents in this segment due to restricted sight distance.
- Cost: $1.0 M.

Trade-Offs and Considerations

- May cause pavement expansion joints to be located in the wheel path at several locations.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 EXPRESS LANE LIGHTING AND SIGNAGE IMPROVEMENTS, CHERRY TO NE 45TH

This safety solution provides Improvement of lighting in covered sections of the express lanes, as well as improvements to lighting and cleanliness of existing signs. It also includes an extension of the southbound HOV designation to the ship canal.

Features

- Addresses high HOV accident locations on this segment.
- Cost: not available.

Trade-Offs and Considerations

- No impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

6.3.1. Enforcement Recommendations

I-5 ENFORCEMENT AREAS, NE 185TH TO 164TH STREETS

This enforcement solution includes the construction of five Type-2 and one Type-3 enforcement areas.

Features

- Cost: $1.1 M.

Trade-Offs and Considerations

- Should result in improved safety and efficiency of enforcement operations.
- Estimate does not include paving of crossover locations currently under construction.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 ENFORCEMENT AREAS, NORTHGATE TO 145TH STREET

This enforcement solution includes the construction of two Type-1 enforcement areas.

Features

- Cost: $ 0.8 M.

Trade-Offs and Considerations

- The required widening may have minor effects on interchange geometry's, and may specifically require modification of the current Northgate interchange revision project (these modifications are included in the cost estimate).
- Should result in improved safety and efficiency of enforcement operations.
- Environmental and construction impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 SOUTHBOUND ENFORCEMENT AREA, SEATTLE CBD

This enforcement solution includes the widening of southbound median underneath the Convention Center to shelter and a concealment area for a WSP motorcycle officer.

Features

- Addresses perception of high violation rate at this location.
- Cost: $133,500.

Trade-Offs and Considerations

- The sudden entry of a motorcycled officer into the HOV lane may alarm drivers, potentially creating a safety problem.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 OBSERVATION AREAS AT I-405 / SR 518 INTERCHANGE

This enforcement solution provides the construction of two motorcycle observation areas at the entrances to the northbound and southbound separated HOV lane segments.

Features

- Cost: $7,000.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.
- Would require modification of the planned Tukwila to Lucile Street HOV lane design. Cost estimate assumes this alternative is built as part of that project.
- No impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 ENFORCEMENT AREAS, PIERCE COUNTY LINE TO TUKWILA

This enforcement solution includes the construction of two Type-1, four Type-2, and one Type-3 enforcement areas.

Features

- Will also serve as emergency and maintenance vehicle access.
- Will require retaining walls in the Southcenter Hill area.
- Cost: $2.7 M.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 ENFORCEMENT AREAS, TUKWILA TO LUCILE

This enforcement solution provides the construction of two Type-1, one Type-2, and two Type-3 enforcement areas.

Features

- Will also serve as emergency and maintenance vehicle access.
- Cost: $0.9 M.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-5 ENFORCEMENT AREAS, BETWEEN SR 181 AND SR 167

This enforcement solution would construct two Type-1 enforcement areas.

Features

- Cost: $197,000.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.
- Much of this segment is on structure where widening would not be geometrically feasible or cost-effective, except in the on-grade southern portion.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-405 ENFORCEMENT AREAS, TUKWILA TO SOUTH RENTON

This enforcement solution includes the construction of one Type-3 enforcement area.

Features

- Shoulder width would be reduced from seven to four feet in one direction for 1.300 feet.
- Requires relocation of buried fiber-optic cable and barrier-mounted luminaries.
- Cost: $1.0 M.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-405 ENFORCEMENT AREAS, 112TH AVENUE SE TO I-90

This enforcement solution would construct one Type-3 enforcement area.

Features

- Shoulder width would be reduced from seven to four feet in one direction for 1.300 feet.
- Requires relocation of buried fiber-optic cable and barrier-mounted luminaries.
- Cost: $1.0 M.

Trade-Offs and Considerations

- Should increase safety and effectiveness of enforcement.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-90 SIGNING AT 5TH AND DEARBORN

This enforcement solution would install variable and standard advance signs on intersection approaches regarding the HOV entrance.

Features

- Addresses inadequate HOV designation.
- Cost: $454,000.

Trade-Offs and Considerations

- Should result in increased enforceability and fewer abrupt lane changes.
- No impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-90 SIGNING FOR ALL HOV LANE ENTRANCES, SEATTLE CBD TO BELLEVUE

This enforcement solution would rename the I-90 center roadway and change the wording of the westbound overhead signage leading to the Rainier Valley area. In addition, it would clarify lane restrictions and destinations.

Features

- Addresses the lack of clarity on existing signage.
- Cost: $100,000 M (conceptual only).

Trade-Offs and Considerations

- Should result in higher utilization of reversible HOV segment from the CBD to Rainier, as well as travel time savings and fewer violations.
- May result in lower level-of-service at 5th Avenue and Dearborn.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

SR 520 OBSERVATION AREAS, 108TH NE TO 76TH NE

This enforcement solution would provide the installation of motorcycle observation areas.

Features

- Addresses perception of high violation rates in this segment.
- Cost: $7,500.

Trade-Offs and Considerations

- Should result in safer and more effective observation.
- Observation areas would serve only existing outside HOV lanes.
- No impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-405 ENFORCEMENT AREAS, I-90 TO SE 8TH

This enforcement solution would include the installation of two Type 1 enforcement areas.

Features

- Possible relocation of sign structures and / or light poles.
- Cost: $343,000.

Trade-Offs and Considerations

- Will serve inside HOV lanes only; existing HOV lanes are on the outside.
- Should result in safer HOV enforcement operations.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-90 ENFORCEMENT AREAS, RICHARDS ROAD TO SR 900

This enforcement solution would install three Type 2 enforcement areas.

Features

- Cost: $484,000.

Trade-Offs and Considerations

- Should improve safety and efficiency of HOV enforcement operations.
- Environmental impacts.

Phase II Refinements and Final Recommendations

- Recommended as indicated in Phase I.

I-405, NE 85TH TO NE 160TH

This enforcement solution would install two Type 2 and one Type 3 enforcement areas.

Features

- Cost: $506,000.

Trade-Offs and Considerations

- Should improve safety and efficiency of HOV enforcement operations.
- Will serve inside HOV lanes only; existing HOV lanes are on the outside.
- Environmental impacts.

6.4. POLICY RECOMMENDATIONS

Policies related to HOV safety and enforcement were evaluated throughout the study process. The policies of the WSDOT and the Washington State Patrol (WSP) were analyzed along with those of several other jurisdictions, including CalTrans and the Virginia DOT, to identify potential revisions or additions. Policies were classified as relating either to physical/operational issues or to legislative issues. The following general policy recommendations were made as a result of this evaluation:

PHYSICAL/OPERATIONAL POLICY RECOMMENDATIONS

- **HOV Buffers:** Expand the WSDOT Design Manual Section 1050 guideline and Freeway HOV System Policy document entries on buffers to include policy information about access to/from the buffer-separated lane, either at designated access points or continuously along the length of the lane.

- **HOV Enforcement Areas:** Modify the WSDOT Design Manual to define at least three types of acceptable enforcement areas. These should be similar to the three types recommended by this study for various median alignments. These three types of enforcement area are described in section 6.2 of this chapter. Clarify that enforcement areas should also be considered in sections with existing shoulders 10 feet or wider.

LEGISLATIVE POLICY RECOMMENDATIONS

- **Violation Fee Schedule:** Support the existing WSDOT Freeway HOV System Policy, Enforcement Issues and HOV Lane Violations section policy statement which recommends an "increased, graduated penalty". Specify a fine level which would be supportable and defensible in terms of deterring violations, while not so high that the judiciary would not uphold it.

- **Dedicated HOV Enforcement Personnel:** Add to the WSDOT State Freeway HOV System Policy document policy wording supporting more aggressive funding for HOV enforcement both during the "first six months of HOV operation" (current policy), as well as for ongoing special enforcement efforts. Acknowledge that effective HOV enforcement leads to safer HOV lanes and improved overall freeway operations.

Several other safety and enforcement issues were discussed but not carried forward. Among these were the concepts of *Automated Enforcement and Ticket-by-Mail.* Prior to testing this type of enforcement, the WSDOT should document the effectiveness of automated enforcement procedures and describe their potential application (and legal ramifications) in Washington State. The implications of decriminalizing the HOV offense should also be examined. The WSDOT should focus its attention on providing safe physical enforcement areas for routine HOV enforcement activities rather than relying upon automated enforcement techniques.

APPENDIX A: GLOSSARY OF TERMS

This HOV Glossary of Terms and Abbreviations is a synthesis from various HOV publications. Specific references are taken from the *NCHRP Synthesis #185: Preferential Lane Treatments for High-Occupancy Vehicles,* 1992, Transportation Research Board's *Urban Public Transportation Glossary*, 1989, and other recent HOV publications by the Institute of Transportation Engineers (ITE) and American Association of State Highway and Transportation Officials (AASHTO). Wherever possible, cross references to similar terms are offered. Local terms and abbreviations are also applied where appropriate.

A.1. HOV, TRANSIT, AND RELATED STUDY TERMS:

add-a-lane:

A general implementation approach whereby an HOV facility is created by adding roadway capacity to an existing freeway facility, usually by widening the freeway or modifying the median or outside shoulder. This is the primary way HOV facilities have been created.

advanced traffic management system (ATMS):

Application for HOV facilities includes a remotely operated traffic management system for monitoring and managing operation of an HOV and/or freeway facility to assure acceptable traffic operation, improved responsiveness to incidents, and improved communication with motorists. Major elements include: Surveillance—collection and processing of data by detectors and visible verification by closed circuit television; Communication—presentation of operational information to motorists through signs, delineation, signals and/or auditory means; and Control—application of traffic restraints or direction of flow controls including signs, barrier gates and signals. (See also traffic management system.)

alternatives analysis:

see *major investment study.*:

average vehicle occupancy (AVO):

The number of persons divided by the number of vehicles (including buses) traveling past a selected point over a predetermined time period, usually expressed to two or three significant figures (i.e., 1.2 or 1.26).

barrier-separated HOV facility:

An HOV facility that is physically separated, frequently by barriers, and access controlled from adjacent mixed-flow freeway lanes. Barrier-separated facilities can be either operated as reversible-flow or two-way. The opposing directions *within* a barrier-separated facility are separated by either a barrier or buffer.

barrier separation:

A physical barrier (either concrete or metal guardrail) that is used to separate an HOV facility from general purpose freeway traffic.

benefit-cost ratio:

The ratio of the dollars of discounted benefits achievable to a given outlay of discounted costs.

bi-directional HOV facility:

A preferential facility in which both directions of traffic flow are provided for during at least portions of the day.

buffer-separated HOV facility:

An HOV lane that is separated from adjacent mixed-flow freeway lanes with a designated buffer width of one foot or more. Narrow buffers of 1 to 4 feet are either traversable or non-traversable (i.e., the buffer can be legally crossed at any point or cannot be legally crossed except at designated access points). The buffer may also be wide—12 to 15 feet—and be considered a refuge for disabled vehicles.

buffer separation, buffer strip:

A roadway area that is used to physically separate an HOV lane from a regular use lane. Generally, no vehicles are allowed in this area, but if the buffer is sufficiently wide (more than 14 feet), it may be considered a refuge for disabled vehicles.

bus:

A self-propelled, rubber-tired road vehicle designed to carry a substantial number of passengers (i.e., 10 or more), commonly operated on streets and highways. A bus has enough head room to allow passengers to stand upright after entering.

bus and carpool lanes, preferential lanes, or HOV lanes:

Any form of preferential treatment in which lanes on streets or highways are reserved for the exclusive use of buses, carpools, vanpools, or all of the above during at least a portion of the day.

bus priority system:

A means by which transit are given special advantage over other traffic (e.g., preemption of traffic signals, or bus lanes).

busway:

A preferential roadway designed for exclusive or predominant use by buses in order to improve bus movement and travel times. A busway may be constructed either at, below, or above grade, and located either in separate right-of-way or within freeway right-of-way.

bus-only lane or transit-only lane:

A lane reserved for the exclusive use of buses, either on a part-time or full-time basis.

capacity, design:

The *maximum* number of vehicles (vehicular capacity) or persons (person capacity) at the design level-of-service that can pass over a given section of roadway or transit line in one or both directions during a given period of time under prevailing roadway and traffic conditions, usually expressed as vehicles per hour or persons per hour.

capacity, operational:

The *maximum* total number of vehicles (vehicular capacity) or persons (person capacity) that can pass over a given section of roadway in one or both directions during a given period of time.

carpool:

Any vehicle, usually an automobile, carrying a specified minimum number of occupants including the driver, or a group of people sharing automobile transportation.

central business district:

That portion of a city which serves as the primary activity center (e.g., downtown Chicago or defined by CATS as the "central area"). Its land use is characterized by intense business activity that serves as a destination for a significant number of daily work trips.

change of mode:

The transfer from one type of transportation vehicle to another (i.e., auto to bus or pedestrian to auto).

compliance rate:

The number of *legal* vehicles (those meeting road use restrictions) on the entire facility (HOV lane and adjacent mixed-flow lanes) divided by the total number of vehicles, on a directional basis expressed as a percent.

concurrent flow lane:

See *lane, concurrent flow.*

contiguous flow lane:

See *lane, contiguous flow.*

contraflow lane:

See *lane, contraflow.*

corridor:

A broad geographical area that defines general directional flow of traffic. It may encompass a mix of streets, highways, and transit alignments.

cost-benefit analysis:

An analytical technique that compares the societal costs and benefits (measured in monetary terms) of proposed programs or policy actions. Identified losses and gains experienced by society are included, and the net benefits created by an action are calculated. Alternative actions are compared to allow selection of one or more that yield the greatest net benefits or benefit-cost ratio.

delay:

The time lost by a person or vehicle during travel due to circumstances which impede the desirable movement of traffic. It is the travel time difference between congested and free-flow travel times.

diamond:

A uniform traffic control symbol used on signing and pavement markings used to designate restricted use of preferential (HOV) facilities.

emergency vehicle:

Any vehicle generally used in responding to an incident that has caused or may lead to life- or injury-threatening conditions or destruction of property. Examples are police, fire and ambulance vehicles as well as tow trucks and maintenance vehicles.

enforcement:

The function of maintaining the rules and regulations to preserve the integrity of a preferential (HOV) facility.

enforcement area:

A dedicated space on which enforcement can be performed. Enforcement areas can be delineated within an available shoulder or provided at specific locations.

express lanes:

Lanes reserved for the exclusive use of serving through trips and HOVs, usually but not necessarily in the same traffic stream.

exclusive facility, separate right-of-way:

An HOV roadway or lane(s) located in a separate right-of-way that is usually, but not always designated for the exclusive use by buses. The facility is typically operated two-way and includes two lanes. Examples of this facility are located in Ottawa, Ontario and Pittsburgh, Pennsylvania. (See also *busway*)

exclusive facility, freeway right-of-way:

An HOV roadway or lane(s) located within a freeway right-of-way that is physically separated from the general purpose freeway lanes and designated for HOVs for all or portions of the day. Physical separation is usually via a concrete barrier, but separation can also be via a wide painted buffer. Examples include are located in Hartford, Connecticut and on the Shirley Highway in northern Virginia. (See also *barrier-separated facility* and *buffer-separated facility*)

express bus service:

Bus service with a limited number of stops, either from a collector area directly to a specific destination or in a particular corridor with stops en route at major transfer points or activity centers. Express bus service is usually routed along freeways or HOV facilities where they are available.

fixed guideway:

Any urban transportation system composed of vehicles that can operate only on their own guideways, which are constructed for that purpose. Examples include rail rapid, light rail, monorail, etc.

general purpose lane:

See *lane, general purpose.*

headway:

The time interval between successive passing of vehicles, measured from bumper to bumper, moving along the same lane in the same direction on a roadway, expressed in seconds or minutes.

high-occupancy vehicle (HOV):

Motor vehicles carrying at least two or more persons, including the driver. An HOV could be a transit bus, vanpool, carpool or any other vehicle that meets the minimum occupancy requirements, usually expressed as either two or more, three or more, or four or more persons per vehicle.

- **HOV lane:**

  See *lane, high-occupancy vehicle.*

- **HOV facility (also priority treatment):**

  The collective application of physical improvements that support an HOV operation, including lanes, ingress/egress, park-and-ride lots, park-and-pool lots, and transit facilities that are developed so as to effectively integrate all elements as a unified whole.

– **HOV system:**

The collective application of HOV facilities, programs and policies that are effectively integrated to provide a comprehensive application of HOV incentives in a corridor or region.

informal carpool:

A form of carpool in which the composition of traveling passengers varies from one day to another; there is no formalized arrangement for regular riders.

in line transit stop:

A mode transfer facility located along an inside or outside oriented HOV lane. Mode transfers typically involve pedestrian or drop-off passenger to/from bus. The stop is located within the freeway ROW.

ingress/egress:

The provision of access to/from an HOV facility.

inside HOV lane:

HOV lane oriented adjacent the median along a freeway or street.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA):

Federal funding program to provide matching funds for a variety of transportation improvements, mandating broad changes in the way transportation decisions are made and funded.

instant carpool:

A form of carpool in which drivers pick up random passengers, usually commuters, often at predetermined locations along the route. The composition of the passengers typically varies from one day to another. Instant carpool passengers sometimes use this commute mode in one direction and take public transit in the other.

intermodal:

Facility connections between transportation modes.

kiss-and-ride:

An access mode to transit whereby passengers (usually commuters) are driven to a transit stop and left to board the vehicle, then met after their return trip.

lane:

A portion of a street or highway, usually indicated by pavement markings, that is intended for one line of vehicles.

- **barrier-separated lane:**

  A lane that is physically separated and access controlled from adjacent general purpose traffic and reserved for the exclusive use of HOVs. A barrier-separated lane can be either operated as reversible-flow or two-way.

- **buffer-separated lane:**

  A lane operating in the same direction as general purpose traffic that is separated by a designated buffer width of one foot or more. The buffer can either be traversable or non-traversable. Buffers are usually either one to four feet or 12 to 15 feet in width.

- **bus lane (bus primary lane, preferential bus lane):**

  A lane reserved primarily for buses, during at least portions of the day.

- **bypass lane:**

  See *queue bypass (HOV)*

- **concurrent-flow lane:**

  A buffer-separated lane on which, during the entire day or certain hours of the day, HOVs operate in the same direction as the normal flow of traffic. The buffer separation may be as narrow as a paint stripe or as wide as four feet.

- **contiguous, contiguous flow:**

  A non-separated concurrent flow lane (also see non-separated lane)

- **contraflow lane:**

  A lane on which, during certain hours of the day, HOVs operate in a direction opposite to that of the normal flow of traffic (commonly the inside lane in the off-peak direction of travel). For freeway applications, the lane is typically separated from the opposing direction travel lanes by pylons or moveable concrete barrier.

- **conversion:**

  A general implementation approach whereby an HOV lane is created by consuming or borrowing use of a mixed-flow lane on a freeway facility, usually by pavement markings and signing. This is not a common approach to implementing HOV treatments.

- **exclusive lane:**

  A preferential lane separated by a wide buffer or physical barrier from general purpose lanes. (see also *barrier-separated lane* and *buffer-separated lane*)

- **general purpose, mixed-flow, mixed-use:**

  A traffic lane that is available for use by all types of vehicles.

- **high-occupancy vehicle (HOV) lane:**

  A preferential lane that is reserved for the use of high-occupancy vehicles.

- **mixed-flow, mixed-use:**

  See *general purpose.*

- **nonseparated (HOV) lane:**

  An HOV lane that is not separated from adjacent mixed-flow freeway lanes (i.e., delineation is via a standard dashed pavement stripe).

- **queue bypass lane:**

  See *queue bypass.*

- **reversible-flow lane:**

  A lane on which the direction of traffic flow can be changed to match the peak direction of travel during peak traffic periods.

- **shoulder lane:**

  An HOV lane that is created on an existing median or outside shoulder of a freeway.

level of service:

A descriptive measure of the quality and quantity of transportation service provided the user that incorporates finite measures of quantifiable characteristics such as travel time, travel cost, number of transfers, etc. Operating characteristics of levels of service for motor vehicles are described in the *Highway Capacity Manual*, Transportation Research Report Special Report, 1985.

line haul:

That portion of a commute trip that is express (non-stop) between two points.

main lane:

One of the mixed-flow freeway through lanes.

main-lane metering:

A procedure used to manage vehicle flow along freeway lanes (or connections at an interchange). The main lanes are equipped with traffic signals that allow vehicles to proceed at a predetermined rate.

major investment study (MIS):

A detailed study and assessment of the various options available for the purpose of selecting one for implementation. Ideally, all feasible alternatives are investigated. A major

investment study is required if federal funds in excess of the maximum allowable for MIS requirements are anticipated.

Metropolitan Planning Organization (MPO):

State agency designated by the Governor to administer the federally required transportation planning process in a metropolitan area. The Puget Sound Regional Council (PSRC) is the local MPO for this study.

mixed-flow (also general purpose) lane(s):

See *lane, general purpose.*

mode:

A means of travel (i.e., walking, bicycling, riding by bus, riding by carpool or vanpool, riding by train, etc.).

mode shift:

The shift of people from one mode to another (e.g., single-occupancy vehicles to HOVs or vice versa).

multi-modal:

Facilities serving more than one transportation mode.

National Highway System (NHS):

Highways of national significance designated as important for interstate travel, national defense, intermodal connections, and interstate and international commerce.

nonattainment area:

A geographic area in which the level of a criteria air pollutant is higher than the level allowed by nationally accepted standards.

nonseparated HOV lane:

See *lane, nonseparated.*

off-line station:

A mode transfer facility located off of the HOV lane, either adjacent the freeway or some distance away. Mode transfers could involve bus, rail, auto, or pedestrian modes.

off-peak direction:

The direction of lower demand during a peak commuting period. In a radial corridor, the off-peak direction has traditionally been away from the CBD in the morning and toward the CBD in the evening.

on-line station:

A mode transfer facility located along the HOV lane. Mode transfers involve bus, auto and/or pedestrian modes.

operation plan:

A comprehensive document that specifies how an HOV facility is to be administered, operated, enforced and maintained.

outlying business district:

That portion of a municipality or an area within the influence of a municipality, normally separated geographically by some distance from the central business district and its fringe area, in which the principal land use is for business activity. This district has its own traffic circulation superimposed on through movements to and from the CBD, a relatively high parking demand and turnover, and moderate pedestrian traffic. Compact off-street shopping developments entirely on one side of the street are not included in the scope of this definition.

outside HOV lane:

HOV lane oriented either adjacent to or located within the right side shoulder of a freeway or street.

paratransit vehicle:

Any form of intra-urban demand-responsive vehicle such as taxis, carpools, etc., that are available for hire to the public. They are distinct from conventional transit as they generally do not operate on a fixed schedule.

park-and-pool lot:

A parking facility where individuals rendezvous to use carpools and vanpools, except the facility is not served by public transportation.

park-and-ride lot:

A parking facility where individuals access public transportation as a transfer of mode, usually with their private automobiles. Public transportation usually involves express bus from the lot to a CBD or major activity center. A park-and-ride lot can also be allowed to serve the dual function of a park-and-pool lot facilitating the formation of carpools and vanpools.

peak direction:

The direction of higher demand during a peak commuting period. In a radial corridor, the peak direction has traditionally been toward the central business district in the morning and away from the central business district in the evening.

peak hour:

That hour during which the maximum amount of travel occurs. It may be specified as the morning peak hour or afternoon or evening peak hour.

peak period:

The period during which traffic levels rise from their normal background levels to maximum levels. These periods are for morning, evening, and mid-day peaks and include the appropriate peak hours. .

preferential parking:

Parking lots or spaces that are reserved for HOVs as a means to encourage ridesharing. They are usually located closer to a terminal or building entrance than other vehicle spaces and may also enjoy a reduced parking fee.

preferential treatment:

In transportation, giving special privileges to a specific mode or modes of transportation (i.e., bus lanes or signal preemption at intersections).

priority entry ramp:

See *ramp meter bypass.*

public transit (or transportation):

Passenger transportation service to the public on a regular basis using vehicles that transport more than one person for compensation, usually but not exclusively over a set route or routes from one fixed point to another. Routes or schedules of this service may be predetermined by the operator or may be determined through a cooperative arrangement.

queue:

A line of vehicles or persons.

queue bypass (HOV):

An HOV facility that provides a bypass around a queue of vehicles delayed at a ramp or mainline traffic meter, toll plaza, bridge, tunnel, ferry landing, or other bottleneck location.

ramp metering:

A procedure used to reduce congestion on a freeway facility by managing vehicle flow from local access entrance ramps. An entrance ramp is equipped with a metering device and traffic signal that allows vehicles to enter a facility at a controlled rate.

ramp meter bypass:

A form of preferential treatment at a ramp meter in which one or more a queue bypass of one or more lanes is provided for the designated use of high-occupancy vehicles.

reversible-flow lane:

See *lane, reversible-flow.*

ridesharing:

The function of sharing a ride with other passengers in a common vehicle. The term is usually applied to carpools and vanpools.

separated roadway:

See *barrier-separated facility.*

signal preemption:

A interruption of the normal operation of a signal in order to immediately serve a particular movement, typically to accommodate an emergency vehicle.

signal priority:

A technique of altering the sequence or timing of traffic signal phases using special detection in order to provide preferential treatment for buses.

single-occupant vehicle:

Any vehicle carrying only the driver.

special use lane:

A lane that is restricted for specific uses, typically including higher occupancy vehicles, trucks, and express traffic (e.g., HOV lanes, Kennedy Expressway express lanes, etc.)

support facility:

A facility that enhances HOV operation, including park-and-ride lots, park-and-pool lots, transfer terminals, or other physical improvement that is considered a supporting element of the operation.

support program:

Any of a number of services that enhance the public acceptance or usage of the HOV system, including ridesharing, employer-sponsored programs, public information and marketing.

Surface Transportation Program (STP):

A new transportation funding program created by ISTEA, set up for roadway construction and improvements and operational improvements to all transportation modes, including bicycle and pedestrian facilities, transit, ridesharing programs and support facilities, and various transportation planning and study activities.

take-a-lane:

See *lane, conversion.*

traffic management system (TMS), advanced traffic management system (ATMS):

Any of various monitoring, detection, and classification measures, whether by automatic or manual means, to optimize traffic flow without construction of additional roadway lanes, such as: variable message signs (VMS), traffic lights, closed circuit camera surveillance, and loop detection. Advanced systems are intended to continuously optimize flow via feedback controls to the highway infrastructure.

transit:

See *public transit.*

transit, bus rapid:

An inexact term describing a bus operation that is generally characterized by operation on separate right-of-way that permits high speeds. This concept may include barrier-separated HOV facilities.

transit, light rail (LRT):

An urban railway system characterized by its ability to operate single cars or short trains in streets or exclusive right-of-way, capable of discharging passengers at track or car floor level.

transit center (or transit station):

A mode transfer facility serving transit buses and other modes such as automobiles and pedestrians. In the context of this document, transit centers can be located either alongside an HOV lane or busway (i.e., on-line station), or be physically separated from the HOV lane (i.e., off-line station).

transit-only lane:

see *bus-only lane.*

transportation demand management (TDM):

The operation and coordination of various transportation system programs to provide the most efficient and effective use of existing transportation services and facilities. TDM is one category of TSM actions.

transportation system management (TSM):

Actions that improve the operation and coordination of transportation services and facilities to effect the most efficient use of the existing transportation system. Actions include operational improvements to the existing transportation system, new facilities, and demand management strategies.

two-way HOV facility:

An HOV facility in which both directions of traffic flow are provided for at least during portions of the day (see also bi-directional).

undercrossing:

A bridge structure over the freeway or arterial street being studied.

vanpool:

A prearranged ridesharing function in which a number of people travel together on a regular basis in a van, usually designed to carry six or more persons and typically serving longer commuter trips.

violation:

An infraction of the rules and regulations for roadway use. In an HOV context, a violation can include vehicle and occupancy eligibility.

violation rate:

The total number of violators divided by the total number of vehicles in an HOV lane or lanes, expressed as a percentage.

Additional terms not included in this list may be found in the Transportation Research Board's *Urban Public Transportation Glossary*, 1989.

A.2. ABBREVIATIONS

AASHTO: American Association of State Highway and Transportation Officials

ASCE: American Society of Civil Engineers

AVI: Automated Vehicle Identification

AWDT: Average Weekday Daily Traffic

B/C: Benefit/Cost

CAA: Clean Air Act Amendments of 1990

CBD: Central Business District

CD: Collector-Distributor Roadway

CMAQ: Congestion Mitigation and Air Quality Program

DOT: Department of Transportation—generic (State or Federal)

FHWA: Federal Highway Administration

EPA: Environmental Protection Agency

FTA: Federal Transit Administration (formerly UMTA, Urban Mass Transportation Administration)

ITE: Institute of Transportation Engineers

ISTEA: Intermodal Surface Transportation Efficiency Act of 1991

ITE: Institute of Transportation Engineers

IVHS/ITS: Intelligent Vehicle-Highway Systems/Intelligent Transportation Systems

LOS: Level of service

MUTCD: Manual on Uniform Traffic Control Devices

MPH: Miles per hour

MPO: Metropolitan Planning Organization

NHS: National Highway System

P&P: Park-and-pool

P&R: Park-and-ride

ROW: Right-of-way (also R.O.W.)

SIP: State Implementation Plan

SOV: Single-occupant vehicle

STP: Surface Transportation Program

SR : State Route

TDM: Transportation Demand Management

TIP: Transportation Improvement Program

TRB/NAS: Transportation Research Board/National Academy of Sciences

TSM: Transportation System Management

V/C: Vehicle/Capacity

VPH: Vehicles per hour

VPHPL: Vehicles per hour per lane

3+: Three or more persons per vehicle, including motorcycles

2+: Two or more persons per vehicle, including motorcycles

APPENDIX B: STAKEHOLDERS AND PARTICIPANTS

Puget Sound HOV Pre-Design Studies
Snohomish County HOV Access Stakeholder Group

First	Last	Org
Gordy	Hyde	City of Edmonds
Paul	Kaftanski	City of Everett
Richard	Nordon	City of Lynnwood
Will	Vanry	City of Mountlake Terrace
Larry	Ingalls	Community Transit
Mike	Wong	King County
Ron	Kuchenreuther	RTA
George	Godley	Snohomish County Planning
John	Davis	Snohomish County Public Works
Phil	Fordyce	WSDOT - Northwest Region
Ron	Kinoshita	WSDOT - Northwest Region
Amir	Rasaie	WSDOT - Northwest Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs
Walt	Fisch	WSP

Puget Sound HOV Pre-Design Studies
I-90 Corridor HOV Access Stakeholder Group

First	Last	Org
Don	Noble	Bellevue Community College
Tom	Noguchi	City of Bellevue
Bill	Nims	City of Issaquah
Mike	Wong	King County
Jim	Arrowsmith	Metro
Carol	Cooper	Metro
Sondra	Early	Metro
Ron	Kuchenreuther	RTA
Bob	Aye	WSDOT - Northwest Region
Dave	Berg	WSDOT - Northwest Region
Bill	Carter	WSDOT - Northwest Region
Mike	Cotton	WSDOT - Northwest Region
Bill	Dues	WSDOT - Northwest Region
Phil	Fordyce	WSDOT - Northwest Region
John	Johnson	WSDOT - Northwest Region
Bob	Josephson	WSDOT - Northwest Region
Jerry	Schutz	WSDOT - Northwest Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs

First	Last	Org
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Gordon	Burch	City of Bothell
Ed	White	City of Kent
Don	Wickstrom	City of Kent
David	Godfrey	City of Kirkland
Gary	Sund	City of Kirkland
Loren	Sand	City of Lynnwood
Sandra	Meyer	City of Renton
Brian	Shelton	City of Tukwila
Lane	Youngblood	City of Woodinville
Franz	Loewenherz	Community Transit
Jim	Moore	Community Transit
Charles	Prestrud	Community Transit
Mike	Wong	King County
Sally	Marks	King County Public Works Department
Carol	Cooper	Metro
Eric	Gleason	Metro
Ramona	Jackson	Metro
Jack	Whisner	Metro
Ned	Conroy	PSRC
King	Cushman	PSRC
Mary	McCumber	PSRC
Karen	Richter	PSRC
Nick	Roach	PSRC
Ron	Kuchenreuther	RTA
Bobann	Fogard	Snohomish County
George	Godley	Snohomish County Planning
Mike	Cotton	WSDOT - Northwest Region
Phil	Fordyce	WSDOT - Northwest Region
Les	Jacobson	WSDOT - Northwest Region
John	Johnson	WSDOT - Northwest Region
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John	Batiste	WSP

Puget Sound HOV Pre-Design Studies
South King County to Seattle HOV Corridor Alternatives Stakeholder Group

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Saied	Daniari	City of Federal Way
Ed	White	City of Kent
Bob	Kaplan	City of Renton
Bruce	Rayburn	City of SeaTac
Brian	Shelton	City of Tukwila
Michael	Morrow	FHWA
Dan	Burke	King County Public Works
Sally	Marks	King County Public Works Department
Barb	Gilliland	Metro
Jack	O'Bryan	Metro
Jack	Whisner	Metro
Jesse	Hamashima	Pierce County
Kate	Erickson	Pierce Transit
Kate	Erickson	Pierce Transit
Brad	Funkhouser	Pierce Transit
Tim	Payne	Pierce Transit
Gerri	Poor	Port of Seattle
Ron	Kuchenreuther	RTA
Holly	Haynes	Washington Mutual Savings Bank
Dave	Edwards	WSDOT - Northwest Region
Susan	Everett	WSDOT - Northwest Region
Phil	Fordyce	WSDOT - Northwest Region
Dave	McCormick	WSDOT - Northwest Region
Larry	Ross	WSDOT - Olympia Service Center
Jim	Vorass	WSDOT - Olympic Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Craig	Stone	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs

Puget Sound HOV Pre-Design Studies
Central Seattle HOV Corridor Stakeholder Group

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Joan	Rosenstock	City of Seattle
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Richard	Warren	King County Public Works
Mike	Bergman	Metro
Jack	Whisner	Metro
Ron	Endlich	RTA
Dave	Berg	WSDOT - Northwest Region
Susan	Everett	WSDOT - Northwest Region
Les	Jacobson	WSDOT - Northwest Region
Jerry	Schutz	WSDOT - Northwest Region
Rob	Fellows	WSDOT Office of Urban Mobility
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Gary	Trunkey	WSP

Puget Sound HOV Pre-Design Studies
SR 522 Corridor Analysis Stakeholder Group

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Ruth	Muller	City of Lake Forest Park
Ty	Peterson	City of Lake Forest Park
Dick	Fredlund	City of Monroe
Tom	Jensen	City of Monroe
Eric	Tweit	City of Seattle
Charles	Prestrud	Community Transit
Mike	Wong	King County
Nevin	Harwick	King County Traffic and Planning
John	Shively	King County Trasnp. Planning
Mike	Bergman	Metro
Ron	Kuchenreuther	RTA
John	Dewhirst	Snohomish County Public Works
Dave	Edwards	WSDOT - Northwest Region
Susan	Everett	WSDOT - Northwest Region
Jerry	Schutz	WSDOT - Northwest Region
Tom	Simpson	WSDOT - Northwest Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs
Walt	Fisch	WSP

Puget Sound HOV Pre-Design Studies
General Purpose Lane to HOV Lane Conversion Analysis Stakeholder Group

First	Last	Org
Bruce	Olsen	AAA
Preston	Schiller	ALT-TRANS
Pat	Emerson	Citizen Representative
Tom	Noguchi	City of Bellevue
Paul	Kaftanski	City of Everett
Larry	Ingalls	Community Transit
Paul	Carr	Dept. of Ecology
Chuck	Chappell	FHWA
Dwayne	Daniels	Greyhound Line, Inc.
Chris	Leman	Institute for Transp. and the Environment
Mike	Wong	King County
Steve	Gorcester	King County Council Staff
Gene	Baxtrom	Legislative Transp. Comm.
Jack	Whisner	Metro
John	Hubbard	Pierce Transit
Don	Hammac	SCCIT/Washington Nat. Gas
John	Dewhirst	Snohomish County Public Works
Fred	Mannering	U of W
Peter	Hurley	WA Environmental Council
Holly	Haynes	Washington Mutual Savings Bank
Larry	Pursley	Washington Trucking Association
Phil	Fordyce	WSDOT - Northwest Region
Les	Jacobson	WSDOT - Northwest Region
Miguel	Gavino	WSDOT - Office of Urban Mobility
Bill	Brubaker	WSDOT - Olympia Service Center
Jerry	Ellis	WSDOT - Olympia Service Center
Paula	Hammond	WSDOT - Olympia Service Center
Pasco	Bakotich	WSDOT - Olympic Region
Toby	Rickman	WSDOT - Olympic Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs
Dale	Lathan	WSP

Puget Sound HOV Pre-Design Studies
Safety and Enforcement Improvements Assessment Stakeholder Group

First	Last	Org
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Terry	Compton	Metro, Bldg. A
Phil	Fordyce	WSDOT - Northwest Region
Tom	Simpson	WSDOT - Northwest Region
Gary	Farnsworth	WSDOT - Olympia Service Center
Jim	Vorass	WSDOT - Olympic Region
Rob	Fellows	WSDOT Office of Urban Mobility
Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs
John	Fuller	WSP
Dale	Lathan	WSP
Steve	Wagner	WSP

Puget Sound HOV Pre-Design Studies
Project Advisory Committee

First	Last	Org
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Mike	Wong	King County
Sally	Marks	King County Public Works Department
Dick	Hayes	Kitsap Transit
Eric	Gleason	Metro
Jack	Whisner	Metro
Jesse	Hamashima	Pierce County
Kate	Erickson	Pierce Transit
Tim	Payne	Pierce Transit
Karen	Richter	PSRC
John	Dewhirst	Snohomish County Public Works
Leslie	Barben-Price	WSDOT - Northwest Region
Les	Jacobson	WSDOT - Northwest Region
Hank	Peters	WSDOT - Northwest Region
Jerry	Schutz	WSDOT - Northwest Region
John	Villager	WSDOT - Northwest Region
Paula	Hammond	WSDOT - Olympia Service Center
Linea	Laird	WSDOT - Olympic Region
Toby	Rickman	WSDOT - Olympic Region
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Carol	Hunter	WSDOT Office of Urban Mobility
Jerry	Ayres	WSDOT Public Transp. & Rail Dvs
Dale	Lathan	WSP

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PUGET SOUND HOV PRE-DESIGN STUDIES

FINAL REPORT

MAY 5, 1997

Submitted to:

Washington State Department of Transportation Office of Urban Mobility

Submitted by:

PARSONS BRINCKERHOFF