ATTACHMENT 3. Redmond TMP Update

High Occupancy Vehicle (HOV) Workshop Summary

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MEETNG DATE: June 30, 2011

LOCATION: City Hall, Redmond

FROM: John McKenzie/SEA

DATE: August 18,2011

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General Summary

The HOV workshop focused on the SR 520 Corridor and connections that support the existing "spine" HOV network specifically for transit accessibility and for general HOV. Several key findings emerged as outcomes from the workshop:

- Arterial HOV does not appear to have significant value unless it directly supports or is connected to the SR 520 HOV networks
- "West" connections to and from the West Lake Sammamish Parkway/ Leary Way interchange and further to the west need to emphasize transit connections (rather than carpools) due to the significant transit needs
- "East" end of the freeway emphasis is more on carpools and at the SR 202 interchange it is a blend of both carpools and transit in the future

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- Moving the HOV lanes from the outside to the inside on SR 520 (current WSDOT plan) ought to be reconsidered to determine what configuration will best serve both transit and carpools from about I-405 to Avondale
- More specific concepts developed at the workshop can be found in the "Project Discussion Results" for the "east" and "west" sides

Meeting Purpose and Objective

The purpose of the workshop was to solicit advice from experts from regional agencies and consulting firms on HOV study project screening method and potential HOV project ideas within the City of Redmond. Specifically, the objectives for the HOV workshop were to:

- Consider the full range of HOV/transit improvement options
- Confirm screening methodology
- Refine candidate list of options for further development

Context for the HOV Study

Redmond Growth Trends

Redmond projects a 40% growth in employment and residential activity between 2010 and 2030. The majority of this future growth will be concentrated in Redmond's two urban centers, Downtown and Overlake, together accommodating approximately three quarters of all new dwellings and two thirds of all new commercial development in Redmond. Outside of the two urban centers, Southeast Redmond will also be a significant location for employment growth. Moreover, the East Link light rail will arrive in Overlake by 2021, and is planned to extend to Downtown and Southeast Redmond in 2030.

HOV Study Objectives

The objectives of the HOV study were to explore and identify potential HOV facilities that respond to future growth and planned network changes, improve mobility, support travel choices, and expand the multimodal transportation network. In order to leverage existing and planned facilities and effectively complement the regional transportation system, potential HOV facilities need to integrate with existing HOV facilities onto or on SR 520, park and ride lots, and transit centers.

Overall, potential HOV facilities are expected to support the transportation system in achieving TMP principles.

HOV Study Scope

To effectively meet Redmond TMP principles, a Citywide HOV network will directly: a) facilitate connections between major local and regional destinations; b) effectively improve mobility for motorized vehicles and reduce barriers for non-motorized transportation; and c) improve travel choices.

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This study will evaluate a full range of HOV solutions using evaluation framework tied with TMP principles, and will inform decision making by screening out impractical concepts and prioritizing feasible projects. HOV solutions include HOV lanes (e.g., concurrent reserved lanes, reversible center lanes, and queue bypass lanes), direct access ramps, interchange revisions, and business access transit (BAT) lanes.

The backbone of the HOV network, SR 520, will be the focus of this study, while City arterials adjacent to SR 520 are also included in the scope. While the SR 520 corridor is a major regional transportation facility with existing HOV facilities, SR 520 presents barriers and conflicts to local connectivity and local travel. Many of the key transportation "hot spots" in Redmond that will be further evaluated as part of the TMP involve access to, or across, the SR 520 corridor. These hot spots include the east end of SR 520 at Avondale Road, Union Hill Road and SR 202, and the connections to SR 520 at employment centers around the Microsoft campus. Consequently, much of the workshop focus was on improvements in these locations.

Expected HOV Study Outcomes

This HOV study will generate a list of HOV improvements that support the achievement of TMP principles. This list will be prioritized in a rough order. Improvements with high priorities will be considered for funding. The list of HOV improvements and the priorities will inform two major planning efforts: a) Redmond TMP Update; and b) SR 520 Corridor Planning Study (CPS) between I-405 and Avondale Road.

Presentation

City staff presented current travel behavior data from the 2010 Redmond Travel Diary and Redmond Commute Trip Reduction surveys.

- 1) Regional versus local travel. 50% of workers that live in Redmond currently work within the City. However, Redmond is also a major regional job center, with 86% of Redmond employees commuting from locations outside of the City. This highlights the importance of connecting Redmond locally, while also connecting Redmond to the region.
- 2) Mode choices for all day trips. Walking is about 10%. HOV is about 40%. Transit is about 3 to 4%. Current mode choices indicate the need for improving the environment for transit services and continue to accommodate HOV mode choice.

CH2MHill presented a two-layer project screening and evaluation method (details in Attachment 1):

- 1) First-level screening. Using project screening criteria to eliminate fatally-flawed projects and advance the rest for detailed evaluation. These criteria include: a) being part of a major corridor or ramp connection; b) connecting to an existing or proposed carpool/vanpool or major transit facility; and c) serving major markets.
- Second-level evaluation. Rate projects using criteria reflecting: a) Serving major markets; b) measures of effectiveness; c) supporting transit; d) infrastructure needs; e) impacts and safety.

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Next, CH2MHill presented preliminary project ideas (shown in Figure A).

General Discussion and Feedback

Meeting participants clarified that both transit riders and carpools/vanpools are significant users and beneficiaries of an improved HOV network.

Meeting participants suggested that it is important to confirm the primary cohorts of customers for improving the HOV network between transit riders and carpools/vanpools because improvements of these two types of service have very different impacts on land use and serve very different needs.

Regarding land use vision and service needs, meeting participants discussed that Redmond's two urban centers will have high density and mixed land uses. Good transit services and high transit demand are expected to project into the future, especially in the Overlake area. On the other hand, Southeast Redmond has a very different outlook than the two urban centers. SR 520 terminates in Southeast Redmond, and this area is also on the fringe of the urban growth boundary. People from East King County and Sammamish/Issaquah use Southeast Redmond to access both other parts of Redmond and the rest of the region.

Meeting participants further suggested that based on Redmond's land use vision, growth trends, and planned regional facilities, it is necessary to establish:

- a) Serving transit as the focus for two urban centers, Downtown and Overlake to accommodate expected high density and mixed land use developments and robust transit services. While the HOV study has a focus on enhancing connections to existing HOV facilities connecting to the SR 520 corridor, it was noted that most routes serving Redmond do not access SR 520 directly. Traversing the SR 520 corridor on arterial streets, as well as facilitating access in and out of transit centers and future light rail, stations will be considered in both this HOV study and the transit plan as part of the TMP update.
- b) Serving carpools/vanpools as the focus in Southeast Redmond and part of Downtown east of the Sammamish River by improving access for carpools and vanpools to the SR 520 network while also accommodating transit needs for accessing the existing Bear Creek Transit Center and the future Southeast Redmond light rail station.

In general, the needs for transit in Redmond break down into three major categories:

1) access to the SR 520 HOV network, especially in Southeast Redmond and at Leary
Way/West Lake Sammamish Parkway; 2) throughout the SR 520 network, with a focus on
facilitating a transition from inside to outside lanes, and improving connection opportunities to
local routes operating on arterial streets; and 3) access across the SR 520 corridor and through
major congestion and pinch points via arterial streets.

Preliminary Concepts Presented

Project staff developed a range of HOV concepts that were presented in the workshop. These concepts are shown in Figure A and include the following:

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	Concept
1	Avondale Road – HOV lanes
2	Union Hill Road – queue jump flyover
3	Union Hill Road – HOV lane
4	SR 520 / Avondale Road HOV flyover of Union Hill
5	SR 202 – extend HOV bypass lane
6	SR 202 – add HOV lanes
7	SR 202 HOV bypass – flyover direct access to center lane
8	Leary Way – add HOV approach lane
9	SR 520 / NE 45 Street – direct access interchange
10	SR 520 / NE 36 Street / NE 60 Street direct access
11	SR 520/ NE 40 Street - HOV bypass ramp
12	SR 520/ NE 51 Street – HOV bypass ramp
13	148 Ave NE – HOV lanes

Project Discussion Results

Workshop participants were arranged in smaller groups to focus on two study areas: east of the Sammamish River and west of the Sammamish River.

East of the Sammamish River

Concepts and notes developed for the east area are summarized in the table below and shown in Figure B. The east side is characterized by the end of SR 520 funneling travel from East King County into and through Redmond, and residential areas outside of Redmond including the Sammamish Plateau, Novelty Hill, and Union Hill. In addition, there are two major regional transit facilities - the Bear Creek Park and Ride located at 178 Ave NE south of Union Hill Road and the Redmond Transit Center located at NE 83 Street and 161 Ave NE. Future light rail stations are planned in Downtown Redmond and Southeast Redmond. With SR 520 terminating in Redmond and the expected need to access the planned 1,400 space park and ride lot in Southeast Redmond, workshop participants focused on addressing the bottleneck of Avondale Road and NE Union Hill Road and on improving connections between SR 520 and transit facilities.

	Concepts	Notes / Considerations
1	Avondale Road – HOV lanes	Southbound congestion tends to be primarily the result of Avondale Road/Union Hill Road intersection. Northbound congestion is the result of Avondale Road capacity.

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		Southbound would benefit most from intersection improvements while northbound could benefit from an HOV or general purpose lane. A reversible lane has some operational challenges, but has some appeal if challenges can be mitigated. A center HOV lane provides no transit benefit.
2	Avondale Road / Union Hill Road intersection improvements	A.M. congestion is related to operation of the intersection, so improvements benefit HOV and general purpose. Ideas include a roundabout, grade separation of left turns, or grade separation of the HOV through movements.
14	Direct access interchange at NE 78 Street	This interchange would connect to the east at NE 78 Place and feed into the park and ride at NE 78 Place. This would allow HOV use from SR 202 in the east and Union Hill Road via 180 Ave NE. The interchange could be expanded to the north to include a flyover connection to Avondale Road. NE 78 Street could be extended to the west to Avondale Way. This would provide a transit benefit by providing a more direct route to the transit center at NE 83 Street.
15	SR 202 / Redmond Way in-lane transit stops	Consider priority enhancement through in-lane transit stops both eastbound and westbound along Redmond Way between 164 Ave NE and SR 520.

West of the Sammamish River

Concepts and notes developed for the west area are summarized in the table below and shown in Figure C. The west side is characterized by higher levels of transit service, serving major employment centers at and around the Microsoft Campus. In addition to public transit, Microsoft Shuttle Connect is a major provider of private transit service in this area. Major transit facilities are located east of SR 520, including the Overlake Transit Center at NE 40 Street and the Overlake Park and Ride, located along 152 Avenue NE north of NE 24 Street. Future light rail stations are planned for the Overlake Transit Center and at the Overlake Village near SR 520 and NE 30 Street.

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	Concept	Notes / Considerations	
8	Leary Way – add HOV approach lane	While a need and opportunity exist, due to environmental impacts, impacts to trail and apartments, this option was not recommended.	
9	SR 520 / NE 45 Street – direct access interchange	This location at NE 45 Street was not recommended because of potential impacts to the Microsoft campus at that site and its proximity to the transit center at NE 40 Street and SR 520, which may provide a better opportunity.	
13	148 Ave NE – BAT lanes or other alternative	148 Ave NE was identified as a major corridor with significant congestion and current and future carpool and transit needs. The workgroup considered multiple options, including converting the outside lane to a BAT lane (right-turn business access and transit lane). Signal priority would be a key component on this corridor to benefit transit.	
16	SR 520 / NE 40 Street direct access	Provide a direct access connection to west SR 520 with center HOV lanes directly to NE 40 Street. (Totem Lake interchange with I-405 provides an example of a similar configuration. General purpose ramps will continue to connect to NE 40 Street and signal priority will be given to the HOV direct access. The design of this facility should facilitate transfers from regional express bus service and light rail to local and bus rapid transit routes operating on NE 40 Street.	
		This concept also considers a transit lane / shoulder on the outside of the collector distributor (CD) ramp between NE 40 and NE 51 Street. At the interchange of NE 51 Street, a direct access connection to east SR 520 with center HOV lanes could also be considered.	
16b &17	shoulder / transit lanes	Convert shoulders to transit lanes / shoulders on the outside of SR 520 from 148 Ave NE to NE 51 Street. This concept would be considered if the HOV lanes on SR 520 are moved to the inside lanes.	

18	Outside HOV lanes from 124 Ave NE through Redmond	Provide an interchange in the vicinity of 124 Ave NE where inside HOV lanes west of the interchange would convert to outside HOV lanes east of the interchange. Outside HOV lanes through Redmond provide benefit for transit considering transit facilities on the ramps for NE 40 Street interchange.	
19	Develop bus rapid transit in the location of future East Link light rail alignment along the eastbound side of SR 520.	In advance of the future light rail, develop the future alignment for use of a bus rapid transit corridor. This would require right-of-way acquisition and roadway construction. Try to build infrastructure that is compatible with future light rail infrastructure. 28-ft width required for the bus rapid transit corridor. This could build demand for future light rail along the alignment. There are national examples of this strategy to follow.	
20	Access to SR 520 transit at NE 24 Street	An opportunity and need to connect to SR 520 based transit routes was identified near the NE 24 Street/148 Ave NE intersection.	

General Feedback

One general comment to both sides is about arterial HOV lane treatments. The general consensus is that they are very challenging to design and operate even though they have some appeal for transit and carpool/vanpools.

Another general comment is that shifting the HOV lane on SR 520 from outside to inside may not bring expected operational benefits especially from the perspective of serving transit.

Next Steps

The team is responding to general discussions and project discussions by workshop participants and will develop a list of HOV projects to be evaluated further (second level evaluation). Results of the second level evaluation will feed into the buildout needs list development. The buildout needs list is expected to be complete in September 2011.

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FIGURE A: PRELIMINARY CANDIDATE HOV SOLUTIONS

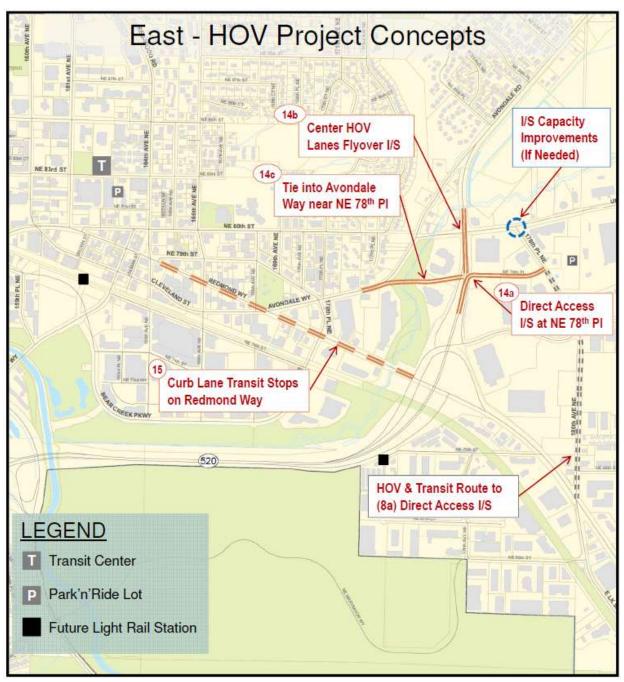


FIGURE B: WORKSHOP HOV CONCEPTS - EAST

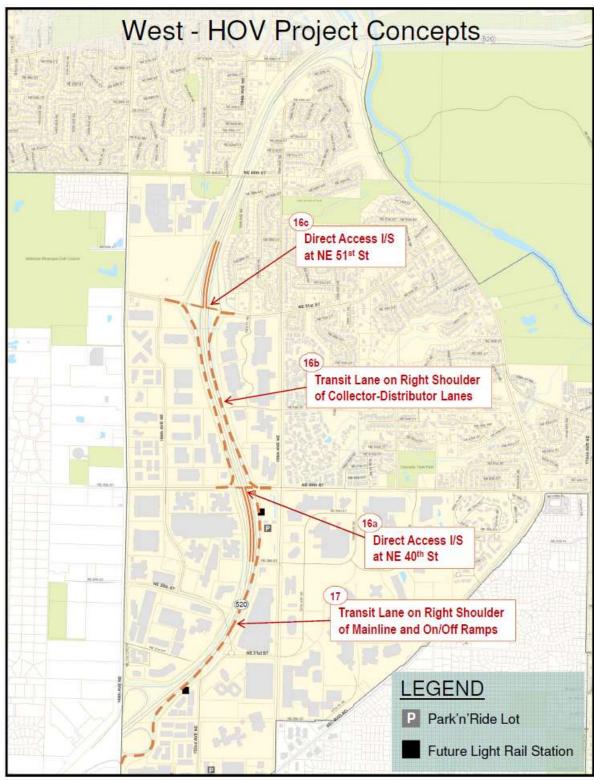


FIGURE B: WORKSHOP HOV CONCEPTS - WEST

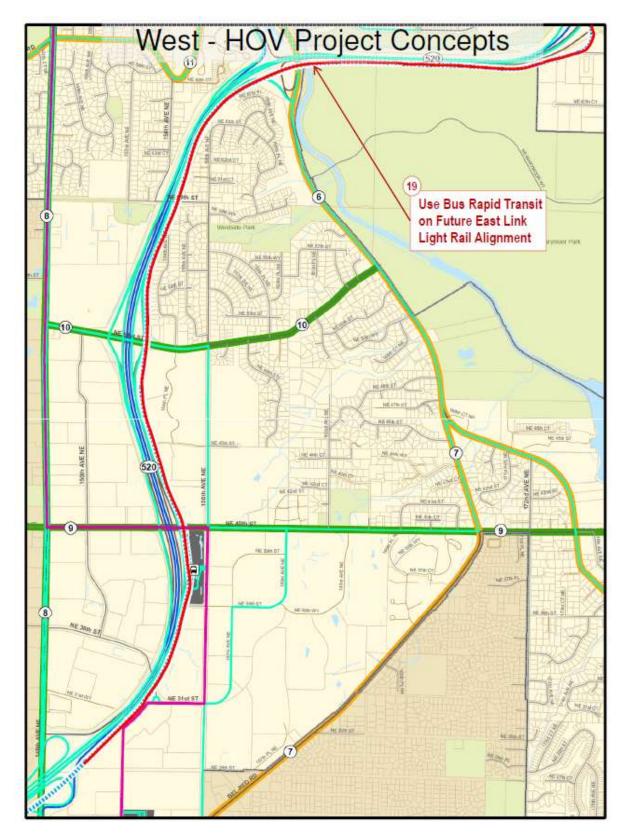


FIGURE C: WORKSHOP HOV CONCEPTS - WEST OPTION 19

Attachment 1: Proposed project screening and evaluation criteria

TECHNICAL MEMORANDUM 3 - DRAFT

CH2MHILL

High Occupancy Vehicle Study Project Screening and Evaluation Criteria

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DATE: June 30, 2011

PROJECT NUMBER: 413091

Introduction and TMP Guiding Principles

As part of the Transportation Master Plan, HOV improvements within the City of Redmond will be considered and evaluated. This memorandum identifies the methodology that will be used to screen and evaluate candidate HOV improvements.

Two levels of screening are proposed. The first high-level screening criteria will be used to eliminate from consideration fatally-flawed projects where implementation of HOV amenities would not be appropriate. The second level of screening involves a more detailed evaluation of the remaining candidate projects that could be considered for HOV facility implementation. Proposed evaluation criteria for the second level screening and a process for scoring are defined in this memo. These criteria will be used in the next steps of the HOV study approach process.

The City has developed a list of guiding principles for the Transportation Master Plan. As HOV projects are identified through this HOV study process, evaluation will be consistent with these over-arching guiding principles, but more specific criteria are proposed herein that will help differentiate arterial HOV projects. These over-arching guiding principles include:

- Safety
- Maintenance
- Natural environment
- Centers
- Neighborhood connections
- Travel choices

- Priority corridors
- Prepare for high capacity transit
- Community character
- Mobility
- System integration
- Leveraged funding

First Level Screening

The first level screening will establish candidate project locations for further analysis. To screen out HOV project locations that are not appropriate for implementation, the following criteria will be applied:

- The roadway should only be part of a major corridor(s) or ramp connection(s) and classified as an arterial [TMP Principle: Priority Corridor]
- The roadway must connect to an existing or proposed carpool/vanpool or major transit facility. HOV facilities must be implemented throughout the region and City as a comprehensive system to realize the full benefits. [TMP Principle: System Integration]
- The roadway must serve a major market (employment center, urban center, etc.) [TMP Principle: Centers, Neighborhood Connections]

Second Level Screening Evaluation Criteria

Candidate project corridors that remain after the first level screening process will then be further evaluated using some of the criteria identified in this section which will distinguish projects that would provide greater benefit for implementation of HOV facilities. Using the evaluation criteria, the project scoring and decision making will follow a measurable and defensible process.

Project Evaluation Rating Method

This section discusses the recommended approach in evaluating potential HOV arterial projects. The proposed rating method is described in the table below:

Rating	Description
•	Most favorable outcome. Most effective.
•	Some favorable outcomes. Somewhat effective. Potential similarities to the no build conditions.
0	No or very little favorable outcomes. Not effective. No change from no build conditions.
N/A	The criterion does not apply.

The potential evaluation criteria are described in the following tables.

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SERVING MAJOR MARKETS				
Criteria Category	Objective	Performance Measure	Scale	
	Roadway should connect to or serve a major market such as an urban center or major employment area.	Does this roadway connect to or serve a major market? Would this major market benefit from a HOV facility on this roadway?	 This roadway directly serves a major market. The major market would benefit from a HOV facility. This roadway is located nearby a major market or connects to roadways that serve a major market. The major market would benefit somewhat from a HOV facility on this roadway. This roadway does not directly serve a major market or does not connect to a road that serves a major market. 	
Serving major markets ^a TMP PRINCIPLE: Centers Neighborhood connections	Roadway should connect to or serve regional or major arterial traffic.	Does this roadway connect to or serve regional or major arterial traffic?	 This roadway connects to or serves regional or major arterial traffic. This roadway does not connect directly to a regional or major arterial, however it does feed some traffic to major roadways. This roadway does not serve or connect to major traffic. 	
	A new transportation facility may impact growth management. Transportation facility should be consistent with land use plans.	Is development of a HOV facility on this roadway compatible with area land use plans? Would this HOV facility affect growth management?	 A HOV facility on this roadway is compatible with land use plans and has no impact on growth management. A HOV facility on this roadway would have some conflicts with land use plans. There may be some impact to growth management. A HOV facility on this roadway would not be compatible with land use plans. Growth management would be impacted by HOV on this roadway. 	

^a While serving major markets was used as a first high-level screening criteria, roadways can be further evaluated with a second level of criteria to determine if a HOV facility should be implemented.

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MEASURES OF EFFECTIVENESS				
Criteria Category	Objective	Performance Measure	Scale	
Impact on general purpose operations TMP PRINCIPLE: Mobility Priority Corridors	General purpose traffic operations could potentially be impacted (positively or negatively) by implementation of a HOV facility.	Would general purpose traffic on this and adjacent roadways be impacted by the implementation of a HOV facility along this roadway?	 General purpose traffic on this and adjacent roadways will experience very little impact from a new HOV facility. Little to no increase in traffic congestion, no major increase in travel time. Potential congestion improvement for general purpose traffic. General purpose traffic on this and adjacent roadways may experience some impacts – some increase in congestion and travel time. General purpose traffic conditions may be similar to no build conditions. General purpose traffic on this and adjacent roadways will experience impacts – significant 	
HOV travel time savings ^a TMP PRINCIPLE: Mobility Travel Choices	A HOV facility should provide a travel time savings benefit to HOV users (including transit).	Would HOV experience travel time savings with the new HOV facility on this roadway?	 HOV will experience significant travel time savings. HOV will experience some travel time savings. Travel time savings may be slightly better or similar to no build conditions. HOV will experience no travel time savings. 	
HOV travel time reliability ^a TMP PRINCIPLE: Mobility Travel Choices	A HOV facility should provide a constant day- to-day travel time advantage than general purpose traffic.	Would HOV experience an increase in day- to-day travel time advantages compared general purpose traffic?	 HOV will experience an increase in travel time reliability compared to general purpose traffic. HOV will experience similar travel time advantages compared general purpose traffic. Travel time reliability for HOV may be similar to no build conditions. HOV will not experience any advantages compared to general purpose traffic. 	

^a Measures of effectiveness for transit are not discussed in detail in this technical memorandum.

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	ANSIT		
Criteria Category	Objective	Performance Measure	Scale
Current transit conditions TMP PRINCIPLE: Travel Choices Mobility	Current transit service should benefit from operations in a HOV lane. Transit should show improvements in reliability, travel time, etc.	Would current transit service along this roadway benefit from a HOV facility? Is transit currently operating in congested conditions along this arterial?	 Current transit service would benefit from a HOV facility along this roadway. Transit is currently not as reliable along this roadway due to congestion. Current transit service may have some benefits operating in a HOV facility on this roadway. Current transit service would not benefit from a HOV facility. Transit operates infrequently on this roadway. Conditions would remain congested, etc. even with a HOV lane. Transit service along this roadway does not serve a high ridership.
Future transit conditions TMP PRINCIPLE: Travel Choices Prepare for High Capacity Transit	Future/planned transit routes should be considered when planning a HOV facility.	Would future/planned transit service benefit from a HOV facility along this roadway?	 Planned transit service would benefit from a HOV facility along this roadway. Planned transit service may have some benefits operating in a HOV facility on this roadway. Planned transit service would not benefit from a HOV facility. No transit service is planned along this roadway. Transit service would be infrequent or not serve a high ridership.
INFRASTRUCTU	JRE NEEDS		
Criteria Category	Objective	Performance	Scale
		Measure	Scale
Right-of-way requirements TMP PRINCIPLE:	Use existing arterial lane to convert to an HOV lane.	Measure Can an existing lane be used?	Existing lane can be used for HOV lane. Portions of an existing lane can be used for HOV lane. Existing lane is not available to use for HOV lane.
requirements	arterial lane to convert to an	Can an existing	 Existing lane can be used for HOV lane. Portions of an existing lane can be used for HOV lane. Existing lane is not available to use for HOV

IMPACTS				
Criteria Category	Objective	Performance Measure	Scale	
Impacts on environment TMP PRINCIPLE: Natural environment	A HOV facility on this roadway should have minimal or no additional impacts on the environment.	Does a HOV facility on this roadway create impacts to the environment such as water quality, noise, aesthetics, and habitat?	 A HOV facility on this roadway will have minimal or no impact to the environment. May provide benefits to the environment. A HOV facility on this roadway may have some minor impact to the environment which could potentially be mitigated. May provide some environmental benefits. A HOV facility on this roadway will have significant impact to the environment. 	
Impacts to built environment (properties – businesses, residential) TMP PRINCIPLE: Community Character	A HOV facility on this roadway may impact businesses and properties, such as access and traffic.	Does a HOV facility on this roadway create impacts to businesses and residential properties, such as access or increased traffic?	 A HOV facility on this roadway will have minimal or no impact to properties. May provide benefits to properties. A HOV facility on this roadway may have some minor impact to properties which could potentially be mitigated. May provide some benefits to properties. A HOV facility on this roadway will have significant impact to properties. 	

SAFETY	SAFETY						
Criteria Category	Objective	Performance Measure	Scale				
Improves safety for vehicles, bikes, and pedestrians TMP PRINCIPLE: Safety Travel Choices Mobility	A HOV facility should decrease or improve safety on this roadway.	Does a HOV facility on this roadway increase the number of conflicting movements? Does it cause intersections/arterials to operate at poor levels of service? Does it create unsafe conditions for bicycles or pedestrians? Does vehicle access become unsafe?	 A HOV facility on this roadway improves safety or does not create safety issues. A HOV facility on this roadway may have some impacts to safety, but could possibly be mitigated. A HOV facility on this roadway will create safety issues. 				

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