Appendix A: IPS Work Plan

Draft Work Plan

April 20, 2010

Integrated Project Sponsor Council Staff representatives:

Henry Hewitt, Chair

Susie Lahsene, Port of Portland	Katy Brooks, Port of Vancouver
Andy Cotugno, Metro	Dean Lookingbill, Regional Transportation Council
Alan Lehto, TriMet	Jeff Hamm, CTRAN
Paul Smith, City of Portland	Thayer Rorabaugh, City of Vancouver
Richard Brandman, ODOT	Don Wagner, WSDOT

Remove Hayden Island Interchange & Alternative Access

(Work group: Paul, Thayer, Katy, Kathryn, Andy, Don, Richard)

- On April 20, CRC staff will share with the IPS previous traffic analysis regarding an arterial bridge without the HI interchange. CRC recognizes that the previous analysis of an arterial bridge extended across the Columbia River. However, this work will inform the resultant trip redistribution to the Marine Drive interchange.
- This analysis will also be shared with the PSC at their workshop on April 23.
- Portland has hired URS to develop new concepts which would eliminate the Hayden Island interchange and provide the only access to Hayden Island from Marine Drive.
- CRC staff is providing background information to URS and will coordinate with the city of Portland and URS in this effort.
- Portland will provide a progress report to the IPS on this new concept on April 29.
- If further traffic analysis is desired by the IPS following the development of this new design, CRC staff, with Metro, RTC, and Portland assistance, will rerun the VISSIM traffic model to determine the resultant change on travel movements and functionality in the affected areas.
- This run will be completed and results returned to the IPS for review and presentation to the PSC, together with briefings on the status of the new design.
- If more work is desired by PSC, determine next steps and timeframe to complete work.

Redesigned Hayden Island Interchange

(Work group: Paul, Thayer, Katy, Kathryn, Andy, Don, Richard)

- At the April 20 IPS meeting, CRC staff will share work performed to date on the design of this interchange. This will include a review of previous options and issues leading to the current design.
- Local government staff has suggested that alternatives to the current Hayden Island interchange design be examined.
- Andy Cotugno will take the lead in developing one new design proposal to present to the work group. CRC staff will assist in this effort.
- This workgroup should meet ASAP to finalize the new design concept to be evaluated and considered.
- The new design concept should be presented to the IPS on April 29.
- CRC will provide conceptual analysis of the new design and present it to the IPS on May 11 and to the PSC on May 14. If further work is desired, determine next steps and complete work by May 27.

Remove City Center Access

(Work group: Paul, Thayer, Katy, Kathryn, Andy, Don, Richard)

- There has been no previous analysis of the project without the Vancouver interchange. CRC is coordinating with the city of Vancouver and is preparing an analysis of this concept using existing travel forecasts. The team will share the resultant trip redistribution to the Mill Plain interchange at the IPS meeting on April 20.
- Vancouver has also analyzed in detail traffic impacts at many intersections in their downtown for the current CRC design, which does not incorporate closing the City Center interchange. These results will also be presented to the IPS on April 20.
- Both of these analyses will be presented to the PSC on April 23.
- If further analysis is desired, CRC staff, with Metro, RTC and Vancouver assistance, will rerun VISSIM to further define traffic impacts to the Mill Plain interchange.
- This run will be completed and results returned to the IPS on May 11 and presented to the PSC on May 14.
- CRC staff will provide more information on the functionality of the current design and functionality of the Washington interchanges at the IPS meeting on April 20. Next steps, if any, will be determined at that meeting.

Alternative 10 Lane Bridge

(Work group: To be determined)

- The City of Portland has hired URS to analyze the concept of a 10 lane bridge. URS and CRC will work together to evaluate possible changes in the design of the mainline, collector/distributor roads and interchange access to and from the mainline, along with management of traffic flow, to determine the functionality and performance of a 10 lane bridge option.

- Initial analysis will be brought to an IPS meeting as soon as practicable. The necessity and nature of any additional work will be determined at that meeting.

- CRC staff will also provide an analysis of the current shoulder widths, ODOT, WSDOT, and federal standards for Interstate bridges, and issues relating to variances of those standards.

Managed Lanes

(Work group: Jeff & Don)

- Several HOV lane concepts have previously been considered by the Task Force. Review that work and its conclusions with the IPS on April 29.

- Determine at that meeting if additional work is desired.

Post-Completion Transportation Demand Management

(Work group: Matt Ransom, Peter Hurley, John Replinger)

- TDM Workgroup to present post-completion TDM plan to IPS for discussion and consideration.

Performance Measures

(Work group: Katy, Dean, Andy, Peter Hurley & Rob Fellows)

- Performance measures workgroup to present preliminary recommendation of 5-6 goals to the IPS on April 20.

Metroscope Modeling

(Work group: Andy, Thayer, Alan, Susie & Richard)

- Andy Cotugno to meet with workgroup to review Metroscope modeling methodology and assumptions in the model on April 21.

- Modeling workgroup to report to the IPS on April 29 regarding Metroscope methodology and assumptions, with detail on changes in assumptions from those in previous models.

- Andy Cotugno to provide a budget and cost estimate for Metroscope modeling proposed for the CRC project (source of payment has been discussed, but not agreed).

- Modeling scenarios proposed are (i) no build, (ii) 12-lane bridge, light rail with no tolls, and (iii) the currently proposed 10-land LPA.

IPS Principles:

- Mutual respect.
- Collaboration/One-Team/One Region.
- Transparency.
- Find consensus, if possible.

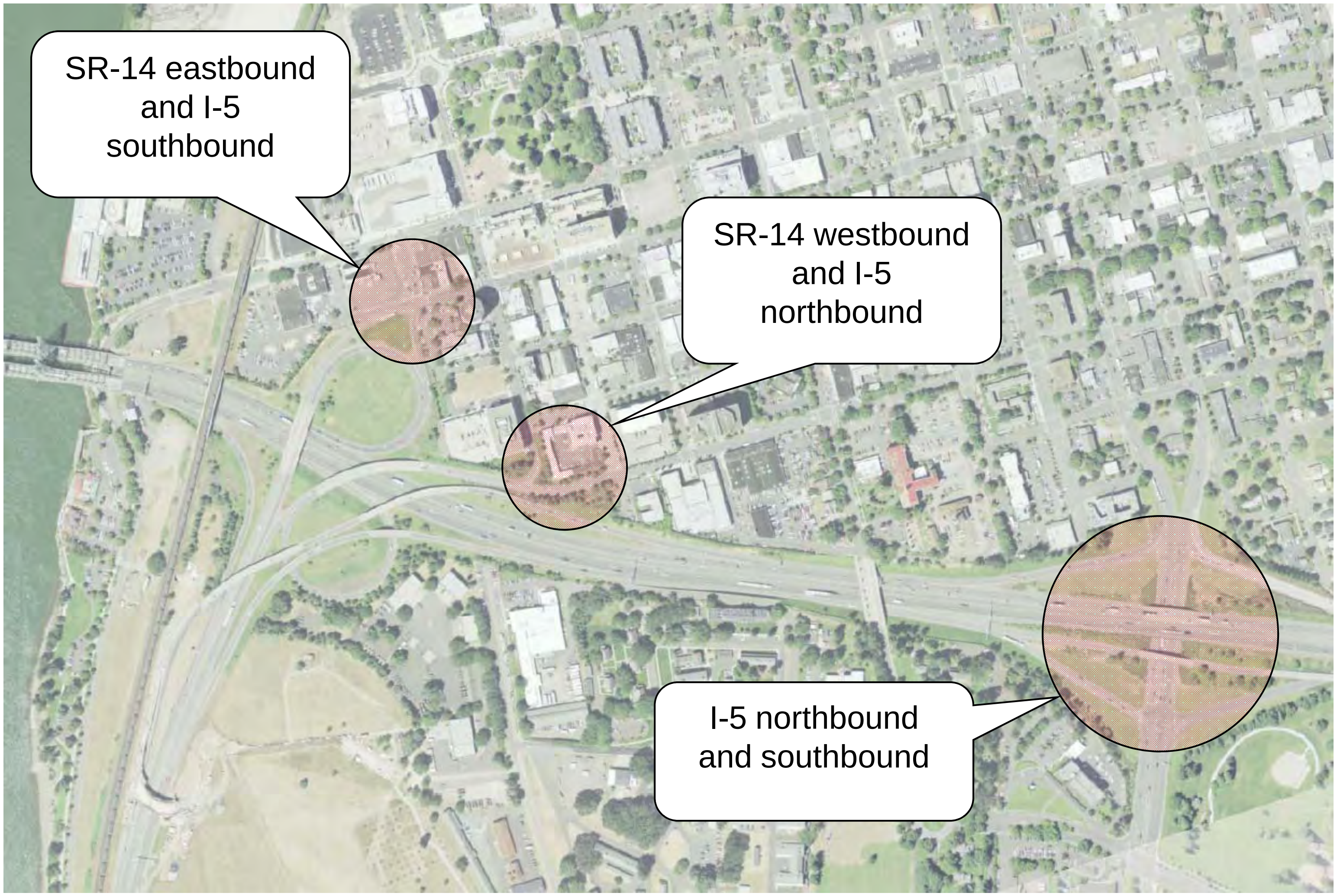
Appendix B: Remove Vancouver City Center Access Work Group Materials

Refinement Study Question:
Downtown Vancouver Access

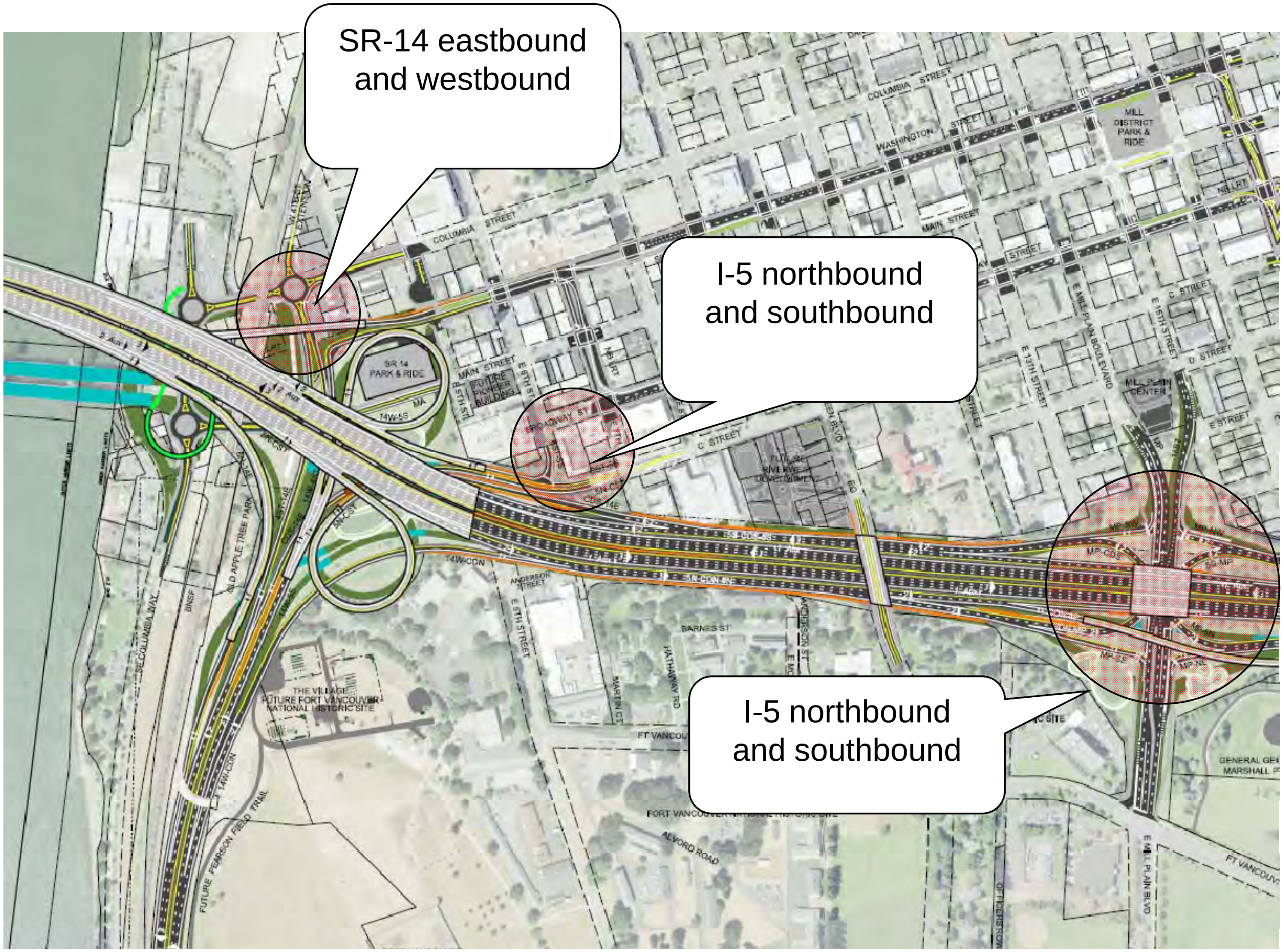
April 23

Project Sponsor Council

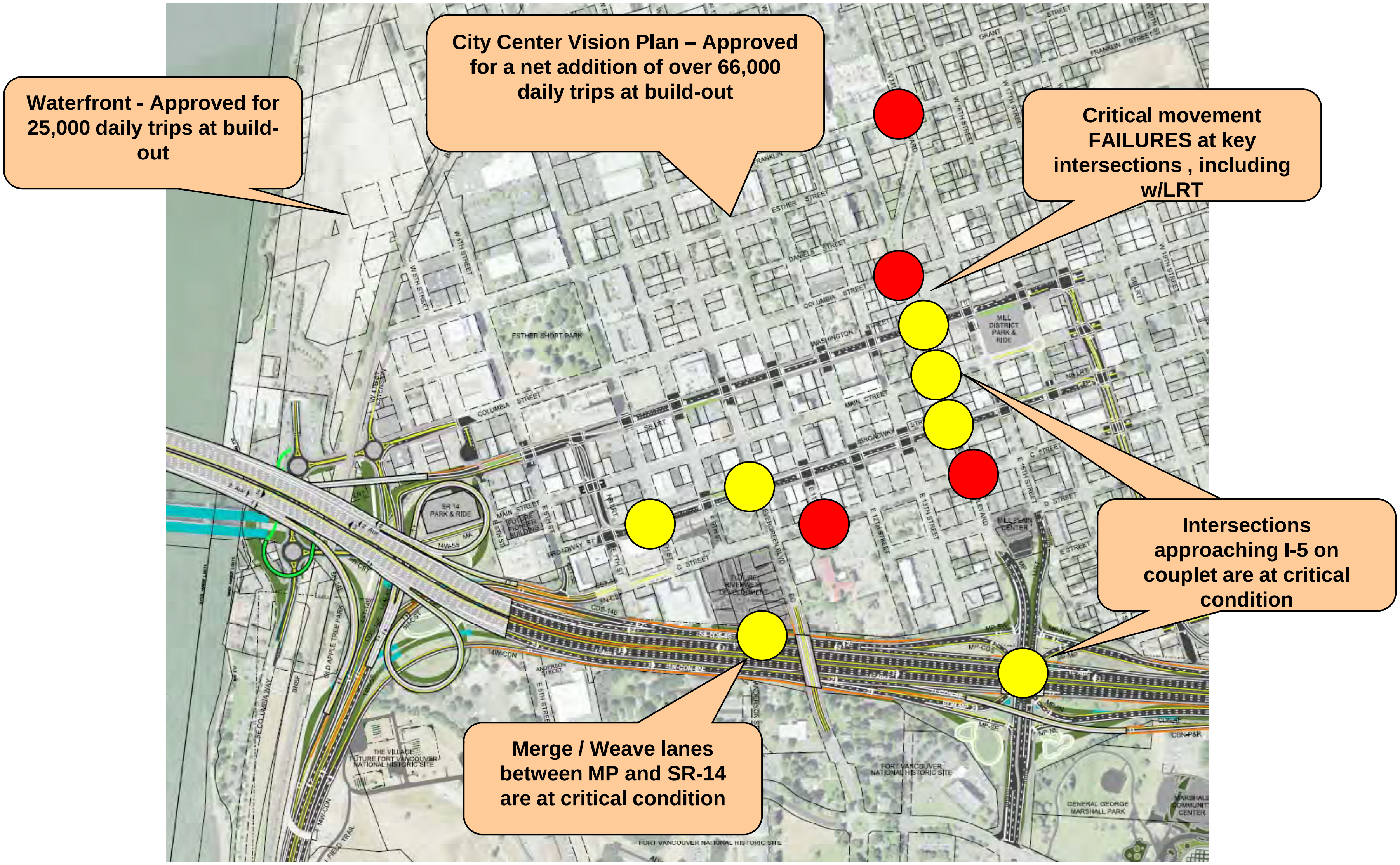
Vancouver Access - Existing



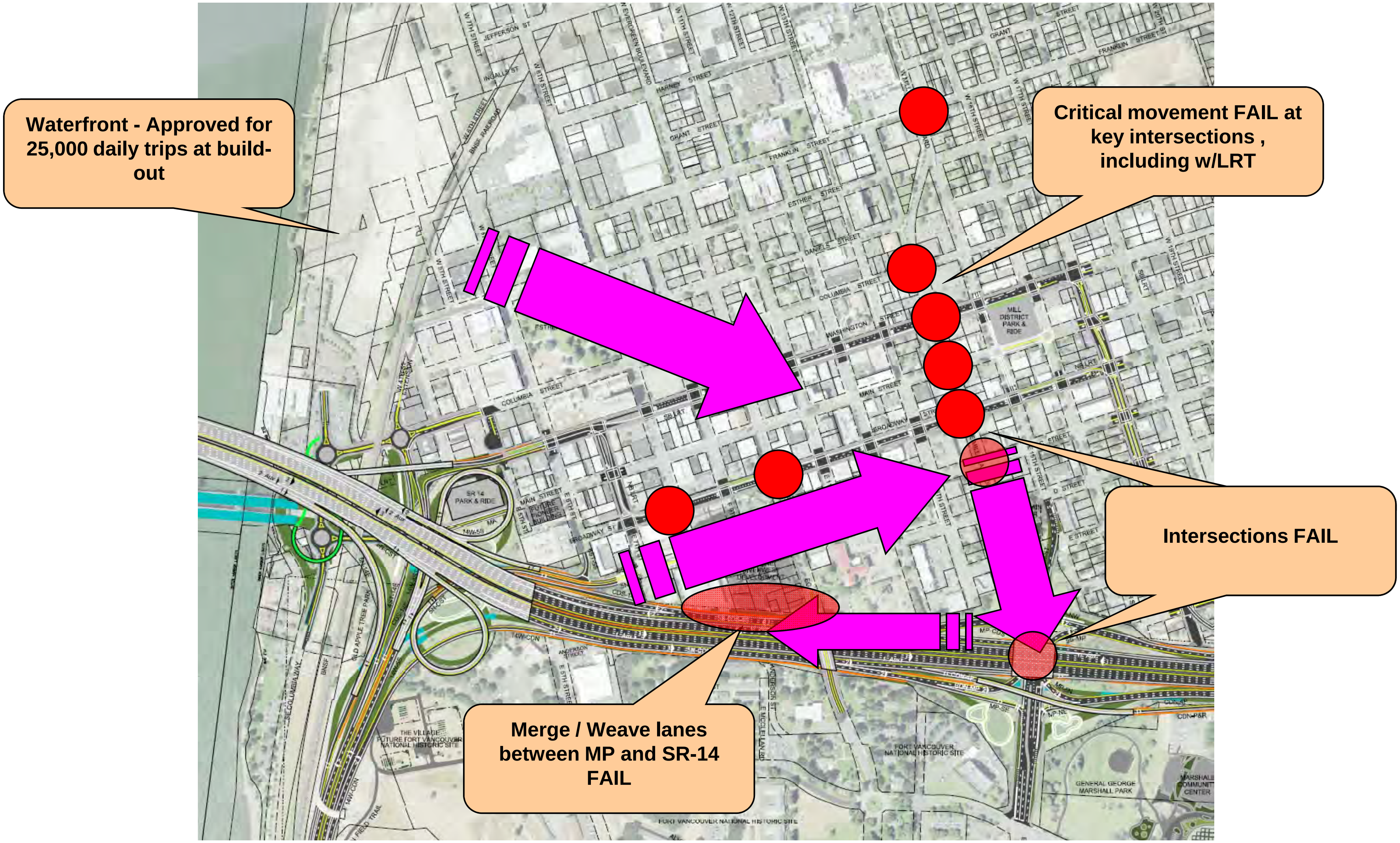
Vancouver Access - Proposed



Traffic Flows - *no ramp closure*



Traffic Flows - *with ramp closure*



Impacts of Closure

- Bridge Size
  - No effect on proposed I-5 bridge size because SR-14 and "C Street" traffic merge into Mill Plain and Fourth Plain lanes; not carried across the bridge

- Traffic Flow
  - Traffic re-routed to Mill Plain intersections causes increased failure at key intersections
  - Re-routed traffic causes more delay on Mill Plain which further impacts LRT progression due to priority for Mill Plain traffic
  - Freeway merge/weave area between Mill Plain and SR-14 degrades further creating a critical hot spot

Appendix C: Hayden Island Access Work Group Materials

REFINED LPA

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USERS OFTHIS INFORMATION SHOULD REVIEW OR CONSULT THE PRIMARY DATA AND INFORMATION SOURCE TO ASCERTAIN THE USABILITY OF THIS INFORMATION.

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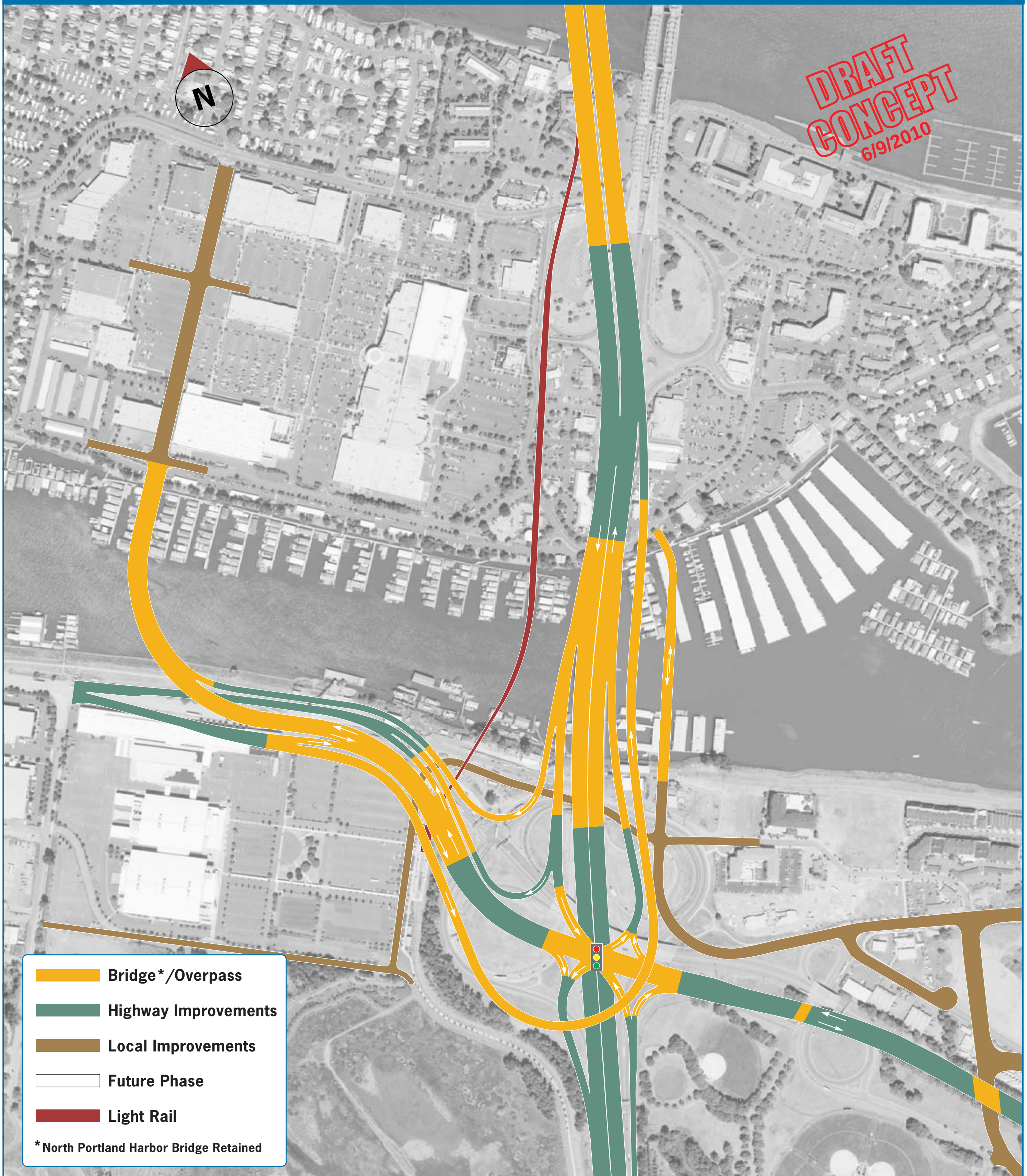
SCALE IN FEET

IPS CONCEPT #1
OFF-ISLAND ACCESS



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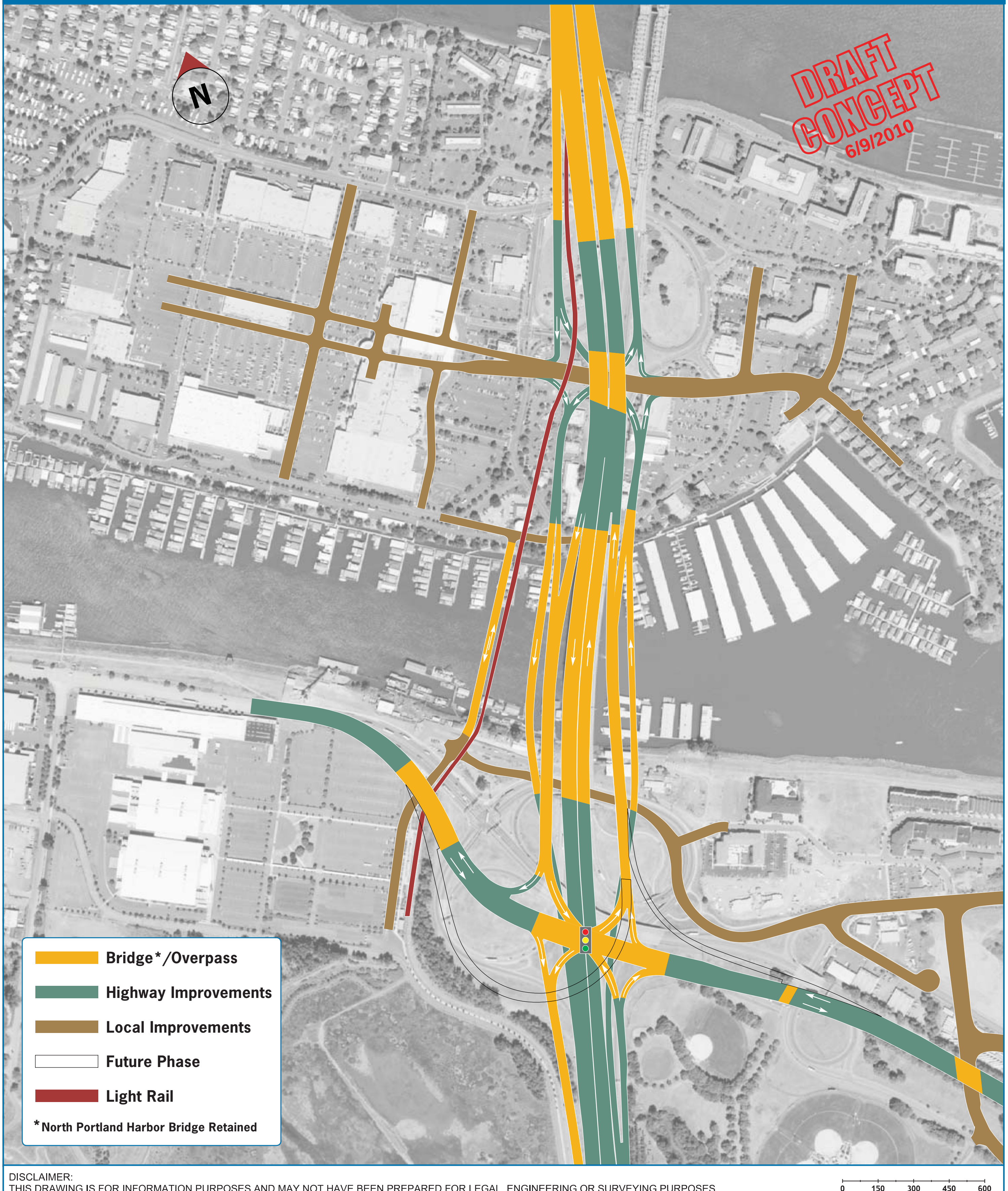
SCALE IN FEET

IPS CONCEPT #2
ON-ISLAND ACCESS



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CONCEPT A

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CONCEPT B

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CONCEPT C

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HAYDEN ISLAND DESIGN GROUP

Hayden Island Interchange – Design Options

The goal of this design exercise was to develop alternatives to provide access to Hayden Island with a reduction in the amount of structure overhead on Tomahawk Island Drive (TID) and overall footprint of the interchange of the proposed "Locally Preferred Alternative" but with comparable or acceptable functionality. The approach was to develop an alternative focused on maintaining an interchange "On-Island" with I-5and an interchange "Off-Island" providing access to Hayden Island through one or more arterial bridges and a modified Marine Drive interchange. If any option resulting from this exercise looks promising, further detailed evaluation will be required.

Description:

Locally Preferred Alternative Phase 1(LPA) – Overlapping split diamond interchange with ramps to/from the north connecting to Jantzen Drive(JD), ramps to/from south connecting to Hayden Island Drive (HID), ramps for Marine Drive to/from north crossing the island, and ramps directly to Marine Drive connecting to Hayden Island Drive. Tomahawk Island Drive has no ramp terminals.

On-Island Interchange Alternative – Single-point urban interchange focuses interchange traffic on Tomahawk Island Drive. Ramps to/from the south connect to I-5 south of Marine Drive allowing northbound Marine Drive ramps to connect to I-5 without crossing the Island. Requires inclusion of Marine Drive southbound braided ramp with Victory Blvd. southbound exit. Hayden Island Drive and Jantzen Drive have no ramp terminals. A new arterial bridge adjacent to LRT provides connection from Hayden Island to Expo Rd., continuing south to Victory Blvd. and Kenton, replacing the access to Hayden Island via the Victory Blvd. ramps to I-5.

Off-Island Interchange Alternative – Access to/from Hayden Island via an extension of Martin Luther King Blvd. across the North Portland Harbor connecting to Avenue C. Provides separate southbound off-ramps for movements to Hayden Island and movements to westbound Marine Drive. Includes the eastbound Marine Drive to northbound I-5 flyover ramp. Adds an arterial bridge east of I-5 from Jantzen Drive to local street network near Bridgeton.

HAYDEN ISLAND DESIGN GROUP

Evaluation Matrix

	Locally Preferred Alternative Phase 1 (LPA)	On-Island Interchange Alternative	Off-Island Interchange Alternative
FOOTPRINT			
I-5 Footprint on Hayden Island	I-5 and its ramps include 21 lanes over TID on 10 structures; and TID drops 14' below grade	I-5 and its ramps involve 9 lanes over Tomahawk Island Drive on 2 structures; 13 lanes over HID on 4 structures; 16 lanes over JD on 6 structures; TID is depressed 8-12' below grade	I-5 involves 11 lanes on 3 structures over TID; a new 5-lane arterial bridge is added across North Portland Harbor to Avenue C; TID drops 6' below grade
Combined width of I-5 mainline and ramp structures over Tomahawk Island Drive	540'	175'	210'

	Locally Preferred Alternative Phase 1 (LPA)	On-Island Interchange Alternative	Off-Island Interchange Alternative
TRAFFIC			
Interchange Spacing	Close interchange spacing is handled by routing Marine Drive ramps to/from the north by bypassing Hayden Island interchange	Close interchange spacing is handled by routing Hayden Island ramps to/from the south by bypassing Marine Drive interchange	Close interchange spacing is handled by removing the Hayden Island Interchange and routing traffic through Marine Drive interchange
Regional Circulation	Regional traffic to Hayden Island is distributed between Hayden Island Drive and Jantzen Drive	Regional traffic to Hayden Island is concentrated on Tomahawk Island Drive	Regional traffic to Hayden Island is through out-of-direction access via Marine Drive Interchange and concentrates traffic on Avenue C
Local Circulation Concept	Tomahawk Island Drive is a local street	Hayden Island Drive and Jantzen Drive are local streets; Adds a new local street from Jantzen Drive to Bridgeton/Expo area	Hayden Island Drive, Jantzen Drive and Tomahawk Island Drive are local streets; adds a new local street from Jantzen Drive to Bridgeton/Expo area

	Locally Preferred Alternative Phase 1 (LPA)	On-Island Interchange Alternative	Off-Island Interchange Alternative
TRAFFIC (continued)			
Freight Access	Marine Drive interchange provides effective freight access	Marine Drive interchange largely unaffected except truck traffic to Marine Drive mixes with traffic to/from Hayden Island on Marine Drive off-ramps	Traffic to/from Hayden Island mixes with truck traffic through Marine Drive interchange except critical truck movements to/from the north on separate ramps; new local bridge east of I-5 mixes Hayden Island traffic with local streets and truck traffic near Jubitz
Bike/Pedestrian Circulation	Pedestrian District west of I-5 is intact; Hayden Island Drive, Tomahawk Island Drive and Jantzen Drive provide access under I-5; regional bike connection from Oregon to Washington provided adjacent to LRT	Pedestrian District west of I-5 is bisected by a high volume Tomahawk Island couplet; Hayden Island Drive, Tomahawk Island Drive and Jantzen Drive provide access under I-5; regional bike connection from Oregon to Washington provided adjacent to LRT	Pedestrian District west of I-5 is impacted by a high volume Avenue C; Hayden Island Drive, Tomahawk Island Drive and Jantzen Drive provide access under I-5; regional bike connection from Oregon to Washington provided adjacent to LRT

	Locally Preferred Alternative Phase 1 (LPA)	On-Island Interchange Alternative	Off-Island Interchange Alternative
IMPACTS			
SuperCenter and other retail impacts	Compatible with short and long-term SuperCenter redevelopment plans	Requires further assessment and refinement to determine compatibility with SuperCenter short and long-term redevelopment plans	Threatens SuperCenter short and long-term redevelopment plans due to indirect I-5 access and high volume traffic on Avenue C; threatens viability of businesses east of I-5 due to indirect I-5 access
Is Safeway displaced?	Yes	Yes	May be partially displaced and indirect I-5 access impacts long-term viability
Likelihood of replacement of full service grocery store	Possible	Maybe	Developer states highly unlikely due to indirect access
Access to properties	Access limits on JD and HID impact businesses	Access limits on TID east and west of I-5 and on JD east and west of I-5 impacts businesses	Access limit on Avenue C may impact possible intersection/residential access at Ave. C and JD
Business displacement adjacent to I-5 on Hayden Island	29	Similar to LPA	Displacements west of I-5 dependent on LRT alignment
Floating Home / Moorage Impacts	Limits impacts to the vicinity of I-5	May have additional displacements for new street connection adjacent to LRT west of I-5	Has additional displacements and impact area at Avenue C; will have additional displacements for new street connection east of I-5

	Locally Preferred Alternative Phase 1 (LPA)	On-Island Interchange Alternative	Off-Island Interchange Alternative
IMPACTS (continued)			
Marine Drive land uses west of I-5	No significant impact	New bridge connection from Hayden Island to Expo Road adds traffic between LRT and Expo	Alignment and expanded footprint to accommodate weave movements west of I-5 impact Expo and **would** require relocation of Diversified Marine and Ross Island Sand & Gravel
LRT Alignment	Alignment partially elevated adjacent to I-5 with station focused on Tomahawk Island Drive; 14'+/- above adjacent land	Alignment elevated adjacent to I-5 with station near Jantzen Drive; 20'+/- above adjacent land	More flexibility to adjust alignment east and west
Footprint in-water / Biological Assessment	Three new structures in North Portland Harbor	Additional ESA impacts from six new structures in North Portland Harbor	Additional ESA impacts from five new structures in North Portland Harbor
Construction schedule		Overall longer construction duration due to in-water construction	Overall longer construction duration due to in-water construction
Construction Cost		Trending higher but requires further evaluation	Trending higher but requires further evaluation
Hayden Island Plan	Neighborhood retail center east of I-5 needs to be revisited in HI Plan	HI Plan would need to be revisited	HI Plan would need to be revisited

DRAFT Memorandum

June 21, 2010

TO: Project Sponsors Council and Integrated Project Sponsors Council Staff

FROM: Columbia River Crossing Communications and Outreach Team

SUBJECT: **SUMMARY OF COMMENTS FROM JUNE 14 PUBLIC MEETING ON HAYDEN ISLAND INTERCHANGE CONCEPTS**

Background

The Integrated Project Sponsors Council Staff (IPS) was charged with developing two concepts for a re-designed interchange on Hayden Island, including both a refined on-island interchange, as well as a design that would remove the interchange and provide alternative off-island access. These concepts were presented at a Project Sponsors Council (PSC) workshop on June 11 and were the subject of a June 14, 2010 public comment session on Hayden Island. The event was attended by 146 members of the public and 30 people provided verbal testimonies. Thirty two written comments were also submitted.

This memorandum provides a summary of verbal and written feedback provided to the PSC Co-Chairs on June 14, 2010, regarding these interchange concepts from Hayden Island residents and businesses, residents of nearby neighborhoods, and businesses on Marine Drive west of I-5. Additional comments pertaining to other aspects of the project were also provided at the public meeting; these comments are not included in this summary but will be made available to PSC members for review at their future meetings.

Comments specific to Hayden Island interchange concepts

Refined Locally Preferred Alternative (Phase 1 LPA)

On-island development

- SuperCenter redevelopment plans are premised on Hayden Island Plan, its relationship to the Columbia River Crossing, and the type of access the LPA provides- adequate access that is convenient, safe, easily understood, and connected to local movements. Efficiency of access required to redevelop the SuperCenter is a primary consideration. Recently advanced alternatives do not respond to this need for access.
- The Refined LPA appears to be a lot of infrastructure for an already developed island. The island is not creating the traffic and only has so much room to expand.

Residential/community impacts

- LPA has been a product of Jantzen Beach moorage participation in the planning process. Delay and potential redesign creates uncertainty for homeowners and affects property values/ability to sell.
- LPA footprint is too large and needs to be reconsidered.

General support

- Want to see the project move forward.
- LPA provides simplest access from Vancouver.

360/737-2726 503/256-2726 WWW.COLUMBIARIVERCROSSING.ORG 700 WASHINGTON STREET, SUITE 300, VANCOUVER, WA 98660

IPS Concept #1- Off Island Access

On-island development

- Isolates the island and reduces economic viability for all on-island businesses.

Marine Drive land uses west of I-5

- Impacts Metro's Expo Center including increased land taking; a new building taking; significant reduction in revenue producing event parking/exterior exhibit space capacity; compression of event ingress/egress, freight mobility and local traffic circulation interests; and negative impacts to the Expo Center's long-term site improvement interests.
- Expo Center impacts would affect event producers by displacing parking that is already beyond capacity for events. Events draw many people from out of town and support the local economy.
- Diversified Marine, Inc. would be displaced and blocked by a west arterial bridge. This business generates $10 million annually and employs 50; has a unique site without relocation options that provide calm, deep water, and upland access; and contributed to Marine Drive Stakeholders group and was not invited to participate in Portland Working Group or Hayden Island design group.
- Ross Island Sand & Gravel is uniquely situated next to I-5 and receives shipments via barge. Alternative locations for these operations are non-existent in the region. Off-island option and other hybrid options may displace or restrict access to their plant. Ross Island Sand and Gravel generates $7.8 million in annual revenue and employs 25.

Residential/community impacts

- Jantzen Beach Moorage residents said that a west arterial bridge will displace more homes, divide floating home community into three, lower property values, impact livability, and increase traffic in their vicinity.
- An additional low bridge will impact navigation in North Portland Harbor. Resident has a sailboat with a large mast that would not be able to pass without a lift span.

General support

- Off-island access promotes Hayden Island neighborhood connectivity, reduces interchange footprint, and provides local access to services on and off the island.

Concept #2- On-island Access

Marine Drive land uses west of I-5

- On-island option may displace a potential Diversified Marine replacement area and their office building.

Residential/community impacts

- Tomahawk Island Drive should not go to 6-8 lanes.

General support

- Support this interchange design; keep it as simple as possible.
- Concept appears to be the best of the options; direct access but smaller footprint and impact.

Other comments related to Hayden Island interchange design

Alternative interchange concepts

- Create arterial connection to Hayden Island on the east side of I-5.
- Combine light rail bridge and arterial access to Hayden Island; provide two-lane arterial access on both sides of I-5 as well as on/off ramps on Hayden Island in lieu of ramps to/from from Marine Drive.
- A modified off-island access option could avoid the problem of displacing Diversified Marine if Marine Drive access were located further to the south.
- Any hybrid design with a western bridge less than 70 feet will displace Diversified Marine operations.
- General support for hybrid design that combines elements of the best designs.

Neighborhood impacts

Floating home moorage

- Project should reference a "relocation pricing model" study when assessing impacts and compensation to floating homes.
- Any arterial access bridge should be on the east side of I-5 and impact boat garages, not homes.

Connectivity

- General support for north-south connectivity between Hayden Island and Bridgeton, East Columbia, and Kenton neighborhoods.
- Services are shared between island and nearby residents, including Safeway, Lowes, Hayden Meadows Veterinary Services, Home Depot, US Bank, Target, and North Portland Library.
- Important to have a separate Marine Drive arterial; makes Marine Drive a much more residential road. Arterial crossing would enhance quality of life for more than 200 condominium residents in the area and improve connections to hotel and recreational businesses.

Relocation/construction impacts

- Be attentive to the issues this project creates:
    - During initial stages: Property takings, relocations of residents and businesses, and maintenance and security of vacant properties.
    - During construction: access to, from, and around the island; noise; air quality; public transportation.
    - After construction: conversion of excess property to public use or private redevelopment, transitional issues.

On-island services and development

- Interchange option should retain or replace grocery/pharmacy amenities. Many citizens cannot drive off the island.
- Hayden Island residents access services off of the island; nearby neighborhoods access many stores and services on the island.
- Interchange option should be attractive and incorporated to SuperCenter. The population of Hayden Island is too small to support the local services needed (and depends on regional connectivity).

Freight mobility

- Access for truck traffic needs to be addressed.

DRAFT Memorandum

July 2, 2010

TO: Project Sponsors Council and Integrated Project Sponsors Council Staff

FROM: Columbia River Crossing Communications and Outreach Team

SUBJECT: **SUMMARY OF COMMENTS FROM JUNE 29 PUBLIC MEETING ON HAYDEN ISLAND INTERCHANGE CONCEPTS**

Background

The Integrated Project Sponsors Council Staff (IPS) was charged with developing concepts for a re-designed interchange on Hayden Island, including both a refined on-island interchange, as well as a design that would remove the interchange and provide alternative off-island access. Initial concepts were presented at a Project Sponsors Council (PSC) workshop on June 11 and were the subject of a June 14, 2010 public comment session on Hayden Island.

Concepts were further revised based on feedback received and again shared with PSC members at their June 25 workshop. A second public meeting was held on June 29 to share these refinements with the public and gather additional input. The event was attended by 102 members of the public and 30 people provided verbal testimonies. About forty written comments were also submitted.

This memorandum provides a summary of verbal and written feedback provided to the PSC co-chairs on June 29, 2010 from Hayden Island residents and businesses, residents of nearby neighborhoods, and businesses on Marine Drive west of I-5. Additional comments pertaining to other aspects of the project were also provided at the public meeting; these comments are not included in this summary but will be made available to PSC members for review at their future meetings.

Comments specific to Hayden Island interchange concepts

Refined Locally Preferred Alternative (Phase 1 LPA)

Residential/community impacts

- The wide area underneath the freeway and ramps on Tomahawk Island Drive is a public safety concern.
- The LPA is far too much structure for the island to support.
- Support LPA improvements for bicycle and pedestrians, light rail, park uses at the light rail station, and safety improvements.
- Helping the SuperCenter is the best way to save Safeway and increase livability of the island. Residents need these services.
- The LPA solves the most problems for most people, including people off of the island in Vancouver and Bridgeton.

On-island development

- Access that is proximate, quick and easy, and understandable is key to retaining commercial tenants at the SuperCenter. An extension of Tomahawk Island Drive will allow for a grid pattern of streets that supports site redevelopment. The LPA provides the best access to the SuperCenter; other options will not work. The SuperCenter's redevelopment plan has relied on a relationship to the Haden Island Plan. Certainty is another key to retaining existing tenants and attracting new tenants.

Marine Drive land uses west of I-5

- The LPA meets Diversified Marine's needs, although it would require more out-of-direction travel for access to and from I-5. The LPA allows access to undeveloped land south to replace storage and parking areas that will be lost and does not displace their offices or shipyard.

IPS Concept #1- Off Island Access

Residential/community impacts

- A west arterial bridge over the Jantzen Beach Moorage will affect the viability of the floating home community. It will reduce property values and devalue the community's lifestyle.
- Hayden Island Livability Project supports the off-island interchange. Reasons stated include: lessens the footprint of the highway system, spreads traffic volume out, improves the street systems where the elderly walk, includes the Hayden Island as a part of the City of Portland with the extension MLK Jr. Blvd. onto the island, fits with the Hayden Island Plan's vision of making the area a residential district provides alternative access without use of the freeway, provides quick access to the manufactured home community, and supports more pedestrian-friendly streets.

Marine Drive land uses west of I-5

- The off-island option will eliminate Diversified Marine. Diversified Marine generates $10M in annual sales and supports 50 family wage jobs. It is the only tugbuilder in the Portland area; maritime businesses and public agencies who use these services will have to go out of the region to find similar services.
- West bridge options would likely displace Ross Island Sand and Gravel's Vanport Plant.

Concept #2- On-island Access

Marine Drive land uses west of I-5

- This alternative could eliminate Diversified Marine. The new roadway along the light rail alignment will displace their office and will consume land needed for storage and parking.

Concept A

Marine Drive land uses west of I-5

- This alternative could eliminate Diversified Marine. The new roadway along the light rail alignment will displace their office and will consume land needed for storage and parking.

General comments

- Concept A is too much like the LPA- same spaghetti and ramps in the air.

Concept B

Marine Drive land uses west of I-5

- This alternative best meets Diversified Marine's needs. It allows for access to undeveloped land south to replace storage and parking areas that will be lost and does not displace their office of shipyard. It also allows more direct access to and from their site from I-5.

General comments

- Concept B seems to minimize the footprint on the island the best.
- Support the direct connection from Hayden Island to Marine Drive.
- Support connections to Bridgeton and East Columbia neighborhoods.

Other comments related to Hayden Island interchange design

Alternative interchange concepts

- Suggested changes to Concept B: the edge of northbound lanes should stay where they are to keep Safeway, or move Safeway across the street; take on- and off-ramps from the north and move to the south; move the light rail line closer to off-island ramp; don't build a road underneath the freeway, make it open park with a public boat launch and give residents an open space park; put three lane bridges on and off the island to promote better traffic.

Neighborhood impacts

On-island services

- Island residents need a pharmacy, fresh food, and emergency services.

Bicycle and pedestrian connectivity

- Island residents need walkability and bicycling,
- The island needs a shuttle that can take residents to the train. Streets and sidewalks are inadequate.
- Concern for maintenance of community streets and sidewalks. You currently cannot walk across the island without crossing private property. This is a safety issue.
- Pedestrian and bicycle connectivity are important for seniors and people with disabilities who live on the island and have no vehicle.

Vehicle access and connectivity

- Current access on and off of I-5 is not a problem; the only access problem is the backup on the bridge.
- Value access on and off the island without having to use the freeway.
- Strongly support a separate and local connection for Hayden Island to North Portland to ease local traffic during rush hour and to provide an escape route if there is a need to evacuate the island.
- A local arterial bridge benefits congestion by keeping local traffic off the I-5 interchange and bridges
- An arterial bridge will benefit the local economy by providing rapid access to shopping and restaurants from several North Portland neighborhoods.

Footprint

- Prefer the smallest footprint option on the island.

Relocation/construction impacts

- The project should focus on impacts during construction and after construction.
- Make sure emergency services can get through when they are needed.
- Not concerned about the impacts on floating homes; have heard that there is a good chance they will be relocated.
- Not concerned about the loss of businesses; they will be compensated for their losses.
- If moorage property is taken, owners can still keep their homes, but there is no place to move them to. It is unknown how the federal government will compensate homeowners as there is no precedent for this type of taking. It is uncertain at this point whether another moorage will be built.

Land uses

On-island development

- The Hayden Island Plan calls for a viable commercial center and acknowledges the importance of redevelopment. The SuperCenter has begun the first stage of redevelopment and will be filing a pre-application outlining details of the first steps for the site, which include demolition and replacement of relocated and new tenants.
- It is important to have commerce on the island and for the SuperCenter to be viable.
- The Interchange Access Management Plan (IAMP) is a broad policy statement with respect to ingress and egress. It provides no certainty as to how properties will develop. Commercial redevelopment requires certainty as to who can go where and where traffic will be.
- We must be concerned with the shopping center. The island will not be livable if there's no place to shop, no grocery, and no pharmacy.
- The Hayden Island Plan recommends a substantial amount of acreage for non-residential uses, new commercial and mixed-use development along the I-5 corridor, promotes access to and from I-5 for the island, and calls for substantial new road development on the island.
- Hayden Island should be more of a residential and less of a commercial area.
- The "big box" mentality needs to go away.
- Don't worry about shopping center. Do worry about Safeway loss.

Marine Drive land uses west of I-5

- The Hayden Island Plan promotes the marine industry and is a subset of the City's Comprehensive Plan. The south side of North Portland Harbor where Diversified Marine is located is designated as an industrial sanctuary.
- Ross Island Sand & Gravel remains concerned that alternative options could either displace or limit access to the Vanport Plant.

Environmental impacts:

- Concern about the number of piers in the new alternatives and how they will affect Portland's ability to meet its Endangered Species Act obligations.

Design process

- The Hayden Island Manufactured Home Community includes approximately 1400 residents, more than half of the total island population. HILP wants assurances from the Project Sponsors Council that they will serve the many and not the few.
- The speed of the process has led to failure. The process has focused on the negative aspects of designs and moved past them without discussing how they could be made better.
- At the HIDG meetings, HILP was represented but did not participate. They brought no designs to the table. The day the City suggested the western bridge there was no HILP comment. Design process has been fair and open with an equal opportunity to participate.
- The comment stating that HILP did not contribute the design process is misrepresentative. The commenter was the original HILP representative for the Hayden Island Design Group. HILP members are not qualified to contribute to technical discussions.

Appendix D: Alternative 10-Lane Bridge Work Group Materials

City of Portland
CRC Design Refinements
Flexible Service Work Order

DRAFT FINAL
FINDINGS REPORT

July 7, 2010

Work Order No. 36670-1

URS

Cover photograph: Interstate I-5 Bridge
Courtesy of Columbia River Crossing Project
columbiarivercrossing.org

City of Portland
CRC Design Refinements

Flexible Service Work Order
No. 36670-1

DRAFT FINAL
FINDINGS REPORT

July 7, 2010

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Paul Wells
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Appendix B: Exhibit A, Detail of NB Hayden Island Entrance
If Carried As Auxiliary Lane

Appendix C: Traffic Operations Review Methodology and
HCS/HCM Segmentation Analysis Worksheets

EXECUTIVE SUMMARY OF FINDINGS

BACKGROUND

The purpose of the URS effort is to aid the City of Portland in its evaluation and decision making relative to the Columbia River Crossing (CRC) project. One of the City's goals is to ensure that the CRC is designed and constructed in a way that maximizes benefits for the least cost. The URS efforts involve analysis of CRC data, designs and strategies, providing findings and considerations from that analysis and offering design concepts that address or capture benefits from that analysis. Our work has been performed at a concept planning level and does not include redesigning the project.

CRC PROPOSAL

- The current CRC LPA Full Build proposal calls for a 12-lane river crossing with inside and outside shoulders as narrow as 8 feet.
- Initially, the bridges would be striped for a total of 10 lanes over the Columbia River.
- The CRC staff conducted traffic analysis of both options: 10- and 12-lane river crossings.

FINDINGS

10-LANE PERMANENT BRIDGE PERFORMS COMPARABLY TO 12-LANE BRIDGE

- Summary Table 1 indicates similar performance characteristics at the bridge between a 12-lane main span (CRC LPA Full Build) and a 10-lane main span (CRC LPA Phase 1).
- If improvement elements included in the Full Build alternative, separate from the main span configuration, were added to a 10-lane main span bridge, similar performance characteristics would be expected. As a value engineering concept, the 10-lane bridge would offer similar performance at a lower cost.
- URS has offered two alternative methods of developing a 10-lane bridge, one for northbound and one for southbound. These alternatives could result in improved traffic operations, but further VISSIM analysis would be needed to confirm this. The CRC staff is currently conducting a VISSIM analysis of the proposed URS southbound option.
- The URS concepts for a permanent 10-lane river crossing include 12'-wide inside and outside shoulders in light of American Association of State Highway and Transportation Officials (AASHTO) standards for freeways with six or more lanes carrying 250 more trucks per hour. I-5 meets this criterion.
- More aggressive traffic demand management (TDM) measures, beyond those already included in the CRC proposal, would improve the performance of the I-5 system with a 10-lane river crossing design.

Summary Table S-1: Performance Characteristics
of the No-Build, CRC LPA Full Build and CRC LPA Phase 1 Alternatives

Performance Measure	Direction	Location	No-Build (NoB)	CRC 12 Lane LPA Full Build (FB)	CRC 10 Lane LPA Phase 1(Ph 1)
Hours of Congestion	I-5 SB	Bridge	7.25	3	3.5
		I-405 split	11	8.25	Similar to FB
		Rose Q lane drop		3.75	Similar to FB
	I-5 NB	Bridge	7.75	<2	Similar to FB
		I-405/Rose Q weaving		Similar to NoB	Similar to NoB
		Marquam Bridge		Similar to NoB	Similar to NoB
Travel Time 2-Hour Peak (minutes)	I-5 SB (AM)	SR 500 to Columbia Blvd	19	18	18
		179th to I-84	46	38	38
		SR 500 to Marine Dr		50% imp vs NoB	Similar to FB
		SR 14 to Marine Dr		13% imp vs NoB	Similar to FB
		Mill Plain to Marine Dr		9% imp vs NoB	Similar to FB
	I-5 NB (PM)	Columbia to SR 500	14	6	6
		I-84 to 179th	44	24	24
I-5 Throughput (4-hour peak)	I-5 SB (AM)	SR 500 interchange		24% increase over NoB	Similar to FB
		Bridge	Demand similar to LPA	4% increase over NoB (98% demand served)	Similar to FB
		I-405 split	90% demand served	1,200 more than NoB (90% demand served.)	Similar to FB
	I-5 NB (PM)	North of I-405	Demand similar to LPA	30% increase over NoB	Similar to FB
		Bridge		40% increase over NoB	Similar to FB
		Near SR 500		12,400/51% more	Similar to FB
Ramp Throughput (4-hour)	I-5 SB (AM)	# of on-ramps with unserved volumes	3	0	1
	I-5 NB (PM)	# of on-ramps with unserved volumes	5	1 (Mill Plain)	1 (Mill Plain)
Person Throughput (4-hour)	I-5 SB (AM)	Bridge		29,500 (19% more than NoB)	28,600 (15% more than NoB)
	I-5 NB (PM)	Bridge		35,300 (33% more than NoB)	Similar to FB
Managed Lanes				Both flexible to allow future managed lane(s)	
Accidents		Bridge Influence Area (BIA)	750/year	200/year	Similar to FB

Data Source: *Interstate 5 Columbia River Crossing Draft Traffic Technical Report*, March 2010

8-LANE PERMANENT BRIDGE

An assessment of a potential 8-lane main span bridge indicated the following:

- Northbound: Using the Highway Capacity Manual (HCM) methodology, the northbound volume-to-capacity ratio (V/C) for a four-lane configuration in 2030 would be greater than 1.0, indicating a breakdown in flow.
- Southbound: In a four-lane configuration, the freeway segment between the SR 14 entrance and the Hayden Island exit would likely contain a weaving area less than 2500 feet in length. Using HCM methods to evaluate this location, V/C for this segment in 2030 would be 0.98, which would be at capacity and breakdown of flow.
- Up to seventy-eight (78) percent of the projected demand in 2030 could be accommodated in a four-lane configuration. The remaining 22 percent of demand would need to be addressed through management strategies. The following items are among several that would need to be pursued and achieved:
  - A full complement of aggressive TDM measures beyond those already planned for the project (see List 1 on page 4)
  - A more aggressive tolling strategy than the one used in the CRC DEIS (e.g., “Tolling Scenario 1E” described in List 1)
- If these traffic demand volume reductions were deemed achievable, it would be necessary to develop an 8-lane facility concept design and perform an operational analysis including weave/merge/diverge movements.

HAYDEN ISLAND INTERCHANGE RELOCATION WOULD IMPROVE INTERCHANGE SPACING ON I-5

The relocation of the Hayden Island interchange would assist the operational performance of the I-5 main span bridge regardless of the number of lanes of the main span. Relocating the Hayden Island interchange function to the Marine Drive interchange would increase interchange spacing to 1 mile between Marine Drive and SR 14, which is the Federal Highway Administration’s (FHWA’s) recommended minimum urban interchange spacing. Various options for relocating or modifying the Hayden Island interchange are currently under consideration.

COMPARISON OF LOWER COST OPTIONS

- One lane eliminated in both directions (thereby producing a 2-lane reduction) could be expected to produce an approximate $50 million savings on the main and approach spans (10-lane span with standard width shoulders compared to a 12-lane span with standard shoulders)
- A cost comparison between a 12-lane span with narrow shoulders (CRC LPA Full Build) and a 10-lane span with standard width shoulders (12’) would show a lower cost savings than the figure mentioned above. This is because a full 24’ narrowing (corresponding to the $50 million cost savings figure) would not be realized despite the elimination of two 12’ lanes (one in each direction). Widening each of the 4 shoulders to 12’ would add back 16’ of bridge width.
- Further costs would likely be saved elsewhere in the bridge influence area closest to the main span (e.g., southbound lane reduction across Hayden Island)

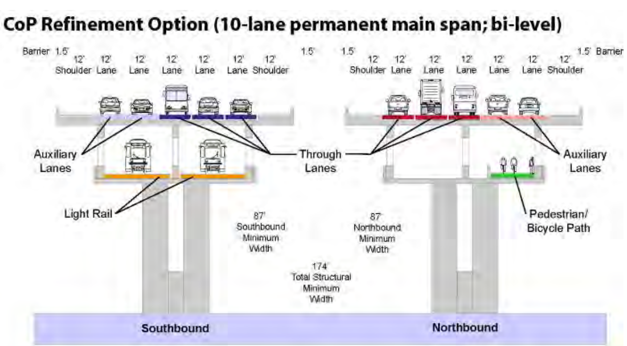


Figure S-1
Cross Section of City of Portland Refinement Option (10-lane bi-level main span)

DOWNSTREAM CONGESTION WOULD IMPACT CRC PROJECT PERFORMANCE SOUTHBOUND IN A.M. PEAK PERIOD

A comparison of the speed profiles for the A.M. peak period southbound for the No-Build, the 10-lane and the 12-lane alternatives is provided on page 5. A detailed explanation of the speed profile diagrams is contained in the CRC Draft Traffic Technical Report, March 2010.

- Backups on I-5 south of the CRC project area will negatively affect I-5 A.M. peak southbound performance in the CRC project area in 2030 (CRC VISSIM speed profile analysis shows speeds of less than 20 mph in the project area); this backup condition also masks, in the speed profile diagrams, the performance of the 10- and 12- lane bridges in the project area.
- There are no appreciable differences visible in the speed profiles between the CRC 12-lane proposal and the 10-lane proposal; both show significant improvements over the performance of the No-Build alternative.

TRUCK MOBILITY

- Truck mobility was considered in options conceived, examined and tested.
- It is suggested that CRC staff prepare a set of Freight Design Guidelines that would be applicable during final design. These guidelines would be adopted as mitigation measures in the Final EIS and would be targeted at major freight interchanges/crossroads: Marine Dr., Mill Plain and SR 14.

List S-1: Demand Reduction Strategies

Post-Construction TDM Program – The CRC's TDM Working Group has developed initial projections for a post-construction phase TDM program that would promote a range of alternatives to single occupant commuting. Among the strategies evaluated were:

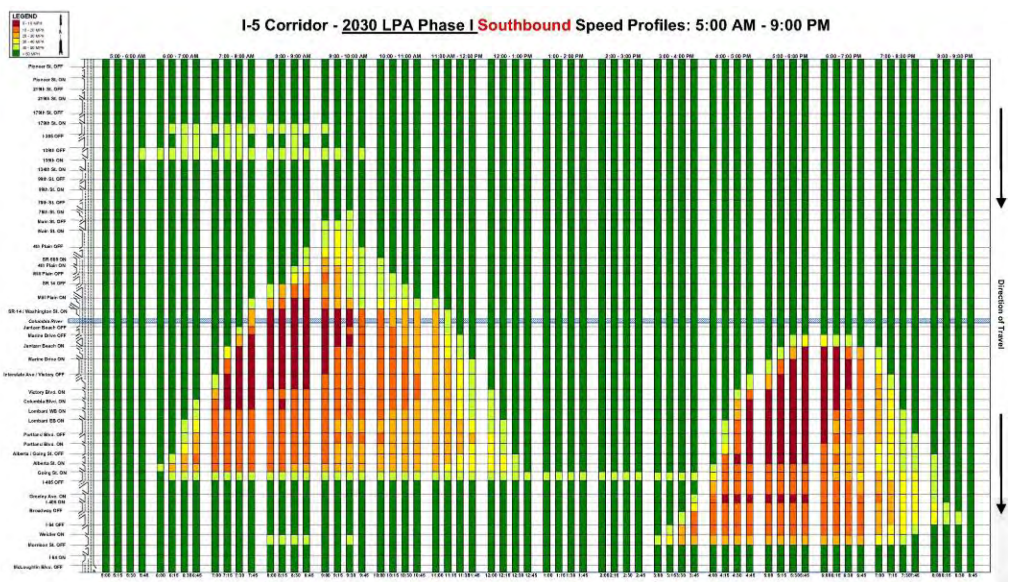
- Carpooling – Increase the proportion of carpool trips in the I-5 corridor near 2005 levels through employer outreach and, potentially, zero tolls for carpools (and vanpools).
- Public Transit – Increase C-TRAN transit service consistent with the proposed C-TRAN long-range plan with 82 peak period buses crossing the bridge. The committee made the conservative assumption that there would be no increase in LRT trips.
- Vanpooling – Expand the vanpool program with 103 Washington-Oregon vanpools in operation.
- Telework – Encourage employers and employees to take advantage of telework. Technology advances may make these projections low.
- Compressed Work Week – Change from traditional 5 day to 4 day schedule.

Preliminary estimates from the TDM Working Group indicate that a moderately comprehensive post-construction TDM program could yield promising reductions in vehicle trips during the 2030 peak 4-hour period and additional reductions are expected by also waiving tolls for carpools/vanpools. These reductions would be beyond those assumed in the DEIS. An upcoming CRC TDM report is expected shortly.

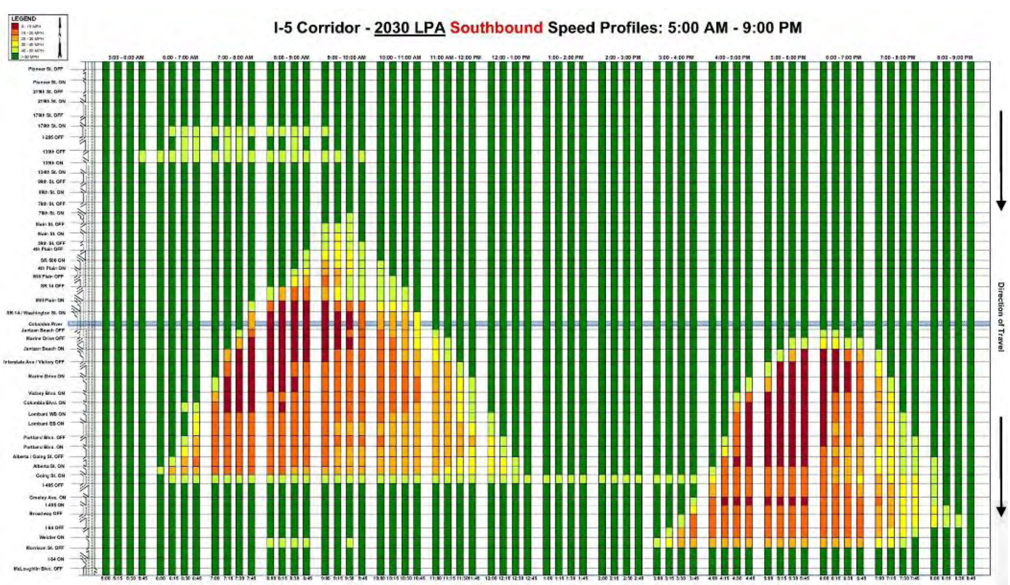
Tolling Scenario 1E – Among the tolling scenarios developed by the CRC Tolling Study Committee, Scenario 1E would implement a variable rate structure that is 1.5 times the rates assumed in the Draft EIS. Peak hour rates would increase from $2.00 to $3.00. The committee's findings indicate that daily traffic on I-5 would decrease from 181,000 under the Draft EIS tolling structure to 154,000 under Tolling Scenario 1E, a reduction of 15 percent.

CRC project staff provided additional traffic information regarding Scenario 1E and its potential effects on peak hour travel. At the bridge, the northbound P.M. 4-hour demand volume for Scenario E is estimated to be 27,460 vehicles compared to 30,855 vehicles in the Draft EIS, an 11 percent reduction. In the southbound direction during the A.M. peak, the 4-hour demand is estimated to be 21,860 vehicles compared to 26,300 vehicles in the Draft EIS, representing a 17 percent reduction.

No-Build
6-Lane Main Span



CRC LPA Phase 1
10-Lane Main Span



CRC LPA Full Build
12-Lane Main Span

Figure S-2
Southbound A.M. Speed Profiles in 2030

FINDINGS REPORT:
SECTION 1 – EXAMINATION OF NUMBER OF LANES

BACKGROUND

URS Corporation (URS) has prepared this Findings Report through a work order from the Traffic Engineering Flexible Services contract between the City of Portland (City) and URS. The purpose of the work order is for URS to assist the City in its evaluation and decision-making relative to the Columbia River Crossing project (CRC). The City seeks to ensure that the project's locally preferred alternative (LPA):

- Results in satisfactory performance of Interstate 5 (I-5)
- Is compatible with the City's transportation system
- Gives priority to freight mobility
- Is cost-effective and fundable

This findings report is a compilation of several draft memoranda and project worksheets that have been developed during the course of the work order and reflects ongoing coordination among City staff, CRC project staff and others. The primary areas of focus are:

- Reducing the number of lanes on the Columbia River Crossing
- Off-island alternatives to the Hayden Island interchange
- Performance of I-5 and parallel facilities in north Portland

REDUCING LANES ON THE COLUMBIA RIVER MAIN SPAN BRIDGE

One of the City's goals as a stakeholder in the CRC project is to ensure that the Columbia River Crossing is designed and constructed in a way that maximizes benefits for the least cost. Because the main span bridge (the structure crossing the main channel of the Columbia River), on a per-square-foot basis, represents one of the costliest project features, it is prudent to examine the question of bridge width.

Our review focused on whether a bridge configured for ten or fewer lanes could perform adequately through the 2030 timeframe. First, we considered a 10-lane bridge by looking at lane reduction options in the northbound and southbound directions; we then examined an 8-lane scenario.

Under the CRC's proposed LPA Phase 1, both northbound and southbound structures would consist of four 12-foot lanes, one 14-foot lane, a 12-foot left shoulder and a 14-foot right shoulder, for a total width of 88 feet between bridge railings. For the CRC's proposed LPA Full Build, the same structures would be striped for six 12-foot lanes and 8-foot shoulders left and right. AASHTO guidelines suggest 12-foot traffic lanes and shoulder widths ranging from 10 to 12 feet, the latter width applicable along lanes where directional design hour volumes for trucks exceed 250 vehicles per hour. Along auxiliary lanes, the guidelines suggest shoulder widths ranging from 8 to 12 feet.

Assuming the wider shoulders for this part of I-5, structure widths of 84 and 96 feet would be applicable under AASHTO guidelines for five and six freeway lanes, respectively. These widths do not include ramps tapering on and off the mainline at the bridge ends.

EVALUATION OF A 5-LANE BRIDGE - NORTHBOUND

The City is interested in finding the appropriate size of a new I-5 Columbia River main span bridge while maintaining acceptable traffic operations and movement of freight. The following discussion applies to permanent, full-build conditions and opportunities to limit or reduce to five the number of northbound lanes on the bridge. Two scenarios were evaluated:

Northbound (NB) Scenario 1: Adopt CRC LPA Phase 1 Bridge Configuration As Permanent Solution

In the CRC LPA Phase 1, a five-lane bridge is designed as follows: The northbound entrance from Victory Boulevard (Ramp V-5N) would be carried along I-5 as an auxiliary lane. From the beginning of this auxiliary lane to the northbound Marine Drive entrance at Hayden Island (Ramp MDE-5N), I-5 would consist of three through travel lanes plus this auxiliary lane in the northbound direction. Farther north, the Marine Drive entrance would similarly join I-5 as an additional auxiliary lane so that a total of five lanes would be carried across the main span river bridge. Under LPA Phase 1, the northbound entrance from Hayden Island (Ramp JD-5N) would merge into these five lanes and would not be carried across the bridge as an auxiliary lane.

Under the CRC LPA Full Build, the bridge would be re-striped to allow the northbound entrance from Hayden Island to be carried as an auxiliary lane to the SR 14 exit where it would be dropped. This would yield a configuration of six northbound lanes over the main span bridge.

In our most recent discussions with CRC staff, a qualitative assessment was made of the VISSIM analyses that have been performed for LPA Phase 1 and LPA Full Build, it was concluded that if the CRC LPA Phase 1 model was modified to reflect the other improvements included in the "full build" alternative at Marine Drive, SR 500 and other locations, the modeling output at the bridge would likely be similar to that for CRC LPA Phase 1. This anticipated similarity is reasonable in light of the nature of these other "full build" connections/improvements. They would enhance operations on I-5.

Therefore, it is expected that the LPA Phase 1 performance characteristics presented in the project's Draft Traffic Technical Report would be indicative of how the five-lane bridge would operate if retained as the permanent solution.

Table 1 provides a tabular summary of those performance characteristics for both CRC LPA Phase 1 and CRC LPA Full Build scenarios at various locations along the I-5 corridor. With respect to operations on the bridge, the CRC LPA Phase 1 and the CRC LPA Full Build would perform similarly in terms of hours of congestion, travel time, I-5 throughput and crashes. Compared to the No-Build alternative, both the CRC LPA Phase 1 and the CRC LPA Full Build configurations would reduce northbound hours of congestion by 4.25 hours to less than 2 hours. Exhibit 7-14 from the Draft Traffic Technical Report (Included in the Appendix) indicates speeds during the P.M. peak period that are faster (better) than congested ranges.

Northbound (NB) Scenario 2: Drop the NB Auxiliary Lane from Victory Boulevard at Hayden Island Exit

This concept was developed in response to the City's desire to explore alternative ways of reducing auxiliary lanes as I-5 approaches the bridge. In this scenario, the northbound entrance from Victory Boulevard would be carried along I-5 as an auxiliary lane but unlike LPA Phase 1, it would be dropped at Hayden Island (Ramp 5N-HI), as indicated in Figure 1. I-5 would continue as three lanes toward the northbound entrance from Marine Drive, which would join the mainline as an auxiliary lane. These four lanes would then be joined by a fifth lane, the northbound entrance from Hayden Island. Exhibit A in Appendix B depicts the detail at this entrance location. Lane 5 would be carried as an auxiliary lane to the Mill Plain exit where it would be dropped. This would yield a configuration of five northbound lanes over the bridge. The overall lane configuration for NB Scenario 2 is shown in Figure 2.

As with NB Scenario 1, NB Scenario 2 would provide five northbound lanes on the bridge. The main differences are:

1. Under NB Scenario 2, Hayden Island traffic would join I-5 as an auxiliary lane without merging into the mainline. This is a feature in common with the CRC LPA Full Build. Furthermore, NB Scenario

2 would carry this auxiliary lane to Mill Plain Blvd. instead of SR 14 as would be the case under the CRC Full Build configuration. This would increase available lane-change distance for Hayden Island traffic by about 1700 feet.

2. North of the exit to Hayden Island, I-5 would contain four lanes under NB Scenario 1 and three lanes under NB Scenario 2. This reduced mainline capacity under NB Scenario 2 would need to be evaluated in the CRC traffic model to determine whether it is a critical constraint.

The benefits and drawbacks of NB Scenario 2, relative to NB Scenario 1, would need to be established through modeling and design development at the same level performed for other aspects of the LPA alternatives.

Northbound 5-Lane Bridge - Findings

- As noted above, if the CRC LPA Phase 1 model were modified to reflect full build modifications while maintaining five northbound lanes on the bridge, we would expect the modeling output at the bridge to remain similar to that which has already been developed for the CRC LPA Phase 1. In terms of the performance data contained in the Draft Traffic Technical Report, these performance characteristics are similar to the CRC LPA Full Build.
- As noted below in the discussion on an 8-lane bridge, four northbound lanes are not expected to be sufficient to meet projected traffic demands without steps taken to significantly reduce those projected demands.
- Whereas the City's objectives as a project stakeholder in the CRC project include:
    - Ensuring cost-effective and fundable solutions
    - Limiting environmental impacts
    - Prioritizing freight mobility

  The 5-lane northbound bridge would be an optimized approach for helping to achieve those objectives. As a value engineering concept, the 5-lane northbound bridge could offer similar performance characteristics as a 6-lane configuration at reduced cost. It is suggested that the CRC consider this approach as a permanent design solution for the LPA.
- NB Scenario 2 could result in improved operations over NB Scenario 1 by virtue of the continuous flow of Hayden Island traffic as it enters the freeway. Further traffic modeling analysis would be needed to confirm this potential benefit and, accordingly, whether NB Scenario 2 should be retained for further design development.

Table 1: Performance Characteristics
of the No-Build, CRC LPA Full Build and CRC LPA Phase 1 Alternatives

Performance Measure	Direction	Location	No-Build (NoB)	CRC 12 Lane LPA Full Build (FB)	CRC 10 Lane LPA Phase 1(Ph 1)
Hours of Congestion	I-5 SB	Bridge	7.25	3	3.5
		I-405 split	11	8.25	Similar to FB
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I-5 Throughput (4-hour peak)	I-5 SB (AM)	SR 500 interchange		24% increase over NoB	Similar to FB
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	I-5 NB (PM)	Bridge		35,300 (33% more than NoB)	Similar to FB
Managed Lanes				Both flexible to allow future managed lane(s)	
Accidents		Bridge Influence Area (BIA)	750/year	200/year	Similar to FB

Data Source: *Interstate 5 Columbia River Crossing Draft Traffic Technical Report*, March 2010

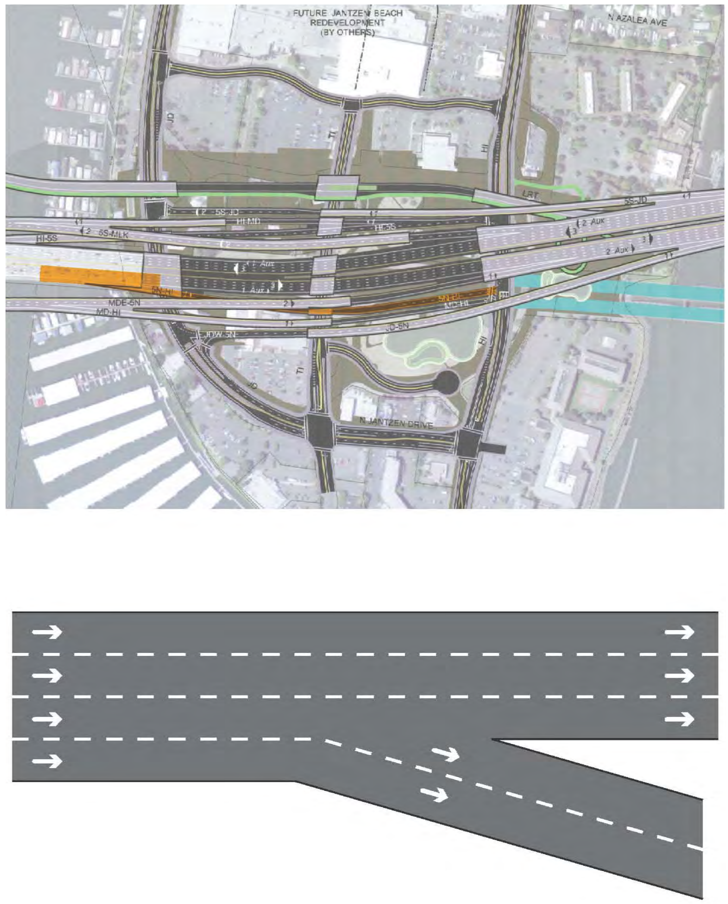


Figure 1
Schematic Lane Drop at Hayden Island for Northbound Scenario 2

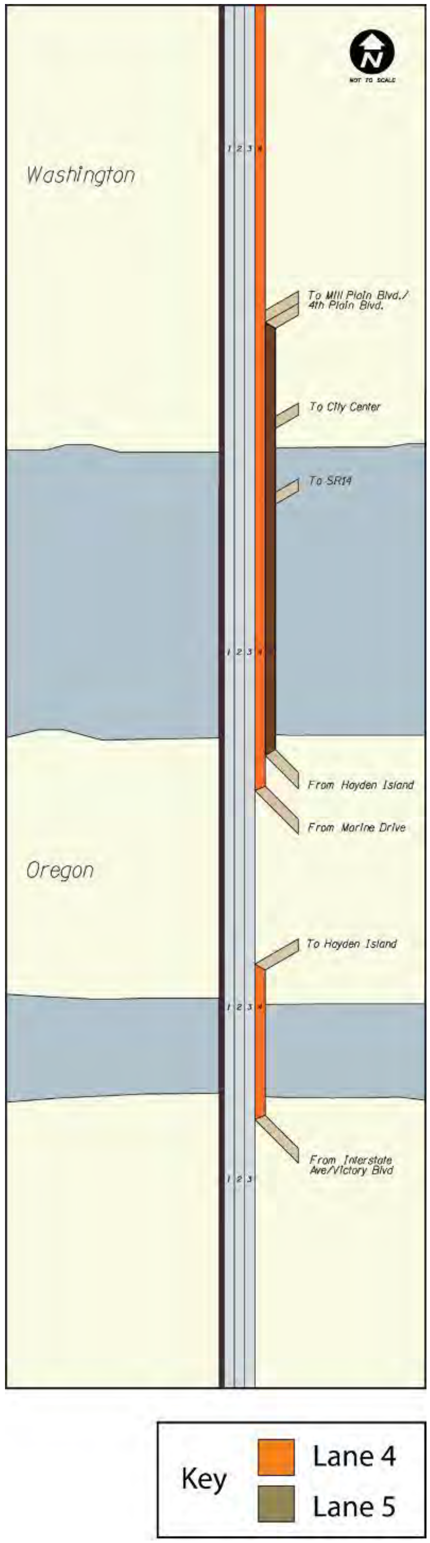


Figure 2
Lane Diagram for
Northbound Scenario 2

EVALUATION OF 5-LANE BRIDGE - SOUTHBOUND

The approach used to evaluate 5-lane bridge options in the southbound direction was similar to that used for northbound. Two scenarios were considered, one based on permanently retaining the CRC LPA Phase 1 configuration at the bridge and another based on terminating an auxiliary lane prior to its crossing of the bridge:

Southbound (SB) Scenario 1: Retain LPA Phase 1 Bridge Configuration Permanently

In the southbound direction, the CRC LPA Phase 1 lane configuration would consist of three basic lanes plus two auxiliary lanes. The Lane 4 auxiliary lane would begin at the SR 500 southbound entrance to I-5 and continue to a merge just south of the Interstate/Victory exit. Lane 5 would begin at the southbound Mill Plain entrance and continue to the Marine Drive exit where it would drop. Five lanes would be carried over the bridge.

As discussed previously under the evaluation of northbound lanes, if the CRC LPA Phase 1 model were modified to reflect the full build modifications while maintaining five southbound lanes on the bridge, the modeling output at the bridge would likely be similar to that for CRC LPA Phase 1. Therefore, it is expected that the CRC LPA Phase 1 performance characteristics presented in the project's Draft Traffic Technical Report would be indicative of how the five-lane bridge would operate if retained permanently.

Referring to Table 1 and considering operations on the bridge, LPA Phase 1 and Full Build would perform similarly in terms of hours of congestion, travel time, I-5 throughput and crashes. Compared to the No-Build, the Full Build would reduce southbound hours of congestion by 4.25 hours while the Phase 1 would reduce congestion by 3.75 hours. The improved performance under Full Build conditions may be attributable to factors such as the reconfigured, southbound Marine Drive entrance ramp and the sixth lane that would be striped onto the bridge. Exhibit 7-12 from the Draft Traffic Technical Report (included in Appendix A) depicts southbound speed profiles for I-5. As shown in Exhibit 7-12, the bridge congestion level is influenced by the I-5/I-405 split during peak hours.

Southbound (SB) Scenario 2: Merge in Lane 4 Auxiliary Lane Adjacent to Mill Plain Collector Distributor (CD) Road

This concept was developed in response to the City's desire to explore alternative ways of reducing auxiliary lanes as I-5 approaches the bridge. Under this scenario, a five-lane configuration would be achieved on the bridge as follows:

In the southbound direction and just south of the SR 14 exit, both LPA Full Build and Phase 1 depict three basic lanes plus one auxiliary lane on I-5. Under this proposed SB Scenario 2, this auxiliary lane would merge into the I-5 lanes prior to the point where the southbound CD road joins the mainline.

The CD road would join the 3-lane mainline with its two lanes tapering to one, similar to that shown in the LPA. This lane would continue across the bridge as an auxiliary lane. The southbound entrance from SR 14 would join the mainline as a single lane, similar to that shown in the LPA Full Build. This lane would continue as an auxiliary lane, and become the fifth lane on the bridge.

As with SB Scenario 1, SB Scenario 2 would provide five southbound lanes on the bridge. The main differences are:

1. Under SB Scenario 2, SR 14 southbound traffic would join I-5 as auxiliary lane without merging into the mainline. This is a feature in common with LPA Full Build. Both SR 14 and Mill Plain would join I-5 without a forced merge at the bridge area. Potentially, this could be a benefit to traffic operations on the bridge.

2. The Lane 4 auxiliary lane drop proposed under SB Scenario 2 would be the trade-off for the SR 14 auxiliary lane on the bridge. I-5 traffic in Lane 4 would need to maneuver left approaching the tapered merge. However, the distance available for this maneuver and advance signing would begin downstream from the SR 500 entrance.

This concept is illustrated in Figure 3 below. The AASHTO guideline (Exhibit 10-51 and related text) for merging the SR 500 auxiliary lane is also included as Figure 4.

Both the benefits and drawbacks of SB Scenario 2, relative to NB Scenario 1, must be determined through further modeling and analysis by the CRC. In our most recent coordination efforts with CRC project staff, they have agreed to consider this scenario in an upcoming model run.

Southbound 5-Lane Bridge - Findings

- As noted above, if the LPA Phase 1 model were modified to reflect full build modifications while maintaining five southbound lanes on the bridge, we would expect the modeling output at the bridge to remain similar to that which has already been developed for LPA Phase 1. In terms of the performance data contained in the Draft Traffic Technical Report, these performance characteristics are similar to LPA Full Build.
- The City's objectives as a project stakeholder in the CRC project include:
  - Ensuring cost-effective and fundable solutions
  - Limiting environmental impacts
  - Prioritizing freight mobility

  The 5-lane southbound bridge would be an optimized approach for helping to achieve those objectives. As a value engineering concept, the 5-lane southbound bridge could offer similar performance characteristics as a 6-lane configuration at reduced cost. It is suggested that the CRC consider this approach as a permanent design solution for the LPA.
- SB Scenario 2 could result in improved operations over SB Scenario 1 by virtue of the continuous flow of SR 14 traffic as it enters the freeway. Further analysis is underway by CRC project staff to confirm this potential benefit and accordingly, whether NB Scenario 2 merits further consideration for design development.

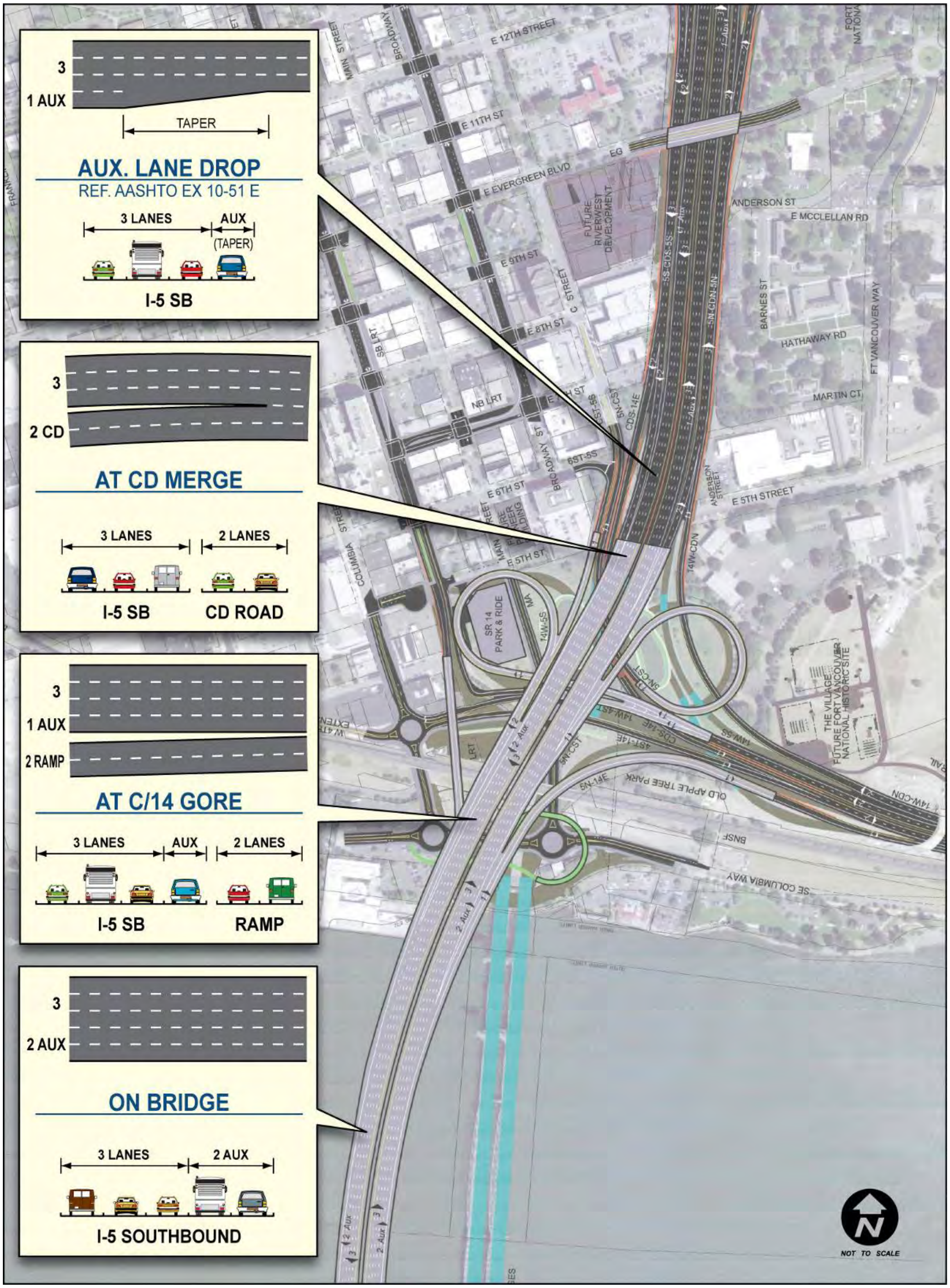


Figure 3
Schematic Lane Drop Prior to CD Merge
for Southbound Scenario 2

If local experience with single-exit design indicates problems with turbulence in the traffic flow caused by vehicles attempting to recover and proceed on the through lanes, the recovery lane should be extended 150 to 300 m [500 to 1,000 ft] before being tapered into the through lanes (see Exhibit 10-51D). Within large interchanges, this distance should be increased to 450 m [1,500 ft]. When an auxiliary lane is carried through one or more interchanges, it may be dropped as indicated above, or it may be merged into the through roadway approximately 750 m [2,500 ft] beyond the influence of the last interchange (see Exhibit 10-51E).

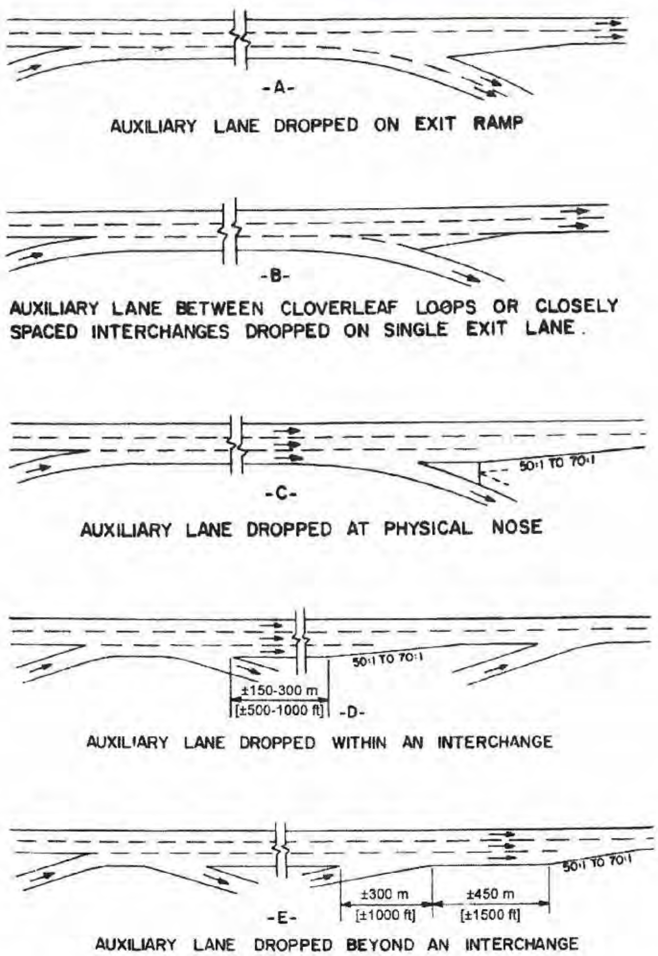


Exhibit 10-51. Alternative Methods of Dropping Auxiliary Lanes

815

Figure 4
AASHTO Exhibit 10-51

EVALUATION OF AN 8-LANE BRIDGE

In the preceding discussion, a 10-lane bridge was considered an optimized approach for serving projected traffic demands. Part of that conclusion rests on the expected inability of eight lanes to accommodate projected traffic demands. The CRC project has previously eliminated the concept of four lanes in each direction throughout the I-5 corridor on the basis of congestion, travel times and inability of the connecting transportation system to handle the additional I-5 traffic. Our concept-level assessment of capacity on the bridge reached similar conclusions:

Northbound: Using HCM methodology the northbound V/C ratio would be greater than 1.0, indicating a breakdown in traffic flow.

Southbound: In a four-lane configuration, the freeway segment between SR 14 entrance and Hayden Island exit would likely contain a weaving area less than 2500 feet in length. Using HCM methods to evaluate this location, V/C ratio for this segment would be 0.98, at or near breakdown of traffic flow.

An 8-lane bridge would not serve projected demands. To function adequately, traffic demands would need to be reduced.

Amount of Demand Reduction Needed

Under LPA Phase 1, the five northbound lanes on the bridge would carry 8,210 vph or about 1600 vehicles per hour per lane during the 4-hour peak. If this volume were carried in four lanes, then I-5 would serve approximately 6,400 vph or 78 percent of the demand. The remaining 22 percent of demand must be addressed through some other management strategy. Following are several strategies that have been discussed during the course of our study.

Demand Reduction Strategies

Special TDM Program – The CRC's TDM Working Group is developing a post-construction phase TDM program that would promote a range of alternatives to single occupant commuting. Among the strategies evaluated were:

- Carpooling – Increase the proportion of carpool trips in the I-5 corridor near 2005 levels through employer outreach and, potentially, zero tolls for carpools (and vanpools)
- Public Transit – Increase C-TRAN transit service consistent with the proposed C-TRAN long-range plan with 82 peak period buses crossing the bridge. The committee made the conservative assumption there would be no increase in LRT trips.
- Vanpooling – Expand the existing Washington-Oregon vanpool operation.
- Telework – Encourage employers and employees to take advantage of telework. Future technology advances may make these projections low.
- Compressed Work Week – Change from traditional 5 day to 4 day schedule.
- Bicycle and Walking – Promote use of both existing and new facilities.

Preliminary estimates from the TDM Working Group indicate that a moderately comprehensive post-construction TDM program could yield promising reductions in vehicle trips during the 2030 peak 4-hour period and additional reductions are expected by also waiving tolls for carpools/vanpools. These reductions would be beyond those assumed in the DEIS and a CRC TDM report quantifying these reductions is expected shortly.

Tolling Scenario 1E – Among the tolling scenarios developed by the CRC Tolling Study Committee, Scenario 1E would implement a variable rate structure that is 1.5 times the rates assumed in the Draft EIS.

Peak hour rates would increase from $2.00 to $3.00. The committee's findings indicate that daily traffic on I-5 would reduce from 181,000 under the Draft EIS tolling structure to 154,000 under Tolling Scenario 1E, a reduction of 15 percent.

CRC project staff recently provided additional traffic information regarding Scenario 1E and its potential effects on peak hour travel. At the bridge in the LPA Phase 1 and LPA Full Build conditions, the northbound P.M. 4-hour demand volume for Scenario 1E is estimated to be 27,460 vehicles compared to 30,855 vehicles in the Draft EIS, an 11 percent reduction. In the southbound direction, the A.M. 4-hour demand volume for Scenario 1E is estimated to be 21,860 vehicles compared to 26,300 vehicles in the LPA Phase 1 and LPA Full Build conditions in the Draft EIS, representing a 16.9 percent reduction.

Other measures that could be considered in the demand reduction effort include extension of the light rail system farther north into Vancouver, additional ramp metering and dedicating the unused cell in the northbound bridge structure to a reversible carpool lane.

A combination of several effective demand management measures would be needed in order to achieve the required reduction of vehicles under the 8-lane scenario. As the project moves forward, continued efforts like those of the TDM working group will be essential. An 8-lane concept would need to be developed and an operational analysis would need to be conducted to determine whether an 8-lane bridge would operate effectively with the reduction in traffic demand.

SECTION 2 – HAYDEN ISLAND ACCESS

BACKGROUND

Existing Hayden Island Interchange

Hayden Island can only be accessed via I-5 freeway on- and off-ramps on the island, so the LPA solution for this interchange replicates those existing connections to and from I-5. Unfortunately, significant geometric constraints are working against a design solution that meets modern interchange design standards. The existing interchange ramps are too short, by AASHTO definition, by approximately 400-500 feet. Modern AASHTO design standards call for significantly longer ramps (perhaps1200 feet) to accommodate speed changes to and from the freeway. Hayden Island itself is only about 2200 feet wide along this section of I-5. For comparison purposes, the footprint of a modern diamond interchange would exceed the island's width.

LPA Proposed Design

The distance between the existing Marine Drive and Hayden Island interchanges, about 2800 feet, is also well below desirable interchange spacing and this short distance, coupled with the application of modern ramp design standards, results in overlapping of interchange ramps. The proposed LPA interchange will be integrated into a new local street system, adding further limitations on the design. Considering all of the constraints bounding the Hayden Island interchange, developing the LPA configuration for the blending of ramp alignments and profiles has been a technical design challenge.

Hayden Island Interchange Impacts

The current CRC LPA design (Full Build and Phase 1) replicates two historical features:

- I-5 interchanges that are spaced too closely, and
- Local trips to and from Hayden Island that must occur exclusively via the I-5 freeway on- and off-ramps.

The CRC project offers perhaps a last good opportunity to change course in these areas.

While the LPA solution addresses existing access requirements, the LPA design has raised concerns for the City. Among them are:

- The breadth of I-5, including ramps and auxiliary lanes, near the center of Hayden Island exceeds 500 feet. The cross-section contains as many as 20 lanes.
- The bridge and ramp footprint will occupy substantially more right-of-way and results in major business impacts. The CRC has estimated that about half of the total project right-of-way costs will be incurred on the island.
- The combination of I-5 bridge and ramp components will create out-of-scale physical and visual intrusions into the community.

ALTERNATIVES TO LPA DIRECT ACCESS FROM I-5

At an April 4, 2010, workshop, the City presented an alternative concept for mobility in and around the Marine Drive interchange known originally as the Freight Bypass Alternative. Under this concept plan, the LPA would be modified as follows:

- A new local access bridge would be constructed over North Portland Harbor connecting Hayden Island to the Marine Drive interchange.
- A two-way crossing over the harbor would extend North Vancouver Way to the island.
- Freight bypass movements would be added to streamline the flow of trucks between Marine Drive and I-5. The eastbound-to-northbound flyover is similar to that shown in the LPA Full Build plan.

The Freight Bypass Alternative became a foundation for the development and study of subsequent on-island, off-island and hybrid interchange concepts. Key features included:

- Connections to Hayden Island could be separated from I-5
- Some interchange connections could be moved off the island to Marine Drive.
- Priority could be given to freight movements

Using the City's Freight Bypass Alternative and the above design features as a starting point, additional design concepts were developed. These additional concepts have become part of a working group study that is evaluating both on- and off-island options to the LPA designs. A refinement of the Freight Bypass Alternative, the Hayden Island Hybrid Concept – 2, is being developed in response to public comments and environmental considerations.

Summary of Off-Island Interchange Evaluation

In concept, Hayden Island access to and from I-5 can be provided from Marine Drive through one or more bridges over North Portland Harbor. Such connections would serve as collector/arterial functions within the Marine Drive interchange service area, providing access to the interchange as well as the north Portland street system. Further traffic study would be needed to ensure that these connections have adequate capacity to serve the island's needs, and that the Marine Drive interchange can, in turn, accommodate the traffic.

The anticipated benefits would be:

- Reduction of impacts on the island associated with the proposed Hayden Island Interchange
- Reduced footprint and right-of-way requirements on the island
- Improved traffic operations on the I-5 mainline
- More options for ingress and egress to/from the island. The above concepts envision a major bridge over North Portland Harbor west of I-5 and other crossings tied to the freeway or on a separate structure just east of I-5. These connections would offer non-freeway access to the Portland side and a choice of intersections with Marine Drive.
- Enhanced ability to phase or stage construction of the project
- Reduced costs may be possible if costs for North Portland Harbor crossings can be offset by eliminating ramps, overpass structures, drainage facilities and right-of-way costs on Hayden Island. Additional investigation of costs will be essential if these alternatives are to be developed further.

Potential drawbacks could be:

- Additional demand on the Marine Drive interchange
- Less direct access to I-5 for Hayden Island traffic
- Possible local opposition to new bridge crossings
- Less reconstruction of the Hayden Island street network compared to LPA Phase 1.
- NOAA biological/environmental impacts associated with additional structure/piers in the North Portland Harbor

Section 3 – PERFORMANCE OF PARALLEL FACILITIES AND I-5

PERFORMANCE OF PARALLEL FACILITIES

Traffic Demand

The Interstate 5 Columbia River Crossing Draft Traffic Technical Report (CRC Draft Traffic Technical Report, March 2010) provides general information on travel demand variation on parallel local streets in north Portland. Exhibits 7-26 and 7-27 of the CRC Draft Traffic Technical Report, as shown in Appendix A, illustrate changes in peak hour volumes between No-Build conditions and the LPA scenarios. These volumes are measured along east-west screenlines at Columbia Slough, north of Rosa Parks and south of Alberta Street. As indicated in the exhibits, changes in peak hour volumes range from an increase of 9 percent to a reduction of 20 percent.

The CRC Draft Traffic Technical Report also provides the following comments regarding local street traffic:

- In general, during both the A.M. and P.M. peak hours, local street traffic demands will decrease under both LPA alternative compared with the No-Build Alternative. The main reason is that the congestion on I-5 will be lessened which would shift some regional trips to the highway from local roads.
- During the A.M. peak hour, southbound traffic on adjacent arterials in Portland is forecast to decrease by up to five percent over No-Build conditions. Northbound traffic on adjacent arterials in Portland is forecast to remain either unchanged or decrease between 10 and 20 percent over No-Build conditions.
- During the P.M. peak hour, northbound and southbound traffic on adjacent arterials in Portland is forecast to change by less than 10 percent.

Intersection Service Levels

According to the CRC Traffic Report, generally the level of service (LOS), delay, queuing, and volume-to-capacity ratios (V/C) of various intersections in the Bridge Influence Area are similar between LPA and LPA Phase 1. Some intersections are predicted to experience significant negative impacts due to LPA and LPA Phase 1 (compared with No Build conditions). Mitigations for these intersections are proposed in the traffic report. Under LPA Full Build and LPA Phase 1, most of the intersections are forecast to meet the intersection performance criteria as described in Exhibit 7-28 of the CRC Draft Traffic Technical Report.

PERFORMANCE OF I-5 in 2030

During the initial stage of this study, southbound operations on I-5 in the design year were assessed using traffic information provided by the CRC project. The City's focus was on 2030 A.M. peak travel in the southbound direction and the impact of congestion at the I-5/I-405 junction. Year 2030 A.M. peak hour volumes were compiled in the diagrams contained in Figures 5 and 6 for the bridge influence area and for the segment south of Victory Boulevard, respectively.

The CRC uses the same data for LPA Phase 1 and Full Build alternatives. The data offer several key pieces of information:

- The highest hourly volume throughout the I-5 southbound corridor, at 8,460 vehicles per hour is forecast to occur between SR 500 on-ramp and the Fourth Plain Boulevard off-ramp.
- On the southbound river bridge, the maximum hourly volume is forecast to be 7,445 vehicles per hour.

Figure 7, Maximum Hourly Volume vs. Capacity, illustrates the forecast 2030 A.M. traffic demand and estimated capacity in terms of passenger cars per hour on I-5 southbound from SR 500 to the I-5/I-405 split. On this diagram the red line indicates maximum hourly volumes in the A.M. peak hour and the blue line represents freeway segment capacities estimated by URS according to guidance provided in the

HCM 2000. Please see **Appendix C** for the traffic operations review methodology and the HCS/HCM segmentation analysis worksheets and calculations.

With respect to weaving, the HCM 2000 specifies reduced capacities for weaving segments less than 2,500 feet in length. For the initial analysis, we assumed that only the location south of Going Street contains a weave less than 2,500 feet. For this Findings Report, the figure has been updated to include weaving considerations in the southbound direction.

The following observations are made from **Figure 7** for a 2030 design year:

- Traveling from north to south, peak traffic volumes generally decline from SR 500 to Victory Boulevard, then increase moving through north Portland to the I-405 split.
- The V/C ratio along I-5 southbound from Interstate Avenue/Victory Boulevard to I-405 indicates that severe congestion will likely occur during the A.M. peak period in 2030 under the LPA Phase 1 conditions. This condition is confirmed in the CRC speed profiles contained in the Appendix.
- I-5 southbound north of the I-405 split is identified as a bottleneck location with at-capacity traffic demand within a weaving area, under both No-Build and LPA conditions. The segment on I-5 southbound from Going Street on-ramp to I-405 off-ramp is a Type C weaving area (one weaving maneuver requires at least two lane changes) according to HCM 2000 . As illustrated in **Figure 7**, with LPA built the forecast traffic demand on I-5 southbound between Going Street and I-405 is very close to the estimated capacity.

A comparison of the speed profiles for the A.M. peak period southbound for the No-Build, the 10-lane and the 12-lane alternatives are shown in the Executive Summary as Figure S-2. A detailed explanation of the speed profile diagrams is contained in the CRC Traffic Report.

- Backups on I-5 south of the CRC project area will negatively affect I-5 A.M. peak southbound performance in the CRC project area in 2030 (CRC VISSIM speed profile analysis shows speeds of less than 20 mph in the project area); this backup condition also masks, in the speed profile diagrams, the performance of the 10- and 12- lane bridges in the project area.
- There are no appreciable differences visible in the speed profiles between the CRC 12-lane proposal and the 10-lane proposal; both show significant improvements over the performance of the No-Build alternative.

The URS review of the VISSIM simulation results and other CRC analysis on the overall performance of the I-5 system in 2030 indicates that:

- Compared with No-Build conditions, the LPA Full Build and LPA Phase 1 would significantly reduce the daily hours of congestion in both directions. In terms of hours of congestion, the two LPA options would perform similarly to each other, except that I-5 southbound on the CRC bridge would experience 3.5 hours of congestion under LPA Phase 1 compared with 3 hours under the LPA Full Build.
- Compared with the No-Build conditions, the LPA Full Build and Phase 1 would reduce the average travel time during the two-hour peak period within the bridge influence area (BIA) from 19 minutes to 18 minutes (A.M. peak) and on I-5 northbound from 14 minutes to 6 minutes (P.M. peak). The relatively small travel time reduction on I-5 southbound is mostly due to the bottleneck around the I-5/I-405 split. The two LPA options perform similarly to each other regarding travel times.
- Compared with the No-Build conditions, the LPA Full Build and LPA Phase 1 would increase vehicle throughput (during the 4-hour peak period, i.e., A.M. peak for I-5 southbound and P.M. peak for I-5 northbound) to various extents from four percent to 51 percent between SR 500 and I-405.

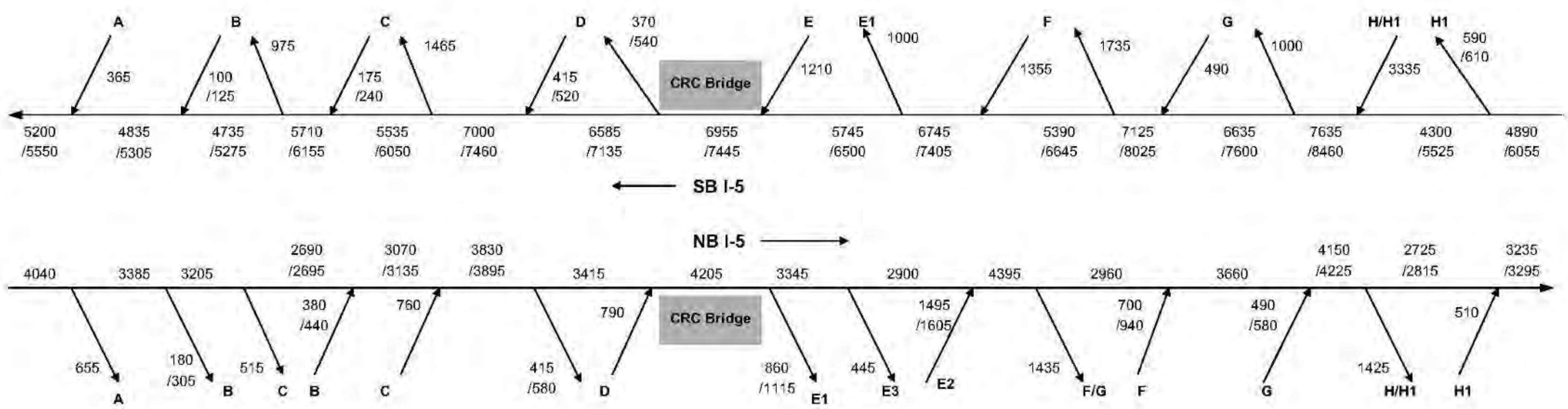
- Compared with the No-Build conditions, the LPA Full Build and LPA Phase 1 would reduce the number of southbound on-ramps with unserved demand from three to zero and one, respectively, during the 4-hour A.M. peak period. They would also reduce the number of northbound on-ramps with unserved demand from five to one during the 4-hour P.M. peak period.
- Compared with the No-Build conditions, the LPA Full Build and LPA Phase 1 would increase person throughput of I-5 southbound on the bridge by 19 percent and 15 percent, respectively, during the 4-hour A.M. peak period. They would increase person throughput of I-5 northbound on the bridge by about 33 percent.
- Both LPA Full Build and Phase 1 would be flexible to allow future managed lane(s).
- The LPA Full Build is forecast to reduce the number of accidents within the BIA from 750 per year to 200 per year. The CRC Traffic Report states that "The safety findings would be similar for the LPA and the LPA Phase 1 options."
- Overall, the VISSIM simulation results and the CRC safety analysis indicate that the LPA Phase 1 would perform similar to the LPA Full Build regarding forecast traffic operations and safety.

Figure 5
Stick Diagram

LPA Phase I Peak Hour Volumes (vph) – 2030 AM

Bridge Influence Area

(From CRC Traffic Technical Report 3/2010)



Key: On and Off Ramps

A = Columbia Blvd
B = Victory Blvd
C = Marine Dr/MLK Blvd
D = Hayden Island
E = SR 14, E1 = EB SR 14, E2 = WB SR 14, E3 = C St
F = Mill Plain Blvd
G= 4th Plain Blvd
H = SR 500, H1 = 39th St

Notes:

###/### - AM peak hour volume/Maximum hourly volume during the 4-hour peak period

A single value is presented (without "/") when the above two volumes are the same

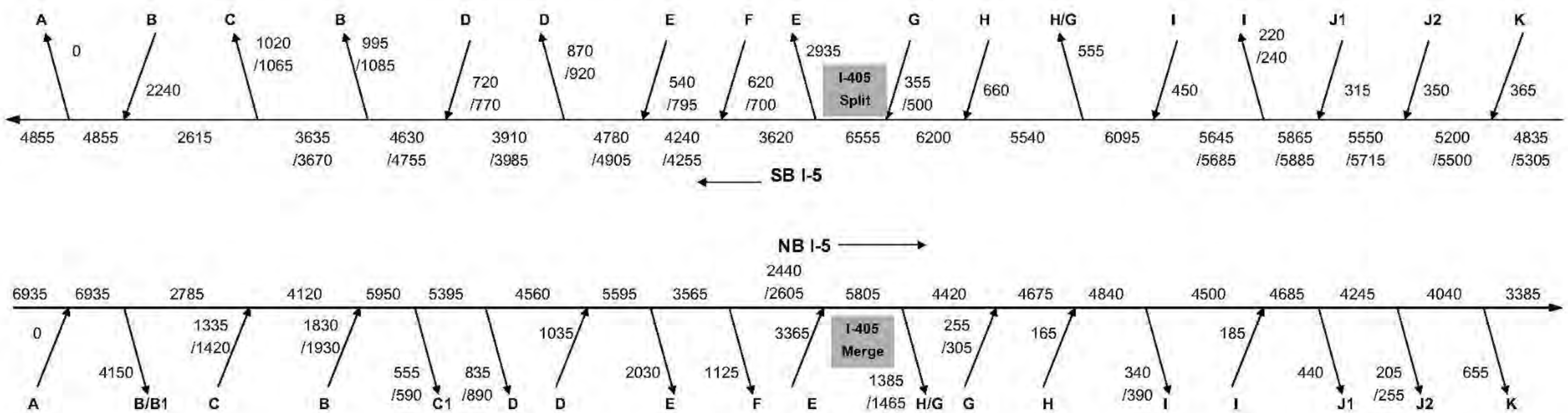
Source: Interstate 5 Columbia River Crossing Traffic Technical Report (March 2010). Data compiled by URS Corporation

Figure 6
Stick Diagram

LPA Phase I Peak Hour Volumes (vph) – 2030 AM

South of Victory Blvd

(From CRC Traffic Technical Report 3/2010)



Key: On and Off Ramps

A = McLoughlin
B = I-84, B1 = Water
C = Morrison, C1 = Holiday
D = Broadway/Weidler
E = I-405
F = Greeley
G = Going
H = Alberta
I = Portland
J1 = Lombard EB, J2 = Lombard WB
K = Columbia

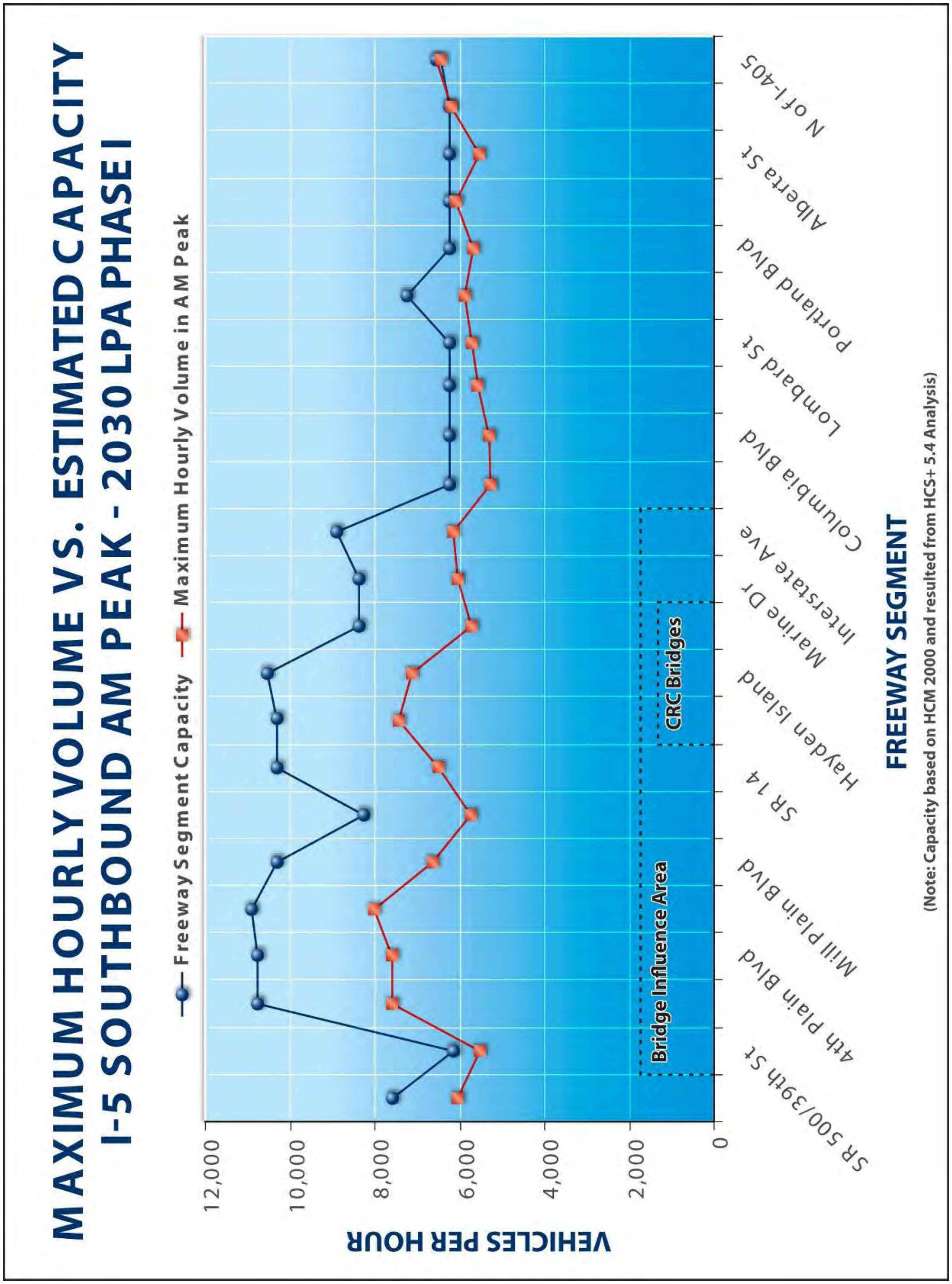
Notes:

###/### - AM peak hour volume/Maximum hourly volume during the 4-hour peak period

A single value is presented (without "/") when the above two volumes are the same

Source: Interstate 5 Columbia River Crossing Traffic Technical Report (March 2010). Data compiled by URS Corporation

Figure 7
CRC LPA Phase 1: 10-Lane Design
(5 Lanes Southbound Across Columbia River)



Section 4 – EVALUATION OF BRIDGE CONCEPT DESIGNS AND COST IMPLICATIONS

BACKGROUND

This section provides an evaluation of the Columbia River Crossing's bridge concepts, including the following:

- Potential bridge cost savings in reducing the facility from the existing 12-lane configuration to a 10- or 8-lane facility,
- Evaluation of providing a 10-lane facility on a single-level deck,
- Evaluation of providing a 8-lane facility on a single-level deck,
- Evaluation of the proposed open-web box girder two-level bridge concept,
- Comments on other potential bridge or lane configurations.

This evaluation utilizes existing CRC-prepared cost information to the maximum extent possible.

EVALUATION OF POTENTIAL COST SAVINGS COMPARING BI-LEVEL FACILITIES OF 12, 10 AND 8 LANES

The 12-lane, bi-level facility proposed by CRC is shown below in Figure 8. The nominal width of each deck is 88 feet that would be striped initially for a 10-lane facility with four 12' lanes, one 14' lane, a 12- inside shoulder and a 14' outside shoulder on each deck. Each bridge would be restriped in the future to a 12-lane facility with six 12' lanes and two 8' shoulders.

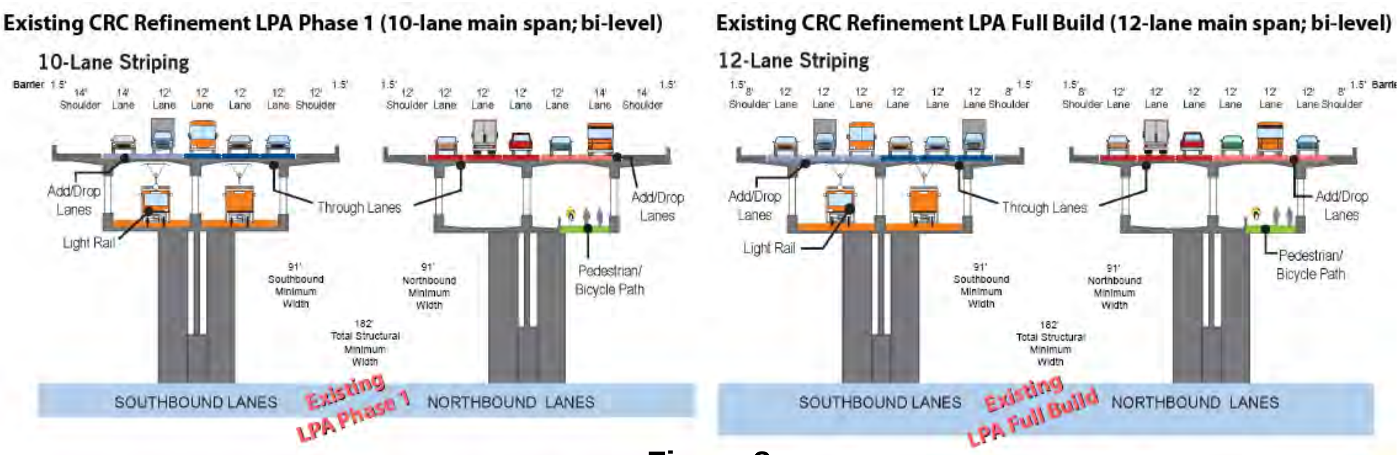


Figure 8
Cross Sections of Existing
CRC Refinement LPA Phase 1 and LPA Full Build
(10- and 12-lane bi-level main spans)

There are ramp tapers on the river crossing structure that increase these nominal widths. Based on information provided by CRC, the upper deck area for the 12-lane Columbia River Crossing bridge with this arrangement is 557,700 square feet.

The Phase 1 LPA 10-lane facility proposed by CRC is "overbuilt" to provide the flexibility of future restriping to a future permanent 12-lane facility. A refinement of this option could be to provide an initial 10-lane facility that does not allow future restriping to 12 lanes. This arrangement is shown below as the CoP 10-lane permanent main span, and represents a 4' width savings for each deck as compared to the proposed CRC Phase 1 LPA 10-lane section. A further refinement would be to provide an 8-lane facility, also shown below. The 8-lane facility would represent an additional 12’ width reduction for each deck from the CoP proposed permanent 10-lane section. These refinement options are shown in Figure 9.

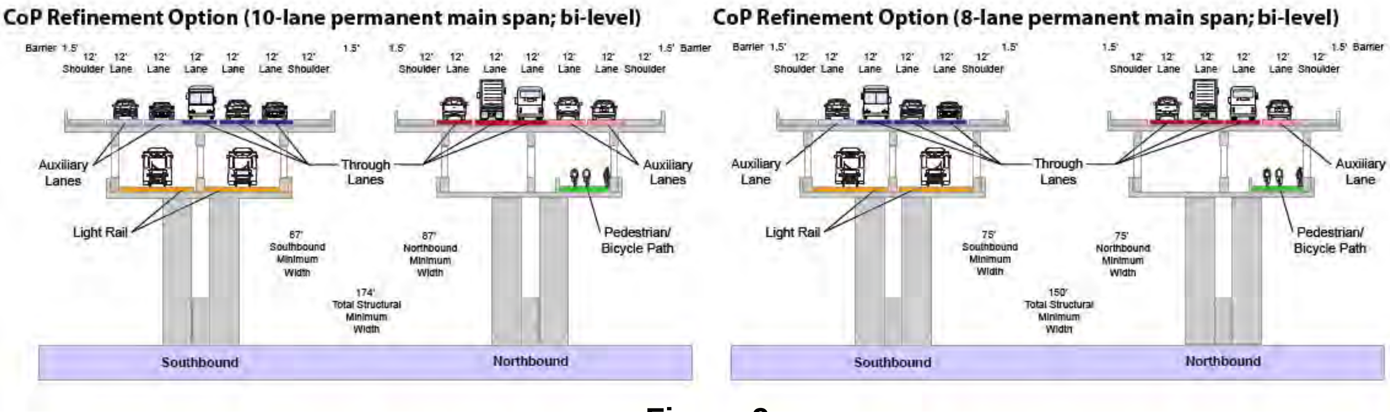


Figure 9
Cross Sections of
City of Portland Refinement Options
(8- and 10-lane bi-level main spans)

The table below summarizes the potential bridge cost savings of these refinements. The bridge cost includes both the savings for the river crossing bridge and the approach bridges on each side of the river. There would also be additional roadway and interchange related savings, which are not addressed here.

Table 2: Cost Savings for Potential Bridge Width Reductions

	River Crossing Bridge		Approach Bridge		Total Savings ($million)
	Deck area savings (SF)	Cost savings ($million)[1]	Deck area savings (SF)	Cost savings ($million)[2]	
CRC Phase 1 (10-Lane expandable to 12-Lane) vs. 10-Lane CoP Option	20,800	$12.4 m	20,320	$4.1 m	$16.5 m
10-Lane CoP vs. 8-Lane CoP	62,400	$37.0 m	60,960	$12.2 m	$49.2 m

Note 1: The river bridge cost savings is based $595 per square foot of bridge deck, based on the proposed open-web box girder cost taken from HDR’s cost estimates provided by CRC.
Note 2: The approach bridge cost was not included in the information provided by CRC, and is based on a unit cost of $200/SF, based on URS’ judgment for this type of structure.

What can be extracted from the above is that each lane saved (representing 12 feet of reduced width) represents $24.6 million savings. So if one lane is reduced in each direction, this represents a $49.2 million savings.

EVALUATION OF A SINGLE-DECK BRIDGE OPTION WITH 10 LANES
(i.e., one highway bridge and one *separate* LRT/pedestrian/bike bridge)

Figure 10 below shows a potential configuration for a single-deck bridge option with 10 lanes.

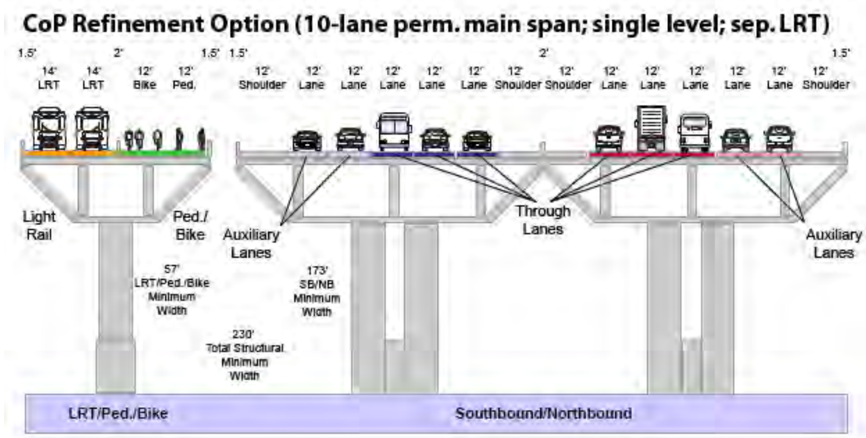


Figure 10
Cross Section of
City of Portland Refinement Option
(10-lane single-level main span with separate LRT/pedestrian/bike structure)

There are several potential bridge types that were identified in the Bridge Type Study provided by CRC that are consistent with this type of bridge layout, including:

- Segmental Concrete Box Girders,
- Concrete Box Girders with Drop-In Spans,
- Steel Box Girders,
- Steel I-Girders,
- Steel Deck Truss, and
- Extradosed Prestressed Bridge

Based on the cost information provided in the CRC estimates, the bridge cost between the two-level open-web box girder bridge type and the least costly of the above options (the segmental concrete box girder bridge) are very close at $332 million and $331 million for the river bridge cost, respectively. However the above 10-lane arrangement utilized a reduced bridge width as compared with the CRC proposed Phase 1 10-lane section which would result in some cost savings. This savings is approximately $16.4 million, computed in a similar manner as shown in Table 1.

It should be recognized, however, that there may be different cost risks between these two bridge types that could result in a much greater cost differential favoring the more conventional segmental concrete box girders. See the “Critique of Current Open-Web Box Girder Main River Bridge” section below for more detail.

Beyond the obvious cost comparisons, there are other considerations for these two bridge arrangements that should be considered:

a. The single-level arrangement will have a reduced structure depth that will lower the bridge profile (for auto and truck traffic). However, the single-level arrangement will place the LRT and pedestrians on the same level as the roadway, and therefore raise the vertical profile for these two elements of the design.

b. The single-level arrangement may have a greater right-of-way impact, having a wider footprint as it reaches each river bank.

c. From a design viewpoint, the deflection criterion for bridges carrying pedestrians and for LRT is more stringent than that for conventional vehicular traffic. Therefore it makes some sense to place the LRT and pedestrians on a separate structure, designed for the more stringent deflection criteria. This will result in some incremental cost savings for the bridges carrying only the vehicular traffic. This savings is not included in the above cost comparisons, as the estimates are not presently at the level of detail to capture this refinement.

d. The pedestrian facility located below the deck has advantages and disadvantages. Pedestrians will be provided with some level of weather protection with the bi-level deck option, however there will likely be a significant noise issue below the deck unless some type of noise suppression is included in the design. For the single-level option, there is no weather protection (although a canopy could be provided) but there will likely be a lower noise level (note that the pedestrians could be shifted outboard of the LRT on the above sketch, which would increase the distance from auto traffic and reduce noise levels).

EVALUATION OF A SINGLE-DECK BRIDGE OPTION WITH 8 LANES
(An 8-lane bridge with all travel lanes, LRT and pedestrians/bikes on one single-level structure)

Figure 11 below shows a potential configuration for a single-deck bridge option with 8 lanes.

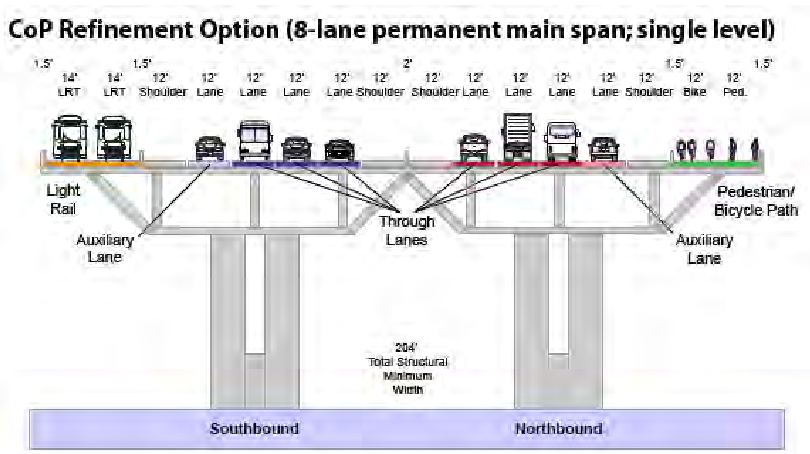


Figure 11
Cross Section of
City of Portland Refinement Option
(8-lane single-level main span on single structure)

The potential bridge types for this arrangement are the same as identified in the 10-lane single-level option discussed previously.

As previously noted above, the cost information provided in the CRC estimates shows costs between the two-level open-web box girder bridge type and the segmental concrete box girder bridge are very close at $332 million and $331 million for the river bridge cost, respectively. As a result any savings would primarily be a function of the savings in structure width by reducing lanes. This savings is approximately $49.2 million, computed in a similar manner as shown in Table 2.

Similar to the 10-lane single level comparison above, it should be recognized that there may be different cost risks between these two bridge types that could result in a much greater cost differential favoring the more conventional segmental concrete box girders and a single-level arrangement.

Beyond the obvious cost comparisons, there are other considerations for these two bridge arrangements that should be considered:

a. The single-level arrangement will have a reduced structure depth that will allow for a lower bridge vertical profile (for auto and truck traffic).
b. The single level arrangement will place the LRT and pedestrians on the same level as the roadway, and thus raise the vertical profile for these two elements of the design.
c. The single-level arrangement may have a greater right-of-way impact, having a wider footprint as it reaches each river bank.
d. The pedestrian facility located below the deck has advantages and disadvantages. Pedestrians will be provided with some level of weather protection with the bi-level deck option; however, there will likely be a significant noise issue below the deck, unless some type of noise suppression is included in the design. For the single-level option, there is no weather protection (although a canopy could be provided) and there will be a lower noise level. Note that the LRT and pedestrian locations can be swapped, if it is preferred to locate the pedestrians on the west side of the structure.

CRITIQUE OF THE CURRENT OPEN-WEB BOX GIRDER MAIN RIVER CROSSING BRIDGE

The proposed bridge type for the Columbia River Crossing is an open-web box girder. It is a 6-span bridge with four 500-foot main spans and 300-foot end spans, giving an overall length of 2,600 feet. The box girder depth varies from 35'-6" at the piers to 25' at mid-span. The bridge concept places the vehicular traffic on an upper deck and the LRT and pedestrian/bike traffic on a lower deck inside the box.

The bi-level deck option with an open-web box girder structure type represents essentially a unique structure type for the United States. Even abroad, this is not a common structure type. On one hand, this will provide a certain level of uniqueness and "signature bridge" quality to the project. On the other hand, it introduces a level of risk into the project. A unique design is more likely to experience design and cost growth during design, as the design issues that may not have been anticipated in the concept development are uncovered and addressed in final design. Contractors are also more likely to include contingencies in their design for a new or unique design. For more conventional designs, such as a concrete segmental box girder, there are numerous examples of these bridges constructed that can be benchmarked against the proposed bridge, for both design development/costing and bid risk for contractors.

Although the purpose of this memorandum is not a detailed critique of the proposed design, it was requested that it address a general impression of the proposed design. The following comments are not intended to suppress the implementation of a unique or signature design, but to help further focus the issues related to these design options.

a. It would be expected that the "open-web" box girder bridge would behave structurally similar to a truss bridge. For a variable depth truss bridge we would expect the span-to-depth ratio for an economical design, for a variable depth section, to be in the range of 8 to 10. For a conventional box girder bridge we would expect this ratio to be in the range in 16 to 18. The span to depth provided in the proposed design is 15. If the structural behavior is indeed similar to a truss, this represents a very shallow structural section. The consequences of this are that one, economy will suffer, and that two, deflection criteria may be more difficult to achieve. We note that the cost reported in the CRC information places the cost of the open-web box at $332 million and the cost of a conventional concrete box girder bridge at $331 million. Given the choice of structural depths, we would have expected a wider cost range for these two bridge types.

Table 3: Span-to-Depth Ratio by Bridge Type

Bridge Type	Span-to-Depth Ratio at Pier
Truss Bridge (economical range)	8 - 10
As Provided for “Open-Web” Box Girder	15
Box Girder Bridge (economical range)	16 - 18

b. Conventional concrete box girder design is a common and mature construction method in the United States. This means that designers are familiar with economical detailing practices, and that there is a history of previous designs to benchmark quantity estimates against and to benchmark costs against. The open-web box design is a unique structure type for the U.S. This means that new details will need to be worked out, including considerations of cost and constructability. It is not possible to address all of these at the concept stage, so it should be expected that as final design develops there may be some refinements in the design that could impact cost. Likewise, this structure type has not been built in the U.S., and therefore contractors do not have similar designs from which to benchmark details of fabrication, erection and construction engineering. At the bid stage, contractors may have to make some assumptions, and typically will cover these assumptions in a risk analysis that may result in increased bid cost to recognize perceived risks.

   The cost used by CRC for the open-web box option is similar to the cost used for the conventional concrete box girder option ($332 million vs. $331 million, respectively). Review of the cost data from CRC appear to indicate that the costs do not recognize the different risks for the various bridge types – for both the final design and construction stage risks.

c. The issue of redundancy should be addressed for the open-web box girder design. In simple terms, a redundant structure is one where failure of a single component of the bridge will not result in collapse of the bridge. A non-redundant structure is one where failure of a single element would result in collapse of the bridge. These members are termed “fracture critical” and require special design and inspection requirements if this type of design is implemented.

   If this redundancy analysis has not already been addressed, then as future design work progresses the web diagonal members of the open-web box girder should be investigated to assure that they do not represent fracture critical elements.

REVIEW OF OTHER BRIDGE CONFIGURATIONS FOR PLACEMENT OF TRAVEL LANES, LRT AND PEDESTRIANS/BIKES

The staging of the construction of the Columbia River Crossing bridges is an area that does not seem to be addressed in the work to date and is a consideration that may have significant implications. If a structure type and lane arrangement is selected independent of staging considerations, it may limit staging options. There can be cost implications as well. The staging may also include phased construction of the facility in response to financial constraints. In general, the individual long-span river crossing bridges cannot easily be stage constructed. It is suggested that staging considerations be included in the final decision of lane arrangements and bridge type.

The maximum flexibility for staging is afforded for bridge configurations that have separate structures for the different transportation components, and/or bridges that can be stage constructed. In this regard, there is some advantage in providing a three-bridge solution, with the northbound vehicular traffic on one bridge, the southbound vehicular traffic on a second bridge and the LRT/pedestrian traffic on a third structure. The LRT/pedestrian structure(s) could be constructed first, thus providing a viable transportation alternative during construction of the main I-5 spans.

In general, the individual long-span river crossing bridges cannot easily be stage constructed.

Other lane configurations, such as the arrangement shown in Figure 12, have been suggested that accommodate all of the traffic components on a single structure. Although possible, it is not expected that this type of arrangement would be structurally economical. Large transverse spans are required to accommodate the 5-lane traffic arrangement and the unsymmetrical longitudinal supporting members would not lead to an economical design.

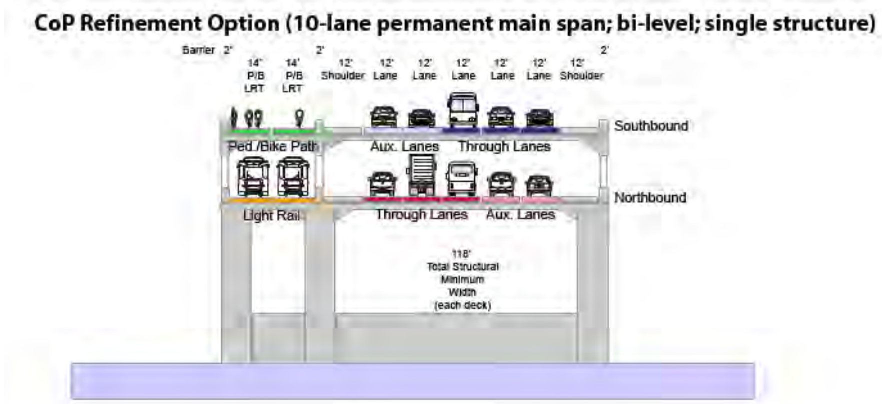


Figure 12
Cross Section of
City of Portland Refinement Option
(10-lane bi-level main span, single structure)

Several bridge concepts that have been considered by CRC have separate twin bridges on the same level. Questions have been asked if there is an advantage to joining these to have a single, wide bridge. In general there is not a structural advantage to joining the bridges into one wide structure. Any advantages would probably come from reduced right-of-way or future flexibility in removing the median barrier and reconfiguring traffic lanes.

There are also some distinct disadvantages of a single wide structure. Inspection of the under deck using a snooper truck can be limited on one wide bridge. With twin bridges, the snooper can access the bridge under-deck through the median opening. Wide bridges also present some challenges in accommodating transverse thermal movements. Many times, bearings must be released to accommodate these movements, which may be contrary to the needs of the seismic analysis. This can require compromise in achieving optimal structural behavior. In general the separate twin deck solution would be preferred over a single, wide deck for a facility of the size of the Columbia River Crossing.

City of Portland
CRC Design Refinements
Flexible Service Work Order

APPENDICES

July 7, 2010

Prepared By:
URS Corporation

APPENDIX A

Exhibits from the *CRC Draft Traffic Technical Report* March 2010

Exhibit 7-12

I-5 Corridor - 2030 LPA Phase I Southbound Speed Profiles: 5:00 AM - 9:00 PM

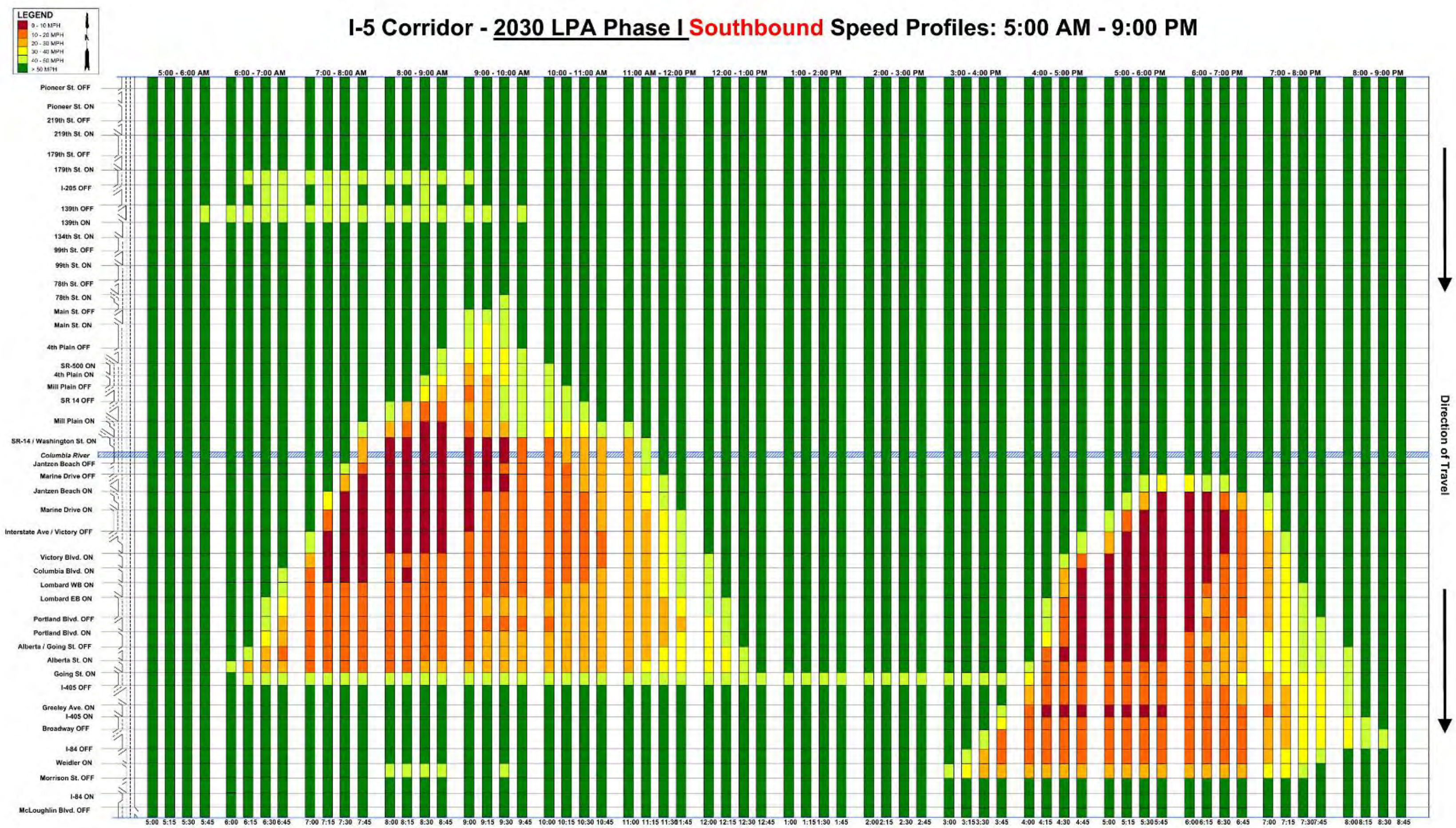


Exhibit 7-14

I-5 Corridor - 2030 LPA Phase I Northbound Speed Profiles: 5:00 AM - 9:00 PM

Exhibit 7-26

Portland North-South Screenlines - AM Peak Hour Volumes					
Screenline	**No-Build**	**LPA Phase I**	**Difference from No-Build**	**LPA**	**Difference from No-Build**
West of Interstate					
Westbound Total	4,250	4,250	0%	4,250	0%
Eastbound Total	3,200	2,900	-9%	2,900	-9%
East of I-5					
Westbound Total	3,450	3,150	-9%	3,150	-9%
Eastbound Total	2,950	3,050	3%	3,050	3%
East of MLK Jr Blvd					
Westbound Total	3,950	3,900	-1%	3,900	-1%
Eastbound Total	2,850	3,100	9%	3,100	9%

Portland East-West Screenlines - AM Peak Hour Volumes					
Screenline	**No-Build**	**LPA Phase I**	**Difference from No-Build**	**LPA**	**Difference from No-Build**
Columbia Slough					
Southbound Total	1,400	1,400	0%	1,400	0%
Northbound Total	1,150	1,050	-9%	1,050	-9%
North of Rosa Parks					
Southbound Total	1,150	1,200	4%	1,200	4%
Northbound Total	750	750	0%	750	0%
South of Alberta St					
Southbound Total	1,800	1,800	0%	1,800	0%
Northbound Total	1,250	1,000	-20%	1,000	-20%

Exhibit 7-27

Portland North-South Screenlines - PM Peak Hour Volumes

Screenline	No-Build	LPA Phase I	Difference from No-Build	LPA	Difference from No-Build
West of Interstate					
Westbound Total	3,100	3,200	3%	3,200	3%
Eastbound Total	4,950	4,700	-5%	4,700	-5%
East of I-5					
Westbound Total	3,300	3,550	8%	3,550	8%
Eastbound Total	3,850	3,650	-5%	3,650	-5%
East of MLK Jr Blvd					
Westbound Total	3,300	3,200	-3%	3,200	-3%
Eastbound Total	4,050	3,900	-4%	3,900	-4%

Portland East-West Screenlines - PM Peak Hour Volumes

Screenline	No-Build	LPA Phase I	Difference from No-Build	LPA	Difference from No-Build
Columbia Slough					
Southbound Total	1,450	1,350	-7%	1,350	-7%
Northbound Total	1,550	1,650	6%	1,650	6%
North of Rosa Parks					
Southbound Total	1,550	1,400	-10%	1,400	-10%
Northbound Total	1,850	1,900	3%	1,900	3%
South of Alberta St					
Southbound Total	1,750	1,600	-9%	1,600	-9%
Northbound Total	2,550	2,400	-6%	2,400	-6%

Exhibit 7-28

Applicable Local Street Intersection Performance Criteria for LPA

Vancouver Intersection Performance Criteria			
No-Build	**LPA**	**Determination**	**Mitigation?**
LOS E or better ≤ 80 seconds(1)	LOS E or better ≤ 80 seconds	No project impact	No
LOS E or better ≤ 80 seconds	LOS F > 80 seconds	Significant project-related impact	**Yes**
LOS F > 80 and ≤ 100 seconds	LOS E or better ≤ 80 seconds	Project-related benefit	No
LOS F > 80 and ≤ 100 seconds(2)	LOS F > 80 and ≤ 100 seconds	No project impact if delay within established range is lower under build alternative	No
LOS F > 80 and ≤ 100 seconds(2)	LOS F > 80 and ≤ 100 seconds	Significant project-related impact if delay within established range is at least 10 seconds higher under build alternative	**Yes**
LOS F > 100 seconds(3)	LOS F < 100 seconds	Project-related benefit	No
LOS F > 100 seconds	LOS F > 100 seconds	No project impact	No

Portland Intersection Performance Criteria			
No-Build	**LPA**	**Determination**	**Mitigation?**
LOS D or better ≤ 55 seconds	LOS D or better ≤ 55 seconds	No project impact	No
LOS D or better ≤ 55 seconds	LOS E or worse > 55 seconds	Significant project-related impact	**Yes**
LOS E ≤ 80 seconds	LOS E ≤ 80 seconds	Significant project-related impact if delay within established range is at least 10 seconds higher under build alternative	**Yes**
LOS F > 80 seconds	LOS E or better ≤ 80 seconds	Project-related benefit	No
LOS F > 80 seconds(2)	LOS F > 80 seconds	No project impact	No
V/C ≤ 0.85(4) or ≤ 0.99(5)	V/C > 0.85(4) or > 0.99(5)	Significant project-related impact	**Yes**
V/C ≤ 0.85(4) or ≤ 0.99(5)	V/C ≤ 0.85(4) or ≤ 0.99(5)	No project impact	No

(1) Refers to average delay per vehicle entering the intersection.

(2) LOS F gradations not established within this range.

(3) Assumed level of delay at which point motorists would change route, travel mode, or time of day for trip.

(4) A V/C ratio of 0.85 is used for ramp terminals in all scenarios.

(5) A V/C ratio of 0.99 is used for ODOT intersections that are not ramp terminals in all scenarios.

APPENDIX B

Exhibit A, Detail of the NB Hayden Island Entrance If Carried As Auxiliary Lane

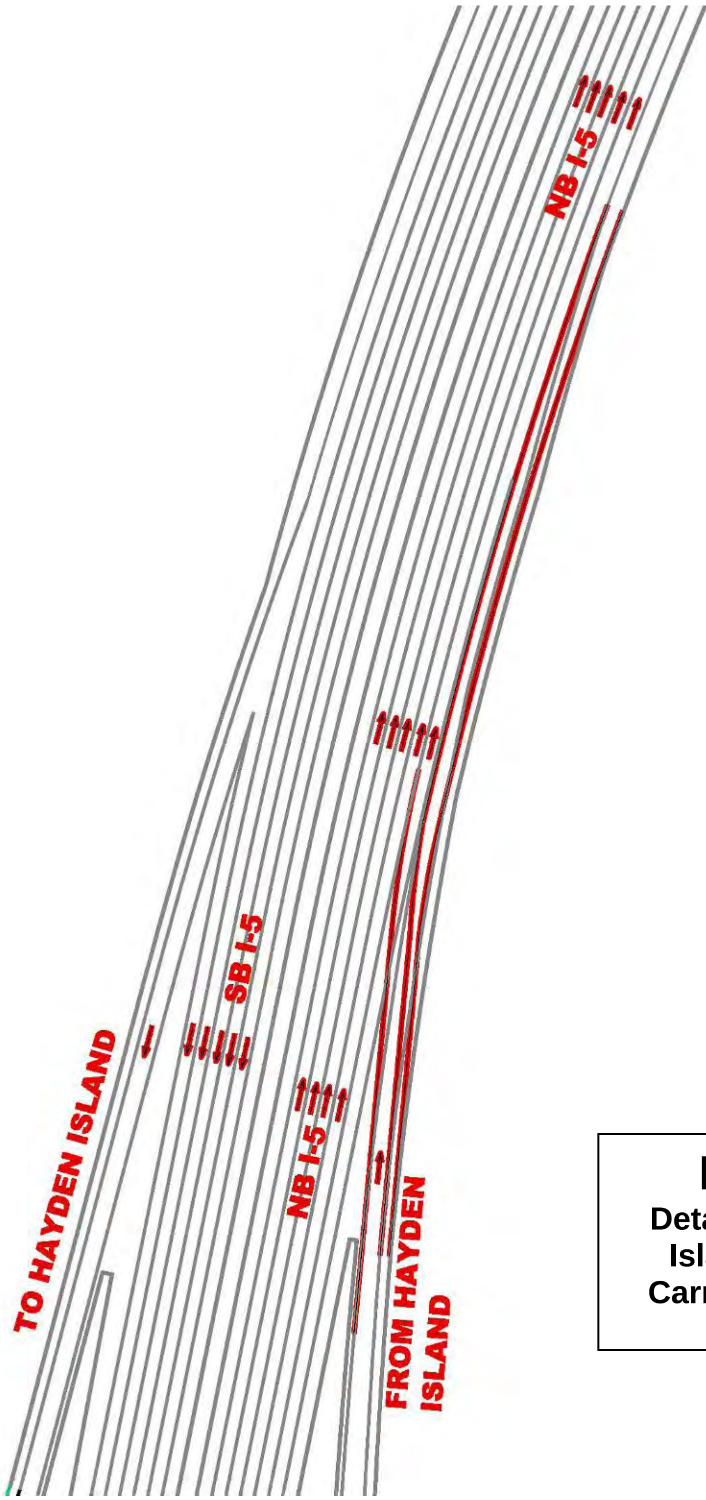


Exhibit A

Detail of NB Hayden Island Entrance if Carried as Aux Lane

APPENDIX C

Traffic Operations Review Methodology and HCS/HCM Segmentation Analysis Worksheets

Appendix C:

CRC Design Refinements: Traffic Operations Review Methodology and HCS/HCM Segmentation Analysis Worksheets

URS reviewed forecast 2030 traffic operations from the following two perspectives:

1. Reviewed VISSIM simulation results as described in the Interstate 5 Columbia River Crossing, Draft Traffic Technical Report, March 2010 (the *CRC Traffic Report*, in abbreviation). URS is not tasked to perform any new or additional VISSIM simulations for this project.
2. Performed preliminary traffic analysis for the LPA Phase I condition in order to estimate whether the forecast traffic demand would be over capacity for the 10-lane bridges (five lanes in each direction). URS used the Highway Capacity Software (HCS+ Version 5.4) which faithfully implemented the analytical methodology for freeway facilities, as described in Chapter 22 of the Highway Capacity Manual (HCM 2000).

The HCM methods were used as a sketch planning tool to provide rough capacity estimates which cannot be directly extracted from VISSIM simulation results. These estimates verified the VISSIM results at the planning level, such as the forecast of overall performance of the 10-lane bridge, but are not intended to replace or add to the VISSIM analysis. A discrepancy between results from the two approaches, if there is any, indicates that further analysis with VISSIM simulations is necessary. The following two performance measures were evaluated using the HCM methods:

- Vehicle Capacity, which the HCM 2000 defines as "the maximum number of vehicles that can pass a given point during a specified period under prevailing roadway, traffic, and control conditions. This assumes that there is no influence from downstream traffic operations, such as backing up of traffic into the analysis point."
- Volume to capacity (V/C) ratio, which the HCM 2000 defines as "the ratio of flow rate to capacity for a transportation facility." For simplicity, this evaluation considers forecast traffic demand as the flow rate, assuming the traffic demand is fully served.

As stated in the HCM 2000, the HCM methodology does not fully address the following subjects:

- Interactions among upstream and downstream segments.
- Delays caused by vehicles leaving before or after the study time duration (usually the peak traffic hour).
- Multiple overlapping bottlenecks.
- The methodology is limited to the extent that it can accommodate demand in excess of capacity. The procedures address only local oversaturated flow situations, not systemwide oversaturated flow conditions.
- Some locations cannot be clearly defined as a specific type of freeway facility based on HCM methodology and therefore would require different HCM methods for comparative analysis.

While a capacity estimate provides one way, with a single performance measure, to evaluate traffic at a planning level, a comprehensive evaluation with multiple performance measures can be achieved effectively using VISSIM simulations.

LPA Phase 1 I-5 Southbound Segmentation Worksheet

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Location	N of SR500	SR500 On	SR500 On to 4th Plain On	4th Plain On to Mill Plain Off	Mill Plain Off to SR 14 Off	SR 14 Off to Mill Plain On	Mill Plain On to SR 14 On 1	Mill Plain On to SR 14 On 2	SR 14 On to HI Off 1	SR 14 On to HI Off 2	SR 14 On to HI Off 3	HI Off to Marine Off	Marine Off to HI On	HI On to Marine On 1	HI On to Marine On 2	MarineOn to Victory Off
Type	B	On	B	WA	Off	B	On	B	On	R	Off	Off	B	On	B	W (typeA)
Length(ft)	1500	1500	640	1180	1080	3010	1500	780	510	990	510	1020	2220	1500	1210	1100
# of lanes	3	5	5	6	5	4	5	5	5	5	5	5	4	4	4	5
Acc/Dec(ft)							450		410					1150		
				Input 5. ca	Major diverge.							Major diverge				

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	total
Location	Victory Off to Victory On 1	Victory Off to Victory On 2	Victory On to Columbia On 1	Victory On to Columbia On 2	Columbia On to Lombard WB On 1	Columbia On to Lombard WB On 2	Lombard WB On to EB On	Lombard EB On to Portland Off	Portland Off to Portland On	Portland On to Alberta Off 1	Portland On to Alberta Off 2	Portland On to Alberta Off 3	Alberta Off to Alberta On	Alberta On to Going On	Going On to I-405 Off	S of I-405 Off	
Type	B	B	On	B	On	B	On	W (t-A)	B	On	R	Off	B	On	W (t-C)	B	
Length(ft)	1000	1460	1500	2140	1500	280	930	1170	1780	400	630	400	2660	760	2090	2000	40950
# of lanes	4	3	3	3	3	3	3	4	3	3	3	3	3	3	4	2	
Acc/Dec(ft)			750		1020		540			120				250			
									1	2	3	4	5	6	7	8	

HCS notes:

B = Basic freeway segment
On = on ramp (merge influence area)
Off = off ramp (diverge influence area)
R = overlapping area
WA = type A weaving area
WB = type B weaving area
WC = type C weaving area

HCS+: Freeway Facilities Release 5.4

Phone: Fax:
E-mail:

Operational Analysis

Analyst: WFH
Agency or Company: URS
Date Performed: 6/19/2010
Analysis Time Period: AM Peak Hour
Freeway: I-5 Southbound
Location: Portland Blvd to I-405 Off
Jurisdiction: ODOT
Analysis Year: 2030
Description: CRC LPA Phase I

FREEWAY GEOMETRY

Segment No.	1	2	3	4	5	6	7	8	9	10	11
Segment Type	B	ONR	R	OFR	B	ONR	WC	B	B	B	B
Length (ft)	1780	400	630	400	2660	760	2000	3000	0	0	0
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade (%)											
RAMP DATA											
No. of Lanes		1		1		1					
Ramp on Left		No		No		No					
Acc Lng(ft)		120		0		250					
Terrain		Level		Level		Level					
Grade (%)											
Length (ft)											

Segment No.	12	13	14	15	16	17	18	19	20	21	22
Segment Type	B	B	B	B	B	B	B	B	B	B	B
Length (ft)	0	0	0	0	0	0	0	0	0	0	0
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade (%)											
RAMP DATA											
No. of Lanes											
Ramp on Left											
Acc Lng(ft)											
Terrain											
Grade (%)											
Length (ft)											

Segment No.	23	24	25
Segment Type	B	B	B
Length (ft)	0	0	0
Terrain	Level	Level	Level
Grade (%)			
RAMP DATA			
No. of Lanes			
Ramp on Left			
Acc Lng(ft)			
Terrain			
Grade (%)			
Length (ft)			

FREEWAY DATA

Time Interval 1

Segment No.	1	2	3	4	5	6	7	8	9	10	11
No. of Lanes	3	3	3	3	3	3	4	2	2	2	2
Ln Wid (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0			
Lat Clr (ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Trucks (%)	6	6	6	6	6	6	6	6	0	0	0
RV's (%)	0	0	0	0	0	0	0	0	0	0	0
RAMP DATA											
Trucks (%)		6		6		6					
RV's (%)		0		0		0					

Segment No.	12	13	14	15	16	17	18	19	20	21	22
Segment Type	B	B	B	B	B	B	B	B	B	B	B
No. of Lanes	2	2	2	2	2	2	2	2	2	2	2
Ln Wid (ft)											
Lat Clr (ft)											
Trucks (%)	0	0	0	0	0	0	0	0	0	0	0
RV's (%)	0	0	0	0	0	0	0	0	0	0	0
RAMP DATA											
Trucks (%)											
RV's (%)											

Segment No.	23	24	25
Segment Type	B	B	B
No. of Lanes	2	2	2
Ln Wid (ft)			
Lat Clr (ft)			
Trucks (%)	0	0	0
RV's (%)	0	0	0
RAMP DATA			
Trucks (%)			
RV's (%)			

INPUT DEMANDS (vph)

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	5685	5900	5900	5900	5365	5675	5865	3190	3190	3190	3190
OnRamp		215				310	190				
OffRamp				535			2675				
RampRamp							20				
2	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
3	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
4	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
5	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				

OffRamp				0			0				
RampRamp							0				
6	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
7	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
8	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
9	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
10	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
11	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				
12	0	0	0	0	0	0	0	0	0	0	0
OnRamp		0				0	0				
OffRamp				0			0				
RampRamp							0				

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190
OnRamp											
OffRamp											
RampRamp											
2	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
3	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
4	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
5	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
6	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
7	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											

RampRamp											
8	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
9	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
10	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
11	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											
12	0	0	0	0	0	0	0	0	0	0	0
OnRamp											
OffRamp											
RampRamp											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	3190	3190	3190
OnRamp			
OffRamp			
RampRamp			
2	0	0	0
OnRamp			
OffRamp			
RampRamp			
3	0	0	0
OnRamp			
OffRamp			
RampRamp			
4	0	0	0
OnRamp			
OffRamp			
RampRamp			
5	0	0	0
OnRamp			
OffRamp			
RampRamp			
6	0	0	0
OnRamp			
OffRamp			
RampRamp			
7	0	0	0
OnRamp			
OffRamp			
RampRamp			
8	0	0	0
OnRamp			
OffRamp			
RampRamp			
9	0	0	0
OnRamp			
OffRamp			
RampRamp			

10	0	0	0
OnRamp			
OffRamp			
RampRamp			
11	0	0	0
OnRamp			
OffRamp			
RampRamp			
12	0	0	0
OnRamp			
OffRamp			
RampRamp			

Origin Demand Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00

7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Base Free Flow Speed

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	70.0	70.0	70.0
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	70.0	70.0	70.0
2	70.0	70.0	70.0
3	70.0	70.0	70.0
4	70.0	70.0	70.0
5	70.0	70.0	70.0
6	70.0	70.0	70.0
7	70.0	70.0	70.0
8	70.0	70.0	70.0
9	70.0	70.0	70.0
10	70.0	70.0	70.0
11	70.0	70.0	70.0
12	70.0	70.0	70.0

Capacity Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Number Of Lanes

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	3	3	3	3	3	3	4	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2	2	2	2
12	2	2	2	2	2	2	2	2	2	2	2

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	2	2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2	2	2	2
12	2	2	2	2	2	2	2	2	2	2	2

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	2	2	2
2	2	2	2
3	2	2	2
4	2	2	2
5	2	2	2
6	2	2	2
7	2	2	2
8	2	2	2
9	2	2	2
10	2	2	2
11	2	2	2
12	2	2	2

Destination Demand Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Lane Width (m)

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0			
2											
3											
4											
5											
6											
7											
8											
9											

10	
11	
12	

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Lateral Clearance (m)

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Percent Trucks Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	6	6	6	6	6	6	6	6	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0

4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

Percent RV's Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0

10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

Et Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	1.5	1.5	1.5
2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
9	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
11	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
12	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
9	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
11	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
12	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.5	1.5	1.5
2	1.5	1.5	1.5
3	1.5	1.5	1.5
4	1.5	1.5	1.5
5	1.5	1.5	1.5
6	1.5	1.5	1.5
7	1.5	1.5	1.5
8	1.5	1.5	1.5
9	1.5	1.5	1.5
10	1.5	1.5	1.5
11	1.5	1.5	1.5
12	1.5	1.5	1.5

Er Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
10	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
11	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
12	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
10	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
11	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
12	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.2	1.2	1.2
2	1.2	1.2	1.2
3	1.2	1.2	1.2

4	1.2	1.2	1.2
5	1.2	1.2	1.2
6	1.2	1.2	1.2
7	1.2	1.2	1.2
8	1.2	1.2	1.2
9	1.2	1.2	1.2
10	1.2	1.2	1.2
11	1.2	1.2	1.2
12	1.2	1.2	1.2

Percent Trucks Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		6		6		6					
2		0		0		0					
3		0		0		0					
4		0		0		0					
5		0		0		0					
6		0		0		0					
7		0		0		0					
8		0		0		0					
9		0		0		0					
10		0		0		0					
11		0		0		0					
12		0		0		0					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			

Time Interval	
10	
11	
12	

Percent RVs Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		0		0		0					
2		0		0		0					
3		0		0		0					
4		0		0		0					
5		0		0		0					
6		0		0		0					
7		0		0		0					
8		0		0		0					
9		0		0		0					
10		0		0		0					
11		0		0		0					
12		0		0		0					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Et Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		2.5		2.5		2.5					
2		1.5		1.5		1.5					
3		1.5		1.5		1.5					
4		1.5		1.5		1.5					
5		1.5		1.5		1.5					
6		1.5		1.5		1.5					
7		1.5		1.5		1.5					
8		1.5		1.5		1.5					
9		1.5		1.5		1.5					
10		1.5		1.5		1.5					
11		1.5		1.5		1.5					
12		1.5		1.5		1.5					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Er Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B

1		1.2		1.2		1.2					
2		1.2		1.2		1.2					
3		1.2		1.2		1.2					
4		1.2		1.2		1.2					
5		1.2		1.2		1.2					
6		1.2		1.2		1.2					
7		1.2		1.2		1.2					
8		1.2		1.2		1.2					
9		1.2		1.2		1.2					
10		1.2		1.2		1.2					
11		1.2		1.2		1.2					
12		1.2		1.2		1.2					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Ramp Free-Flow Speed (kph)

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		45.0		40.0		45.0					
2		35.0		35.0		35.0					
3		35.0		35.0		35.0					
4		35.0		35.0		35.0					
5		35.0		35.0		35.0					
6		35.0		35.0		35.0					

7		35.0		35.0		35.0					
8		35.0		35.0		35.0					
9		35.0		35.0		35.0					
10		35.0		35.0		35.0					
11		35.0		35.0		35.0					
12		35.0		35.0		35.0					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Ramp Metering Rate

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		2100		2100		2100					
2		2100		2100		2100					
3		2100		2100		2100					
4		2100		2100		2100					
5		2100		2100		2100					
6		2100		2100		2100					
7		2100		2100		2100					
8		2100		2100		2100					
9		2100		2100		2100					
10		2100		2100		2100					
11		2100		2100		2100					
12		2100		2100		2100					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Driver Population Adj. Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B

1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Driver Population Adj. Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		1.00		1.00		1.00					
2		1.00		1.00		1.00					
3		1.00		1.00		1.00					
4		1.00		1.00		1.00					
5		1.00		1.00		1.00					
6		1.00		1.00		1.00					
7		1.00		1.00		1.00					
8		1.00		1.00		1.00					
9		1.00		1.00		1.00					
10		1.00		1.00		1.00					
11		1.00		1.00		1.00					
12		1.00		1.00		1.00					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											

Time Interval	
7	
8	
9	
10	
11	
12	

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Peak-Hour Factor Free

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Peak-Hour Factor_Ramp

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1		0.95		0.95		0.95					
2		1.00		1.00		1.00					
3		1.00		1.00		1.00					
4		1.00		1.00		1.00					
5		1.00		1.00		1.00					
6		1.00		1.00		1.00					
7		1.00		1.00		1.00					
8		1.00		1.00		1.00					
9		1.00		1.00		1.00					
10		1.00		1.00		1.00					
11		1.00		1.00		1.00					
12		1.00		1.00		1.00					

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B

Time Interval
1
2
3
4
5
6
7
8
9
10
11
12

Free Flow Speed Type

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0	0	0	0	0	0	0	0	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	1	1	1
2	1	1	1
3	1	1	1
4	1	1	1
5	1	1	1
6	1	1	1

7	1	1	1
8	1	1	1
9	1	1	1
10	1	1	1
11	1	1	1
12	1	1	1

Capacity

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	6248	6248	6248	6248	6248	6248	6446	4138	4800	4800	4800
2	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
3	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
4	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
5	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
6	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
7	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
8	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
9	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
10	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
11	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800
12	4800	4800	4800	4800	4800	4800		4800	4800	4800	4800

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
2	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
3	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
4	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
5	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
6	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
7	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
8	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
9	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
10	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
11	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
12	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	4800	4800	4800
2	4800	4800	4800
3	4800	4800	4800
4	4800	4800	4800
5	4800	4800	4800
6	4800	4800	4800
7	4800	4800	4800
8	4800	4800	4800
9	4800	4800	4800
10	4800	4800	4800
11	4800	4800	4800
12	4800	4800	4800

ESTIMATED CAPACITY (pc/hr) AND D/C RATIO MATRIX

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0.91	0.94	0.94	0.94	0.86	0.91	0.91	0.77			
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	6248	6248	6248	6248	6248	6248	6446	4138	4800	4800	4800

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Capacity	4800	4800	4800

ESTIMATED CAPACITY (pc/hr) AND V/C RATIO MATRIX

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0.91	0.94	0.94	0.94	0.86	0.91	0.91	0.77			
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	6248	6248	6248	6248	6248	6248	6446	4138	4800	4800	4800

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Capacity	4800	4800	4800

ESTIMATED SEGMENT SPEEDS (mi/h)

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	54.9	48.0	52.7	52.7	56.2	49.1	43.7	55.3			
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

ESTIMATED SEGMENT DENSITIES (pc/mi/ln) AND LOS

Segment Number and Type

Time Interval	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	39.6 E	37.9 E	38.8 F	38.8 E	36.5 E	36.1 E	33.5 D	33.1 D			
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 B	24 B	25 B

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

ESTIMATED QUEUE LENGTHS (ft.)

Time Interval	Segment Number and Type										
	1 B	2 ONR	3 R	4 OFR	5 B	6 ONR	7 WC	8 B	9 B	10 B	11 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Time Interval	Segment Number and Type										
	12 B	13 B	14 B	15 B	16 B	17 B	18 B	19 B	20 B	21 B	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 B	24 B	25 B
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

SUMMARY OF FACILITYWIDE PERFORMANCE MEASURES

Performance Measures

Time Interval	pc-mi of Travel	pc-h of Travel	pc-h of Delay	Avg. Speed (mi/h)	Avg. Density (pc/mi/ln)	Facility Travel Time (min)
1	2767.1	53.6	5.1	51.6	35.92	2.5
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
Overall	2767	53.6	5.1	51.6		2.5

HCS+: Freeway Facilities Release 5.4

Phone: Fax:
E-mail:

Operational Analysis

Analyst: WFH
Agency or Company: URS
Date Performed: 6/18/2010
Analysis Time Period: AM Peak Hour
Freeway: I-5 Southbound
Location: SR 500 Entrance to I-405 Exit
Jurisdiction: WSDOT & ODOT
Analysis Year: 2030
Description: CRC LPA Phase I - I-5 SB AM Peak Hour

FREEWAY GEOMETRY

Segment No.	1	2	3	4	5	6	7	8	9	10	11
Segment Type	B	B	B	WA	OFR	B	ONR	B	ONR	R	OFR
Length (ft)	800	700	640	1180	1080	3010	1500	780	510	990	510
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade (%)											
RAMP DATA											
No. of Lanes					2		2		1		1
Ramp on Left					No		No		No		No
Acc Lng(ft)					10000		2400		410		0
Terrain					Level		Level		Level		Level
Grade (%)											
Length (ft)											

Segment No.	12	13	14	15	16	17	18	19	20	21	22
Segment Type	OFR	B	ONR	B	WA	B	B	ONR	B	ONR	B
Length (ft)	1020	2220	1500	1210	1100	1000	1460	1500	2140	1500	280
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade (%)											
RAMP DATA											
No. of Lanes	2		1					1		1	
Ramp on Left	No		No					No		No	
Acc Lng(ft)	5000		1150					750		1020	
Terrain	Level		Level					Level		Level	
Grade (%)											
Length (ft)											

Segment No.	23	24	25
Segment Type	ONR	WA	B
Length (ft)	930	1170	1780
Terrain	Level	Level	Level
Grade (%)			
RAMP DATA			
No. of Lanes	1		
Ramp on Left	No		
Acc Lng(ft)	540		
Terrain	Level		
Grade (%)			
Length (ft)			

FREEWAY DATA

Time Interval 1

Segment No.	1	2	3	4	5	6	7	8	9	10	11
No. of Lanes	5	5	5	5	5	4	5	5	5	5	5
Ln Wid (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Lat Clr (ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Trucks (%)	6	6	6	6	6	6	6	6	6	6	6
RV's (%)	0	0	0	0	0	0	0	0	0	0	0
RAMP DATA											
Trucks (%)					6		6		6		6
RV's (%)					0		0		0		0

Segment No.	12	13	14	15	16	17	18	19	20	21	22
Segment Type	OFR	B	ONR	B	WA	B	B	ONR	B	ONR	B
No. of Lanes	5	4	4	4	5	4	3	3	3	3	3
Ln Wid (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Lat Clr (ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Trucks (%)	6	6	6	6	6	6	6	6	6	6	6
RV's (%)	0	0	0	0	0	0	0	0	0	0	0
RAMP DATA											
Trucks (%)	6		6					6		6	
RV's (%)	0		0					0		0	

Segment No.	23	24	25
Segment Type	ONR	WA	B
No. of Lanes	3	4	3
Ln Wid (ft)	12.0	12.0	12.0
Lat Clr (ft)	6.0	6.0	6.0
Trucks (%)	6	6	6
RV's (%)	0	0	0
RAMP DATA			
Trucks (%)	6		
RV's (%)	0		

INPUT DEMANDS (vph)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	7600	7600	7600	8025	6645	5740	6500	6500	7445	7445	7445
OnRamp				425			760		945		
OffRamp				1380	905						310
RampRamp				50							
2	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
3	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
4	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
5	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		

OffRamp				0	0						0
RampRamp				0							
6	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
7	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
8	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
9	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
10	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
11	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							
12	0	0	0	0	0	0	0	0	0	0	0
OnRamp				0			0		0		
OffRamp				0	0						0
RampRamp				0							

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	7135	5725	6050	6050	6155	5275	5275	5305	5305	5550	5550
OnRamp			325		105			30		245	
OffRamp	1410				880						
RampRamp					40						
2	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
3	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
4	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
5	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
6	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
7	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						

RampRamp					0						
8	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
9	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
10	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
11	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						
12	0	0	0	0	0	0	0	0	0	0	0
OnRamp			0		0			0		0	
OffRamp	0				0						
RampRamp					0						

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	5715	5885	5685
OnRamp	165	170	
OffRamp		200	
RampRamp		30	
2	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
3	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
4	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
5	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
6	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
7	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
8	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
9	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	

10	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
11	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	
12	0	0	0
OnRamp	0	0	
OffRamp		0	
RampRamp		0	

Origin Demand Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00

7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Base Free Flow Speed

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	65.0	65.0	65.0	65.0	55.0	57.0	55.0	55.0	55.0	55.0	60.0
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	60.0	60.0	60.0
2	70.0	70.0	70.0
3	70.0	70.0	70.0
4	70.0	70.0	70.0
5	70.0	70.0	70.0
6	70.0	70.0	70.0
7	70.0	70.0	70.0
8	70.0	70.0	70.0
9	70.0	70.0	70.0
10	70.0	70.0	70.0
11	70.0	70.0	70.0
12	70.0	70.0	70.0

Capacity Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Number Of Lanes

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	5	5	5	5	5	4	5	5	5	5	5
2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2	2	2	2
12	2	2	2	2	2	2	2	2	2	2	2

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	5	4	4	4	5	4	3	3	3	3	3
2	2	2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2	2	2	2
12	2	2	2	2	2	2	2	2	2	2	2

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	3	4	3
2	2	2	2
3	2	2	2
4	2	2	2
5	2	2	2
6	2	2	2
7	2	2	2
8	2	2	2
9	2	2	2
10	2	2	2
11	2	2	2
12	2	2	2

Destination Demand Adjustment Factor

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Lane Width (m)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
2											
3											
4											
5											
6											
7											
8											
9											

Time Interval	
10	
11	
12	

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	12.0	12.0	12.0
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Lateral Clearance (m)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	6.0	6.0	6.0
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Percent Trucks Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	6	6	6	6	6	6	6	6	6	6	6
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	6	6	6	6	6	6	6	6	6	6	6
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0

4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	6	6	6
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

Percent RV's Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0

10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

Et Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
9	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
11	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
12	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
9	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
11	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
12	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	2.5	2.5	2.5
2	1.5	1.5	1.5
3	1.5	1.5	1.5
4	1.5	1.5	1.5
5	1.5	1.5	1.5
6	1.5	1.5	1.5
7	1.5	1.5	1.5
8	1.5	1.5	1.5
9	1.5	1.5	1.5
10	1.5	1.5	1.5
11	1.5	1.5	1.5
12	1.5	1.5	1.5

Er Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
10	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
11	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
12	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
10	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
11	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
12	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.2	1.2	1.2
2	1.2	1.2	1.2
3	1.2	1.2	1.2

4	1.2	1.2	1.2
5	1.2	1.2	1.2
6	1.2	1.2	1.2
7	1.2	1.2	1.2
8	1.2	1.2	1.2
9	1.2	1.2	1.2
10	1.2	1.2	1.2
11	1.2	1.2	1.2
12	1.2	1.2	1.2

Percent Trucks Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					6		6		6		6
2					0		0		0		0
3					0		0		0		0
4					0		0		0		0
5					0		0		0		0
6					0		0		0		0
7					0		0		0		0
8					0		0		0		0
9					0		0		0		0
10					0		0		0		0
11					0		0		0		0
12					0		0		0		0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	6		6					6		6	
2	0		0					0		0	
3	0		0					0		0	
4	0		0					0		0	
5	0		0					0		0	
6	0		0					0		0	
7	0		0					0		0	
8	0		0					0		0	
9	0		0					0		0	
10	0		0					0		0	
11	0		0					0		0	
12	0		0					0		0	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	6		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		

10	0
11	0
12	0

Percent RVs Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					0		0		0		0
2					0		0		0		0
3					0		0		0		0
4					0		0		0		0
5					0		0		0		0
6					0		0		0		0
7					0		0		0		0
8					0		0		0		0
9					0		0		0		0
10					0		0		0		0
11					0		0		0		0
12					0		0		0		0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0		0					0		0	
2	0		0					0		0	
3	0		0					0		0	
4	0		0					0		0	
5	0		0					0		0	
6	0		0					0		0	
7	0		0					0		0	
8	0		0					0		0	
9	0		0					0		0	
10	0		0					0		0	
11	0		0					0		0	
12	0		0					0		0	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	0		
9	0		
10	0		
11	0		
12	0		

Et Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					2.5		2.5		2.5		2.5
2					1.5		1.5		1.5		1.5
3					1.5		1.5		1.5		1.5
4					1.5		1.5		1.5		1.5
5					1.5		1.5		1.5		1.5
6					1.5		1.5		1.5		1.5
7					1.5		1.5		1.5		1.5
8					1.5		1.5		1.5		1.5
9					1.5		1.5		1.5		1.5
10					1.5		1.5		1.5		1.5
11					1.5		1.5		1.5		1.5
12					1.5		1.5		1.5		1.5

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	2.5		2.5					2.5		2.5	
2	1.5		1.5					1.5		1.5	
3	1.5		1.5					1.5		1.5	
4	1.5		1.5					1.5		1.5	
5	1.5		1.5					1.5		1.5	
6	1.5		1.5					1.5		1.5	
7	1.5		1.5					1.5		1.5	
8	1.5		1.5					1.5		1.5	
9	1.5		1.5					1.5		1.5	
10	1.5		1.5					1.5		1.5	
11	1.5		1.5					1.5		1.5	
12	1.5		1.5					1.5		1.5	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	2.5		
2	1.5		
3	1.5		
4	1.5		
5	1.5		
6	1.5		
7	1.5		
8	1.5		
9	1.5		
10	1.5		
11	1.5		
12	1.5		

Er Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR

1					1.2		1.2		1.2		1.2
2					1.2		1.2		1.2		1.2
3					1.2		1.2		1.2		1.2
4					1.2		1.2		1.2		1.2
5					1.2		1.2		1.2		1.2
6					1.2		1.2		1.2		1.2
7					1.2		1.2		1.2		1.2
8					1.2		1.2		1.2		1.2
9					1.2		1.2		1.2		1.2
10					1.2		1.2		1.2		1.2
11					1.2		1.2		1.2		1.2
12					1.2		1.2		1.2		1.2

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.2		1.2					1.2		1.2	
2	1.2		1.2					1.2		1.2	
3	1.2		1.2					1.2		1.2	
4	1.2		1.2					1.2		1.2	
5	1.2		1.2					1.2		1.2	
6	1.2		1.2					1.2		1.2	
7	1.2		1.2					1.2		1.2	
8	1.2		1.2					1.2		1.2	
9	1.2		1.2					1.2		1.2	
10	1.2		1.2					1.2		1.2	
11	1.2		1.2					1.2		1.2	
12	1.2		1.2					1.2		1.2	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.2		
2	1.2		
3	1.2		
4	1.2		
5	1.2		
6	1.2		
7	1.2		
8	1.2		
9	1.2		
10	1.2		
11	1.2		
12	1.2		

Ramp Free-Flow Speed (kph)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					35.0		45.0		45.0		40.0
2					35.0		35.0		35.0		35.0
3					35.0		35.0		35.0		35.0
4					35.0		35.0		35.0		35.0
5					35.0		35.0		35.0		35.0
6					35.0		35.0		35.0		35.0

7					35.0		35.0		35.0		35.0
8					35.0		35.0		35.0		35.0
9					35.0		35.0		35.0		35.0
10					35.0		35.0		35.0		35.0
11					35.0		35.0		35.0		35.0
12					35.0		35.0		35.0		35.0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	40.0		50.0					45.0		45.0	
2	35.0		35.0					35.0		35.0	
3	35.0		35.0					35.0		35.0	
4	35.0		35.0					35.0		35.0	
5	35.0		35.0					35.0		35.0	
6	35.0		35.0					35.0		35.0	
7	35.0		35.0					35.0		35.0	
8	35.0		35.0					35.0		35.0	
9	35.0		35.0					35.0		35.0	
10	35.0		35.0					35.0		35.0	
11	35.0		35.0					35.0		35.0	
12	35.0		35.0					35.0		35.0	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	45.0		
2	35.0		
3	35.0		
4	35.0		
5	35.0		
6	35.0		
7	35.0		
8	35.0		
9	35.0		
10	35.0		
11	35.0		
12	35.0		

Ramp Metering Rate

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					2100		2100		2100		2100
2					2100		2100		2100		2100
3					2100		2100		2100		2100
4					2100		2100		2100		2100
5					2100		2100		2100		2100
6					2100		2100		2100		2100
7					2100		2100		2100		2100
8					2100		2100		2100		2100
9					2100		2100		2100		2100
10					2100		2100		2100		2100
11					2100		2100		2100		2100
12					2100		2100		2100		2100

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	2100		2100					2100		2100	
2	2100		2100					2100		2100	
3	2100		2100					2100		2100	
4	2100		2100					2100		2100	
5	2100		2100					2100		2100	
6	2100		2100					2100		2100	
7	2100		2100					2100		2100	
8	2100		2100					2100		2100	
9	2100		2100					2100		2100	
10	2100		2100					2100		2100	
11	2100		2100					2100		2100	
12	2100		2100					2100		2100	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	2100		
2	2100		
3	2100		
4	2100		
5	2100		
6	2100		
7	2100		
8	2100		
9	2100		
10	2100		
11	2100		
12	2100		

Driver Population Adj. Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B

1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.00	1.00	1.00
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Driver Population Adj. Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					1.00		1.00		1.00		1.00
2					1.00		1.00		1.00		1.00
3					1.00		1.00		1.00		1.00
4					1.00		1.00		1.00		1.00
5					1.00		1.00		1.00		1.00
6					1.00		1.00		1.00		1.00
7					1.00		1.00		1.00		1.00
8					1.00		1.00		1.00		1.00
9					1.00		1.00		1.00		1.00
10					1.00		1.00		1.00		1.00
11					1.00		1.00		1.00		1.00
12					1.00		1.00		1.00		1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.00		1.00					1.00		1.00	
2	1.00		1.00					1.00		1.00	
3	1.00		1.00					1.00		1.00	
4	1.00		1.00					1.00		1.00	
5	1.00		1.00					1.00		1.00	
6	1.00		1.00					1.00		1.00	

7	1.00		1.00					1.00		1.00	
8	1.00		1.00					1.00		1.00	
9	1.00		1.00					1.00		1.00	
10	1.00		1.00					1.00		1.00	
11	1.00		1.00					1.00		1.00	
12	1.00		1.00					1.00		1.00	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	1.00		
2	1.00		
3	1.00		
4	1.00		
5	1.00		
6	1.00		
7	1.00		
8	1.00		
9	1.00		
10	1.00		
11	1.00		
12	1.00		

Peak-Hour Factor Free

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0.95	0.95	0.95
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	1.00	1.00	1.00
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00

Peak-Hour Factor_Ramp

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1					1.00		1.00		1.00		1.00
2					1.00		1.00		1.00		1.00
3					1.00		1.00		1.00		1.00
4					1.00		1.00		1.00		1.00
5					1.00		1.00		1.00		1.00
6					1.00		1.00		1.00		1.00
7					1.00		1.00		1.00		1.00
8					1.00		1.00		1.00		1.00
9					1.00		1.00		1.00		1.00
10					1.00		1.00		1.00		1.00
11					1.00		1.00		1.00		1.00
12					1.00		1.00		1.00		1.00

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	1.00		1.00					1.00		0.95	
2	1.00		1.00					1.00		1.00	
3	1.00		1.00					1.00		1.00	
4	1.00		1.00					1.00		1.00	
5	1.00		1.00					1.00		1.00	
6	1.00		1.00					1.00		1.00	
7	1.00		1.00					1.00		1.00	
8	1.00		1.00					1.00		1.00	
9	1.00		1.00					1.00		1.00	
10	1.00		1.00					1.00		1.00	
11	1.00		1.00					1.00		1.00	
12	1.00		1.00					1.00		1.00	

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B

1	0.95
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
11	1.00
12	1.00

Free Flow Speed Type

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0	0	0	0	0	0	0	0	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0	0	0
2	1	1	1
3	1	1	1
4	1	1	1
5	1	1	1
6	1	1	1

7	1	1	1
8	1	1	1
9	1	1	1
10	1	1	1
11	1	1	1
12	1	1	1

Capacity

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	10780	10780	10780	9104	10321	8275	10321	10321	10321	10321	10550
2	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
3	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
4	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
5	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
6	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
7	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
8	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
9	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
10	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
11	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800
12	4800	4800	4800		4800	4800	4800	4800	4800	4800	4800

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	10550	8385	8385	8385	8916	8385	6248	6248	6248	6248	6248
2	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
3	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
4	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
5	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
6	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
7	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
8	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
9	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
10	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
11	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800
12	4800	4800	4800	4800		4800	4800	4800	4800	4800	4800

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	6248	7250	6248
2	4800		4800
3	4800		4800
4	4800		4800
5	4800		4800
6	4800		4800
7	4800		4800
8	4800		4800
9	4800		4800
10	4800		4800
11	4800		4800
12	4800		4800

ESTIMATED CAPACITY (pc/hr) AND D/C RATIO MATRIX

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0.71	0.71	0.71	0.88	0.64	0.69	0.63	0.63	0.72	0.72	0.71
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	10780	10780	10780	9104	10321	8275	10321	10321	10321	10321	10550

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0.68	0.68	0.72	0.72	0.69	0.63	0.84	0.85	0.85	0.89	0.89
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	10550	8385	8385	8385	8916	8385	6248	6248	6248	6248	6248

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0.91	0.81	0.91
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Capacity	6248	7250	6248

ESTIMATED CAPACITY (pc/hr) AND V/C RATIO MATRIX

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0.71	0.71	0.71	0.88	0.64	0.69	0.63	0.63	0.72	0.72	0.71
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	10780	10780	10780	9104	10321	8275	10321	10321	10321	10321	10550

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0.68	0.68	0.72	0.72	0.69	0.63	0.84	0.85	0.85	0.89	0.89
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
Capacity	10550	8385	8385	8385	8916	8385	6248	6248	6248	6248	6248

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0.91	0.81	0.91
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
Capacity	6248	7250	6248

ESTIMATED SEGMENT SPEEDS (mi/h)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	64.7	64.7	64.7	48.4	52.7	55.4	50.8	54.3	48.3	48.3	57.7
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	56.0	58.3	53.6	57.9	51.1	57.1	56.4	50.6	56.4	50.2	55.4
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	49.2	52.2	54.9
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

ESTIMATED SEGMENT DENSITIES (pc/mi/ln) AND LOS

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	26.9	26.9	26.9	33.2	5.8	29.7	43.5	27.4	56.4	56.4	43.8
	D	D	D	D	A	D	E	D	E	F	E
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	21.0	28.2	42.6	29.9	24.1	26.5	35.8	32.2	36.0	32.5	38.3
	C	D	E	D	C	D	E	D	E	D	E
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B

1	35.3 E	28.2 D	39.6 E
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

ESTIMATED QUEUE LENGTHS (ft.)

Segment Number and Type

Time Interval	1 B	2 B	3 B	4 WA	5 OFR	6 B	7 ONR	8 B	9 ONR	10 R	11 OFR
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	12 OFR	13 B	14 ONR	15 B	16 WA	17 B	18 B	19 ONR	20 B	21 ONR	22 B
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0

Segment Number and Type

Time Interval	23 ONR	24 WA	25 B
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

SUMMARY OF FACILITYWIDE PERFORMANCE MEASURES

Performance Measures

Time Interval	pc-mi of Travel	pc-h of Travel	pc-h of Delay	Avg. Speed (mi/h)	Avg. Density (pc/mi/ln)	Facility Travel Time (min)
1	8883.1	163.8	10.8	54.2	32.37	6.4
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
Overall	8883	163.8	9.8	54.2		6.4

Back cover photograph: Interstate I-5 Bridge
Courtesy of Columbia River Crossing Project
columbiarivercrossing.org

URS

Appendix E: Performance Measures Work Group Materials

Performance Measures Report

Performance Measures

The Performance Measures work group focused on travel times; safety; greenhouse gas emissions; and overall benefit/cost. Project scenarios included the following:

- *Locally Preferred Alternative (2030):* Replacement river crossing with three through lanes and three add/drop lanes; I-5 highway improvements, including improvements at seven interchanges; extension of light rail from the Expo Center to Clark College in Vancouver; bicycle and pedestrian facility improvements; tolling at the river crossing; and, transportation demand and system management measures.
- *Locally Preferred Alternative – Phase 1 (2030):* Includes all elements of the Locally Preferred Alternative (LPA) except construction of the I-5 braided on- and off-ramps at Victory Boulevard, the Marine Drive interchange flyover, and the northern half of the I-5/SR 500 interchange. This scenario also assumes the new Columbia River bridges would be striped for 10 highway lanes (three through lanes and two add/drop lanes) not for 12 highway lanes; however, there is no difference in bridge width.
- *No Build (2030):* Assumes the CRC project is not built. Also assumes that the same population and employment growth occurs; and, the same transportation and land use projects are built, that are assumed in the LPA scenarios.
- *Existing (2005):* Baseline information derived from the existing transportation network, population and employment levels from year 2005.

Travel times

Travel times were summarized for each mode along I-5 including auto/commuter, freight, and auto/commuter on I-205 for the most highly used routes for each specific mode. Listed below is a very brief summary of the findings, more detailed information is available if requested.

Overall travel time findings

The work group found that both the LPA Full Build and LPA Phase 1 scenarios provide significant improvements over existing conditions and the No-Build scenarios. General findings on build scenarios:

- **Peak a.m. southbound** travel times on I-5 are significantly improved. Southbound traffic from connecting east/west facilities benefit from dramatically improved travel times in Washington due to reduced delays and queues on SR 500 and SR 14 entering southbound I-5. Southbound a.m. travel times are limited by downstream bottlenecks at Going Street/ I-405 and the Rose Quarter.
- **Peak p.m. northbound** travel times on I-5 are dramatically improved. The LPA Full Build is slightly faster than the LPA Phase 1 alternative due to increased operations near the I-5 Bridge.
- **Both Build scenarios** provide significant benefit to freight compared to the No Build scenario considering freight typically travels off peak and the number of hours of uncongested times increases from 9 hours under the No Build scenario to 22 hours under the Build scenarios.
- **Transit summary bullet…**
- **I-205 northbound and southbound** travel times are improved with both CRC Build scenarios because the combination of improved transit, lane capacity and the DEIS level of toll keeps traffic in the I-5 corridor compared to the No Build which diverts significant I-5 traffic to I-205 because excessive I-5 No Build congestion levels.

Commuters

- **Southbound a.m.** travel times under both the No Build and Existing scenarios showed significant delays at SR 500 and SR14 westbound to I-5 southbound, creating queues and increased travel time due to backups on these facilities.
- **Southbound a.m**. travel times in both CRC Build scenarios improve significantly over Existing and No Build. Even more significant travel time savings are constrained due to downstream bottlenecks at Going/ I-405 and the Rose Quarter.
- **Northbound p.m.** travel times under both CRC Build scenarios demonstrate dramatic travel time savings. For example between the Morrison Street merge and SR 500 the travel time is reduced from 40 minutes in No Build to 17 minutes with the LPA Full Build. A slight difference of one minute between the Full Build compared to LPA Phase 1 was due to increased operations near the I-5 Bridge.

Freight

- **Southbound a.m.** travel times for most freight O/D pairings had modest improvements for the CRC Build over existing conditions and No-Build scenarios due to the affects of upstream and downstream metering at different bottlenecks under different scenarios. Travel times to and from Mill Plain and Going Street follow similar patterns as summarized under for the commuter patterns.
- **Southbound a.m. freight entering I-5 at Marine drive** will experience longer travel times for the two CRC Build scenarios compared to the No Build scenario due to the interactions of existing bottlenecks upstream and downstream of Marine Drive and the I-5 Bridge metering downstream throughput under the No Build scenario versus trucks entering I-5 in a congested segment under the Build scenarios.
- **Northbound p.m.** CRC Build alternatives provided dramatic travel time improvements to freight in both build scenarios similar to that received by commuters (16 minutes for LPA Full Build scenario vs. 43 minutes for the No Build scenario from I-84 spilt to Mill Plain Boulevard).
- **Southbound a.m. and northbound p.m. build scenarios** provide significant benefit to freight (freight travels more off peak than during peak), allowing for 22 hours of uncongested off-peak freight travel time vs. only 9 available uncongested off peak hours in a 24-hour period with no-build.

[Transit-placeholder]

I-205

- **Southbound** peak travel times for both CRC Build scenarios demonstrate slightly improved travel times compared to the No Build scenario. The combination of improved transit and lane capacity along with the moderate toll rate for the CRC Build alternatives keeps I-5 traffic in the I-5 corridor compared to the No Build scenario which diverts traffic to I-205 because of excessive I-5 congestion.
- **Northbound** peak travel times demonstrate slightly more savings for the CRC Build scenarios compared to Existing and No Build scenarios as compared to southbound peak travel times.

Safety

Project scenarios were compared with respect to the total number of accidents expected on an annual basis in the project area. Both the Full Build and LPA Phase 1 scenarios reduced the number of accidents compared with the No Build scenario. Most of the reductions in accidents were realized in the reduction of substandard merges, diverges, and weaving sections, and reduced congestion throughout the project area, particularly areas where heavy volumes of trucks are entering and exiting I-5.

- Existing accidents – 400/yr
- 2030 No-Build accidents -750/yr
- 2030 Full Build accidents – 200/yr
- 2030 LPA Phase 1 accidents – 210-240/yr

Greenhouse Gas Emissions

Project scenarios were compared for their contributions of greenhouse gas emissions (GHG). The methodology for calculating GHG follows the same analysis peer-reviewed by the CRC Greenhouse Gas Emissions Expert Review Panel in January 2009. This methodology calculates GHG emissions based on energy consumed during construction and operation of the CRC project. Findings show the most GHG benefits for the Build scenarios when compared to the No Build scenario.

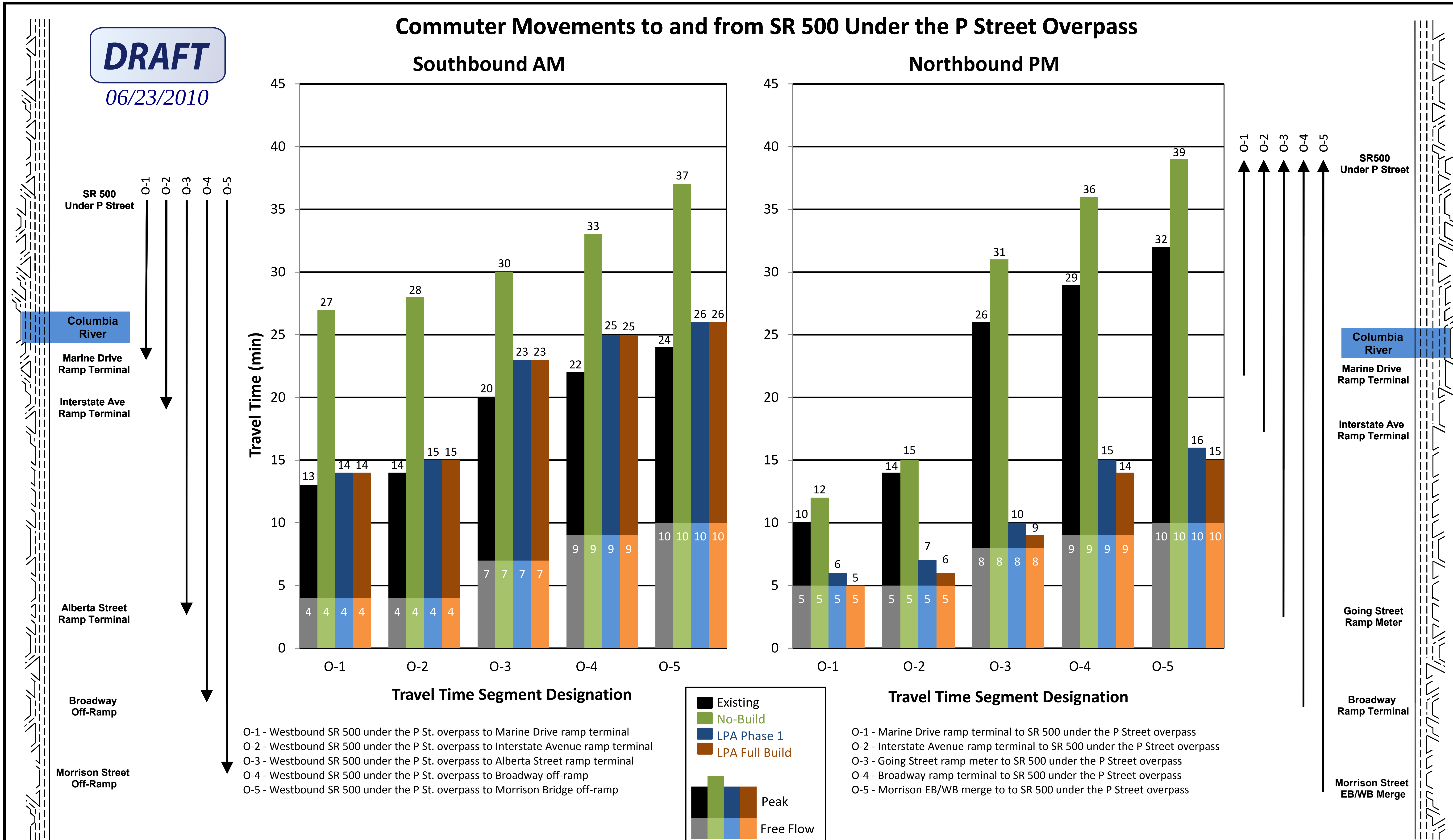
GHG emissions are estimated in 2 manners, one in the corridor itself and second regionally accounting for diversion to I-205 and other arterials. According to these estimates, the Full Build LPA has .5% fewer emissions region-wide and 4.4% fewer emissions in the corridor itself. In addition to these reductions, the LPA Phase 1 has the same regional emissions as the Full Build LPA and in the corridor itself it has an additional 1.1% reduction over and above the Full Build LPA.

Benefit/Cost

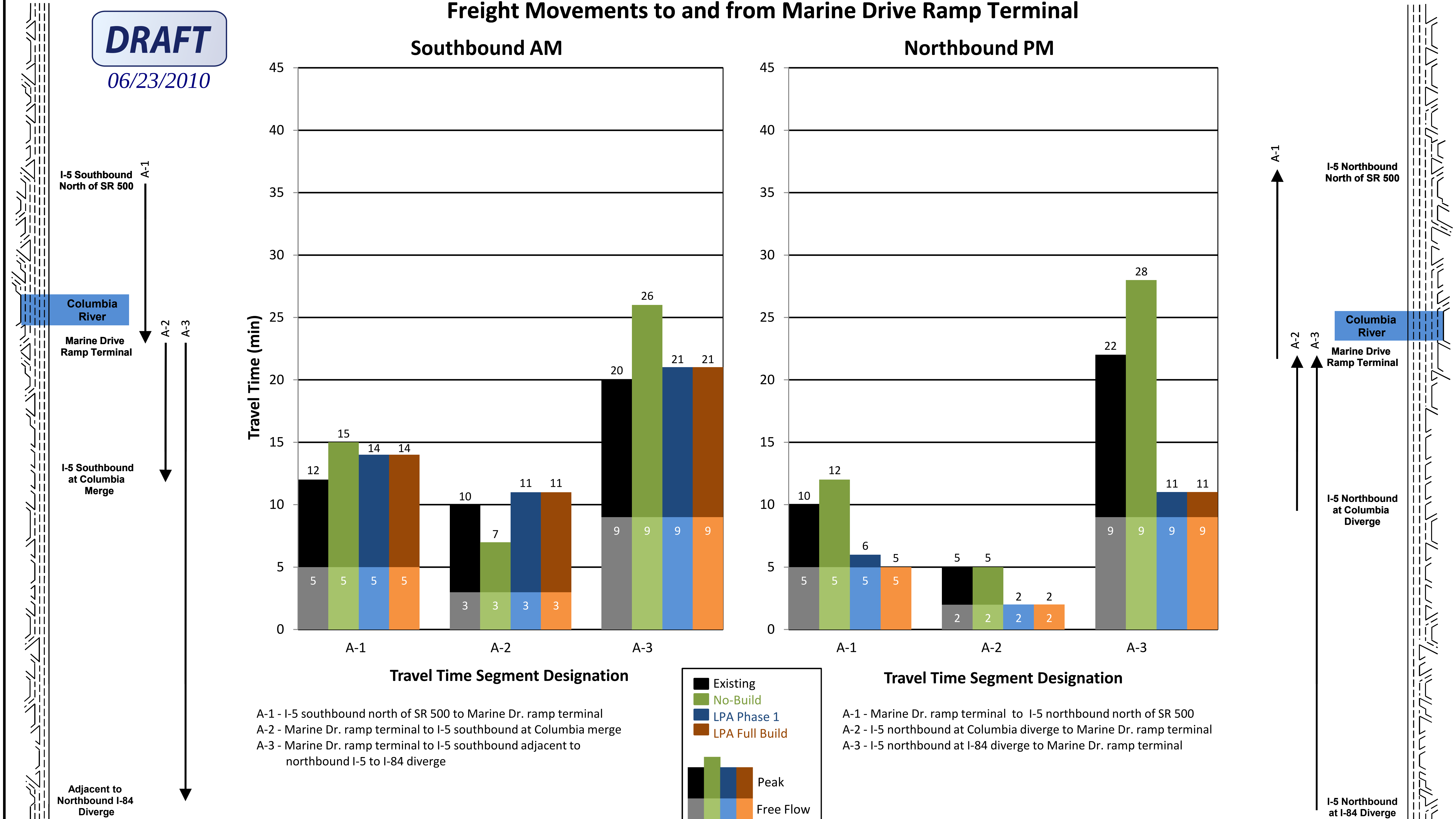
A calculated benefit/cost ratio was developed for each of the scenarios to provide a basis for comparing the multiple benefits and costs associated with project performance. The analysis was conducted using methodologies and metrics recognized and championed by the US Department of Transportation, including FHWA and FTA. The principal categories of benefit considered are congestion management benefits to the area, mobility improvement benefits, economic development benefits in the region, and bridge lift time savings.

CRC convened a panel of stakeholders and subject matter experts, including practitioners and local academic experts to scrutinize the evaluation methodology, the inputs used to conduct the evaluation and the analytic method. The stakeholder panel reviewed the calculations used in each benefit category and provided input on adjustments and refinements and suggestions on appropriate input values. Either build option demonstrates substantial benefit per cost compared to the No Build.

- Full Build benefit/cost: 1.9:1
- LPA Phase 1 benefit cost: 2.0:1
- LPA Phase 1 with Marine Dr flyover and Victory Braid: 1.9+:1


DRAFT
06/23/2010
Commuter Movements to and from SR 500 Under the P Street Overpass
Southbound AM
Northbound PM
Travel Time (min)
0
5
10
15
20
25
30
35
40
45
O-1
O-2
O-3
O-4
O-5
13 27 14 14
4 4 4 4
14 28 15 15
4 4 4 4
20 30 23 23
7 7 7 7
22 33 25 25
9 9 9 9
24 37 26 26
10 10 10 10
10 12 6 5
5 5 5 5
14 15 7 6
5 5 5 5
26 31 10 9
8 8 8 8
29 36 15 14
9 9 9 9
32 39 16 15
10 10 10 10
Travel Time Segment Designation
Existing
No-Build
LPA Phase 1
LPA Full Build
Peak
Free Flow
SR 500 Under P Street
Columbia River
Marine Drive Ramp Terminal
Interstate Ave Ramp Terminal
Alberta Street Ramp Terminal
Broadway Off-Ramp
Morrison Street Off-Ramp
SR500 Under P Street
Going Street Ramp Meter
Broadway Ramp Terminal
Morrison Street EB/WB Merge
O-1 - Westbound SR 500 under the P St. overpass to Marine Drive ramp terminal
O-2 - Westbound SR 500 under the P St. overpass to Interstate Avenue ramp terminal
O-3 - Westbound SR 500 under the P St. overpass to Alberta Street ramp terminal
O-4 - Westbound SR 500 under the P St. overpass to Broadway off-ramp
O-5 - Westbound SR 500 under the P St. overpass to Morrison Bridge off-ramp
O-1 - Marine Drive ramp terminal to SR 500 under the P Street overpass
O-2 - Interstate Avenue ramp terminal to SR 500 under the P Street overpass
O-3 - Going Street ramp meter to SR 500 under the P Street overpass
O-4 - Broadway ramp terminal to SR 500 under the P Street overpass
O-5 - Morrison EB/WB merge to to SR 500 under the P Street overpass

Freight Movements to and from Marine Drive Ramp Terminal



A-1 - I-5 southbound north of SR 500 to Marine Dr. ramp terminal
A-2 - Marine Dr. ramp terminal to I-5 southbound at Columbia merge
A-3 - Marine Dr. ramp terminal to I-5 southbound adjacent to northbound I-5 to I-84 diverge

A-1 - Marine Dr. ramp terminal to I-5 northbound north of SR 500
A-2 - I-5 northbound at Columbia diverge to Marine Dr. ramp terminal
A-3 - I-5 northbound at I-84 diverge to Marine Dr. ramp terminal

Appendix F: Post-Construction Travel Demand Management Work Group Materials

CRC Post-Construction TDM Committee Report
Report to Project Sponsors Council
July 16, 2010

Principle Recommendation

- Develop TDM strategies to shift an additional 11% of peak period person trips crossing the bridge in 2030 to non-SOV modes.
- This shift would reduce 2030 vehicle bridge crossing demand by 10% beyond the 2030 regional travel model forecast used for the LPA.

Recommended Strategies to Reduce Drive-Alone Trips

- Individualized Marketing
  - Provide personalized travel option information to corridor employees and residents
- Financial Incentives:
  - short-term (up to six month) financial incentives for commuters to vanpool, take transit or carpool
  - $0 toll for carpools, vanpools and buses

Projected Trip Reductions Based On:

- Local experience in Vancouver and Washington State (Commute Trip Reduction) and Portland (SmartTrips)
- For example, Portland annually reduces drive alone trips 8-13% in targeted geographic areas using "SmartTrips" individualized marketing programs
- Research related to the cost effectiveness and scalability of rideshare services
- Benchmarking comparison with Central Puget Sound and Bay Area corridors
- Research in WSDOT's SR-520 Transportation Discipline Report

Benefits of Post-Construction TDM Program

- Increases efficiency of all designs by moving more people in fewer vehicles
- Lengthens functional lifespan of all designs
- Reduces costs for Clark County commuters using travel options
- Reduces fuel consumption and greenhouse gas emissions from all designs

What's Not in TDM Committee Recommendation that Could Reduce Drive-Alone Further?

- Increased LRT ridership
- HOV / Managed lanes and/or HOV ramps
- $3 peak period toll (which may further reduce peak demand)
- Compact development financial incentives

Implications/Issues

- Increased number of C-TRAN buses in downtown Portland
- Increased demand for Park ‘n Ride spaces in Clark County
- Need for regional coordinating or management structure
- Impact of $0 toll incentive on financial plan

2030 Demand and Mode Split Projections

2030 LPA PM Peak 4-Hours I-5 NB without Enhanced TDM Program					
	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	23,815	77%	1.0	23,815	54.3%
Carpool	5,025	16%	2.2	10,925	24.9%
Carpool >4 / Vanpools	90	0%	5.0	450	1.0%
Trucks	1,900	6%	1.0	1,900	4.3%
Vehicles(subtotal)	**30,830**	**99.9%**	**1.20**	**37,090**	**84.5%**
Buses	25	0%	51.0	1,275	2.9%
LRT				4,750	10.8%
Transit (subtotal)	**25**	**0.1%**		**6,025**	**13.7%**
Pedestrians				80	0.2%
Bicyclists				700	1.6%
Ped/Bike (subtotal)				**780**	**1.8%**
Total River Crossings	**30,855**	**100.0%**		**43,895**	**100.0%**

2030 LPA PM Peak 4-Hours I-5 NB with Special TDM Program + $0 Carpool Toll					
	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	18,749	67%	1.0	18,749	43.1%
Carpool	7,020	25%	2.1	14,916	34.3%
Carpool >4 / Vanpools	136	0%	5.5	750	1.7%
Trucks	1,900	7%	1.0	1,900	4.4%
Vehicles(subtotal)	**27,806**	**99.9%**	**1.31**	**36,315**	**83.4%**
Buses	33	0%	50.8	1,675	3.8%
LRT				4,750	10.9%
Transit (subtotal)	**33**	**0.1%**		**6,425**	**14.8%**
Pedestrians				80	0.2%
Bicyclists				700	1.6%
Ped/Bike (subtotal)				**780**	**1.8%**
Total River Crossings	**27,839**	**100.0%**		**43,520**	**100.0%**

Draft: 7-14-2010

2005 Existing PM Peak 4-Hours I-5 NB	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	16,490	77%	1.0	16,490	60.9%
Carpool	3,795	18%	2.1	7,885	29.1%
Carpool >4 / Vanpools	15	0%	5.0	75	0.3%
Trucks	1,025	5%	1.0	1,025	3.8%
Vehicles(subtotal)	**21,325**	**99.8%**	**1.19**	**25,475**	**94.1%**
Buses	50	0%	29.5	1,475	5.4%
LRT				0	0.0%
Transit (subtotal)	**50**	**0.2%**		**1,475**	**5.4%**
Pedestrians				20	0.1%
Bicyclists				100	0.4%
Ped/Bike (subtotal)				**120**	**0.4%**
Total River Crossings	**21,375**	**100.0%**		**27,070**	**100.0%**

Draft: 7-14-2010

2030 No-Build PM Peak 4-Hours I-5 NB	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	21,305	75%	1.0	21,305	57.8%
Carpool	4,975	18%	2.1	10,495	28.5%
Carpool >4 / Vanpools	40	0%	5.0	200	0.5%
Trucks	1,900	7%	1.0	1,900	5.2%
Vehicles(subtotal)	**28,220**	**99.8%**	**1.20**	**33,900**	**91.9%**
Buses	60	0%	46.7	2,800	7.6%
LRT				0	0.0%
Transit (subtotal)	**60**	**0.2%**		**2,800**	**7.6%**
Pedestrians				30	0.1%
Bicyclists				150	0.4%
Ped/Bike (subtotal)				**180**	**0.5%**
Total River Crossings	**28,280**	**100.0%**		**36,880**	**100.0%**

Draft: 7-14-2010

2030 LPA PM Peak 4-Hours I-5 NB without Special TDM Program	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	23,815	77%	1.0	23,815	54.3%
Carpool	5,025	16%	2.2	10,925	24.9%
Carpool >4 / Vanpools	90	0%	5.0	450	1.0%
Trucks	1,900	6%	1.0	1,900	4.3%
Vehicles(subtotal)	**30,830**	**99.9%**	**1.20**	**37,090**	**84.5%**
Buses	25	0%	51.0	1,275	2.9%
LRT				4,750	10.8%
Transit (subtotal)	**25**	**0.1%**		**6,025**	**13.7%**
Pedestrians				80	0.2%
Bicyclists				700	1.6%
Ped/Bike (subtotal)				**780**	**1.8%**
Total River Crossings	**30,855**	**100.0%**		**43,895**	**100.0%**

Draft: 7-14-2010

2030 LPA PM Peak 4-Hours I-5 NB with Special TDM Program					
	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	20,490	71%	1.0	20,490	47.1%
Carpool	6,150	21%	2.1	13,175	30.3%
Carpool >4 / Vanpools	136	0%	5.5	750	1.7%
Trucks	1,900	7%	1.0	1,900	4.4%
Vehicles(subtotal)	**28,676**	**99.9%**	**1.27**	**36,315**	**83.4%**
Buses	33	0%	50.8	1,675	3.8%
LRT				4,750	10.9%
Transit (subtotal)	**33**	**0.1%**		**6,425**	**14.8%**
Pedestrians				80	0.2%
Bicyclists				700	1.6%
Ped/Bike (subtotal)				**780**	**1.8%**
Total River Crossings	**28,709**	**100.0%**		**43,520**	**100.0%**

Special TDM Program for Post Construction

Category	**4-Hour Peak Person Trip Reduction**
Telework	187
Compressed work week	188
Vanpooling	300
Carpooling	2,250
Public Transit	400
Total	3,325

Draft: 7-14-2010

TDM Work Group Recommended

2030 LPA PM Peak 4-Hours I-5 NB with Special TDM Program + $0 Carpool Toll	Vehicles	% of Vehicles	Occupancy	Persons	% of Persons
Drive Alone	18,749	67%	1.0	18,749	43.1%
Carpool	7,020	25%	2.1	14,916	34.3%
Carpool >4 / Vanpools	136	0%	5.5	750	1.7%
Trucks	1,900	7%	1.0	1,900	4.4%
Vehicles(subtotal)	**27,806**	**99.9%**	**1.31**	**36,315**	**83.4%**
Buses	33	0%	50.8	1,675	3.8%
LRT				4,750	10.9%
Transit (subtotal)	**33**	**0.1%**		**6,425**	**14.8%**
Pedestrians				80	0.2%
Bicyclists				700	1.6%
Ped/Bike (subtotal)				**780**	**1.8%**
Total River Crossings	**27,839**	**100.0%**		**43,520**	**100.0%**

Assumptions:

4% person increase in 2 person carpool from the LPA with Special TDM Program

Special TDM Program for Post Construction

Category	**4-Hour Peak Person Trip Reduction**
Telework	187
Compressed work week	188
Vanpooling	300
Carpooling	3,990
Public Transit	400
Total	5,065