

Portland / Vancouver

I-5



Draft Technical Report

Functional Descriptions of I-5 Corridor Option Packages

July 18, 2001

DISCLAIMER: As a draft document, all information prior to presentation or use in modeling should be confirmed to ascertain changes which may have been made following this publication.

This technical document is a discussion draft for PAG-level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a "work in progress" and does not reflect final recommendations or the individual views of any project team member.

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I-5 OPTION PACKAGE FUNCTIONAL DESCRIPTIONS

INTRODUCTION

The primary purpose of this technical report is to provide functional descriptions of the option packages currently under consideration for the I-5 corridor between I-205 in Clark County and I-84 in Portland. The descriptions were developed to provide sufficient detail and direction to the staff involved in the travel demand modeling and the conceptual engineering design efforts. Each option package is described “functionally” -- indicating key corridor features such as where roadway connections would occur, how many lanes should be designed/analyzed, and what type of Columbia River crossings would be developed. The information contained in this report is also intended for review and use by decision-makers and policy-makers as they continue to provide oversight on this study.

A great deal of decision-making and option refinement has occurred on this project in recent months. This report focuses only on summarizing those decisions and refinements that directly affect travel demand modeling and conceptual design for each option package. Where modeling is concerned, this report describes where roadway and/or transit connections would likely occur, and for roadway improvements, the number of lanes to be modeled. Specific land use issues or other possible refinements to this project are not discussed herein.

Revision Protocol and Navigation

This report describes the intent of each option package and provides parameters to help guide and bring consistency to the engineering and modeling efforts. It is designed to launch the design and modeling efforts in the right direction, but is not intended to be a living document to keep pace as design evolves. A separate process to capture design revisions and ensure positive hand-off of final designs to the modeling team for network coding will be established.

This report was created in “read-only” format to provide a coordinated point source for any future revisions. It was created in PDF format for use with Adobe Acrobat to support electronic distribution and use of the graphic-intensive report. Each page and figure in this report contains a revision date. As refinements occur, DEA will maintain a log until a reasonable number of revisions are noted. At that time, the entire report or specific components of the report will be updated and redistributed electronically.

The report, when viewed using Adobe Acrobat, incorporates dynamic links to specific information contained herein. Readers may click and move directly to specific pages or figures without scrolling through the entire report.

Report Format and Contents

Following the introduction, the report is organized into 10 sections with section numbers corresponding to option package numbers. Figures are numbered sequentially by section. For the most part, the authors have avoided redundant material presentation. For example, where a particular bridge concept drawing applies to two option packages, it is shown under the first option package only. For the subsequent option package, the reader is referred to the earlier option package to review the bridge concept.

Where applicable, the following information is presented for each option package:

- Functional description
- Overall corridor schematic drawing
- Express bus or LRT service plan and facility descriptions
- Park-and-ride facility identification
- Transit network description
- River crossing and interchange concept schematics

Graphics

A number of graphics are presented in this report that depict overall corridor function, potential corridor modifications, and detailed conceptual bridge crossings. Many of the graphics were originally created as oversized files and are displayed with a grid identifying printable 11x17 inch segments for printing. First, care was taken to ensure that graphics are viewable onscreen using Acrobat. Secondly, it was important that graphics print appropriately in color. Finally, that graphics plot appropriately in black and white. Readers wanting original graphics files for plotting/resizing purposes should contact DEA directly (Mike Baker @ 503-499-0484).

Option Packages and Variations

There are currently 10 option packages identified under this study. Although decisions have been adopted by the Governor’s Task Force (GTF) to defer or not analyze some of the 10 option packages, all of the packages are presented in this report for tracking and consistency. Some option packages have a number of variations to be evaluated. The list of option packages and variations is presented in Table I-1.

TABLE I-1 LIST OF CURRENT OPTION PACKAGE VARIATIONS	
Option Package	Variation Description
Option Package 0:	Existing Conditions
Option Package 1a:	Baseline-No build
Option Package 1b:	Baseline-Constrained, no Delta/Lombard or Rose Quarter improvements
Option Package 1c:	Baseline-Constrained, with Delta/Lombard and Rose Quarter ramp improvements only
Option Package 1d:	Baseline-Priority system, planned regional RTP/MTP bus improvements
Option Package 2:	Express bus <u>without</u> corridor-wide capacity increase
Option Package 3a:	LRT <u>without</u> additional corridor-wide capacity increase- Loop LRT System (SR 500) with joint LRT/arterial bridge
Option Package 3b:	LRT <u>without</u> additional corridor-wide capacity increase- LRT from Expo to Clark college only with LRT only bridge
Option Package 3c:	LRT <u>without</u> additional corridor-wide capacity increase- LRT From Expo to Clark College only, with joint LRT/arterial bridge
<i>Option Package 4:</i>	<i>Commuter Rail (Analysis deferred)</i>
<i>Option Package 5:</i>	<i>Planned regional bus with additional corridor-wide capacity increase (merged with Option Package 6)</i>
Option Package 6a:	Express bus <u>with</u> additional corridor-wide capacity increase (HOV only)
Option Package 7c:	LRT <u>with</u> additional corridor-wide capacity increase (reversible lanes only)
Option Package 8:	New western arterial corridor
<i>Option Package 9:</i>	<i>New freeway (dropped from consideration)</i>
Option Package 10:	Transportation Demand Management (TDM)/Transit

This technical document is a discussion draft for PAG level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a “work in progress” and does not reflect final recommendations or the individual views of any project team member.

Table I-2 presents an additional option package list with further detail such as modeling techniques and sub-variations to be tested.

It should be noted that as currently proposed, Option Package 6 will be designed and evaluated as an high occupancy vehicle (HOV) system only and not also as a reversible lane system. Option Package 7 will be modeled (but not designed) as a reversible lane system only for performance comparison to the Option Package 6 HOV system. If reversible lane system performance is deemed promising under Option 7, a reversible lane system may be evaluated at a later date for Option Package 6 and designed under Option Package 7.

Contact People

- This report was created and is currently maintained by David Evans and Associates, Inc. (DEA) drawing from information provided by sources listed below. Requests for source material contained herein should be directed to DEA (Mike Baker @ 503-499-0484).
 - ◆ Transit network description development was overseen by Metro.
 - ◆ Express bus service plans were developed by C-Tran.
 - ◆ LRT concept drawings were provided by Tri-Met.
 - ◆ Park-and-ride information was overseen by Tri-Met.
- Specific project related questions should be directed to the Agency project management team including
 - ◆ Fred Eberle-ODOT (503-731-8284)
 - ◆ Ed Pickering-WSDOT (360-905-2052)

This section last revised on 7-18-01

Portland/Vancouver I-5 Transportation and Trade Partnership Project
Option Packages Functional Descriptions
Modeling and Concept Design Variations to be Evaluated

Option Package		Option Package Variation			Sub-Variations for Design & Evaluation		
No.	Name	Var.	Description	Modeling Technique	Columbia R. X'ing Option	Description	Modeling Technique
0	Existing	0	Existing Conditions (Year 2000)	Reg. Model	--		
1	Baseline	1a	No-Build - Financially Committed System (Clark County transit service at year 2000 levels)	Reg. Model	--		
		1b	Constrained Baseline - without Delta/Lombard and Rose Quarter improvements (Clark Co. transit service at year 2000 levels)	Reg. Model	--		
		1c	Constrained Baseline - with Delta/Lombard and Rose Quarter (ramps only) improvements (Clark County transit service at year 2000 levels)	New Assign.	--		
		1d	Planned Regional Improvements - using RTP Priority and MTP Systems	Reg. Model	--	Sub: Add Northern Ramps to Columbia Blvd. I/C Sub: Ramp Meter Bypass for trucks: Columbia and Marine Dr Sub: GP improvements to Marine Dr/Hayden Is. interchange	New Assign. Operational New Assign.
2	Exp. Bus to Expo (PIR) in HOV Lanes with Add. Arterial River-Xing Capacity		Joint Use Bridge for Arterial and Express Bus/HOV Traffic, with Ramp Changes at Hayden Is.	Reg. Model	4-lane (1 HOV, 1 GP ea dir.)		
3	Light Rail Transit without Additional Corridor Freeway Capacity	3a	LRT – Loop System (SR 500) with joint LRT and arterial bridge.(arterial connection Vancouver to Columbia Blvd.)	Reg. Model	4-lane arterial w/LRT		
		3b	LRT – Expo to Clark College only with LRT only bridge	Mode Choice			
		3c	LRT – Expo to Clark College only with LRT and arterial/HOV bridge (same as 2)	Reg. Model	4-lane (1 HOV, 1 GP ea dir.)		
4	Commuter Rail without Additional Freeway Capacity		Regional Commuter Rail System	Analysis Deferred			
5	Planned Regional Bus with Additional Freeway Capacity		Merged with Option 6, no independent analysis planned				
6	Express Bus with Additional Corridor Freeway Capacity	6a	Clark County to Downtown Portland, HOV lanes on I-5	Reg. Model	?	"Conceptual" transit link to Portland CBD Sub: Trucks Use HOV Lanes in Non-Peak	Mode Choice Midday Run
7	Light Rail Transit with Additional Corridor Freeway Capacity	7c	LRT Option with Reversible Express Lanes on I-5	Reg. Model	?		
8	New Arterial Road with Columbia River Crossing	8a	New Arterial Road with Columbia River Crossing	Reg. Model	--		
10	TDM/Transit Option		Constrained base (no RQ or DL), Priority transit system w/ LRT loop Preferred TDM (OR and WA)	Mode Choice	--		

1.0. OPTION PACKAGE 1: BASELINE

1.1. Road Network Description

Four 2020 Baseline variations will be modeled and evaluated as a part of this project. Certain variations have been established to test corridor performance and impacts under varied transit investment levels and with and without certain key highway-capacity improvements, namely in the Delta Park/Lombard and Rose Quarter areas.

Each Baseline variation draws from project lists contained in Metro's adopted 2020 Regional Transportation Plan (RTP) and in the Southwest Regional Transportation Council's (RTC) Metropolitan Transportation Plan (MTP) associated with various transportation investment levels.

A brief functional description of each Baseline variation follows. Each Baseline variation builds upon the preceding baseline variation.

- **Option Package 1a- Baseline-No build:** Also referred to as the Financially Committed system, the No-Build variation represents the lowest level of I-5 corridor and regional transportation investment. It includes the existing transportation system, projects currently under construction, and projects committed to be built within the next six years. Key highway projects include the following:
 - ◆ I-5 widening to add third lane each direction (southbound lane for HOV use during the morning peak period) from Main Street to 99th Street (under construction today),
 - ◆ I-5 widening to add third lane each direction (southbound lane for HOV use during the morning peak period) from 99th Street to 134th Street,
 - ◆ Restriping southbound I-5 from Main Street to Mill Plain Blvd. to provide a continuous southbound HOV lane from 134th Street to Mill Plain Blvd.
- **Option Package 1b- Constrained Baseline Without Delta/Lombard & Rose Quarter Improvements:** Relative to the preceding Baseline variation, no additional I-5 corridor projects are identified. However, this baseline variation includes a number of additional transportation improvements not on I-5, such as widening of Marine Drive to five lanes from Terminal 6 to Portland Road, providing a new four-lane bridge to Hayden Island from Marine Drive, improving the Columbia/Killingsworth intersection area and its connection to I-205, and providing a North Lombard overcrossing into Rivergate.
- **Option Package 1c- Constrained Baseline With Delta/Lombard & Rose Quarter Improvements:** This baseline variation includes specific improvements within the Delta Park/Lombard and Rose Quarter areas as described below:
 - ◆ I-5 widening to add a third southbound travel lane through the Delta Park/Lombard area for morning peak period HOV use, and improving I-5's northbound shoulders in this area,
 - ◆ Rose Quarter ramp improvements (only) to address specific weaving, merging, and diverging issues associated with the existing close ramp spacing along this four-lane segment of I-5.

- **Option Package 1d- Priority Baseline With Planned Regional Improvements:** This represents the highest investment level baseline variation and includes specific transportation improvements identified in the RTP and MTP priority investment systems, including increased planned regional transit service levels.

Beyond an increased number of off-corridor regional transportation improvements, the primary addition to I-5 corridor capacity stems from widening I-5 to add a third lane in each direction for general purpose traffic use through the Rose Quarter area between I-84 and I-405 and implementation of specific ramp improvements to address specific weaving, merging, and diverging issues associated with the existing close interchange ramp spacing.

1.2. Transit Network Description

This section includes a description of the identified Tri-Met and C-Tran transit networks to be modeled and evaluated in support of each Baseline variation.

Option Package 1a: This network is intended to test a true no-build concept, where no improvements beyond those currently underway are included in the transit system.

Tri-Met: Tri-Met's No-Build network will be based on the network used to prepare the opening year (2005) forecast for the Interstate MAX FEIS. This network includes Interstate MAX to the Expo Center, Airport MAX, Central City Streetcar and Washington County Commuter Rail. Tri-Met bus service in this network is the same as the existing service, with minor adjustments to coincide with the addition of the capital projects listed in the RTP.

C-TRAN: C-TRAN's No-Build network uses the existing (2001) bus service network and park-and-ride system.

Option Packages 1b&1c: The transit network for these option packages is intended to provide a financially constrained base with which to compare the build scenarios.

Tri-Met: The Tri-Met 2020 Financially Constrained Base network is generally based on the Financially Constrained Transit Network included in the 2000 Regional Transportation Plan (RTP). Although the RTP network includes the extension of light rail from the Expo Center to Clark College, this extension is not included in the I-5 Partnership Financially Constrained transit network. However, a shuttle connection between the Interstate MAX PIR station and the 7th Street Transit Center (with service to Hayden Island) was assumed.

The 2020 Financially Constrained transit network is based on a 1.5% per year growth in service hours for the Tri-Met system. As discussed above, this network includes the Central City Streetcar (to North Macadam) and the Washington County Commuter Rail.

C-TRAN: C-TRAN's 2020 Financially Constrained Base network includes the existing bus service routes and service levels and the existing park-and-rides, plus a new 99th Street park-and-ride with a new express bus route from the park-and-ride to the PIR Interstate MAX station.

Option Package 1d: The Priority Base network reflects a more aggressive level of transit improvement than the Financially Constrained base scenario. This network will provide the base upon which the build scenarios (Option Packages 2 through 10) are developed.

Tri-Met: Tri-Met's 2020 Priority Base transit network is based on the 2000 RTP Strategic (Priority) transit network. As with the Financially Constrained Base network, the Priority Base network also replaces light rail from the Expo Center to Clark College with a shuttle connection between the Interstate MAX PIR station and the 7th Street Transit Center (with service to Hayden Island).

The RTP Priority transit network includes a growth of 2.8% per year in transit service hours. While the RTP Financially Constrained transit network is built on the existing transit service patterns, the Priority Base network includes restructured routes and a considerable amount of new transit service.

The major new transit route in the vicinity of I-5 in North Portland is a route connecting North Portland with Gresham via Columbia Boulevard, Marine Drive and 181st. The key restructured routes in North Portland include a route operating on MLK Jr. Boulevard through to St. Johns via Lombard, including improved frequency on the Killingsworth/Swan Island route. Overall, service frequency on all North Portland routes would be improved substantially over today's levels.

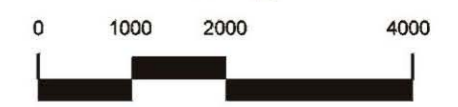
C-TRAN: C-TRAN's 2020 Priority Base network includes an increase in transit service over existing levels. The network includes existing park-and-ride lots and express routes, plus the new 99th Street park-and-ride along I-5 and the new Central County park-and-ride lot along I-205. This network includes express bus connections between park-and-ride lots and the PIR Interstate MAX station along I-5 and between park-and-ride lots and the Parkrose Airport MAX station in the I-205 corridor.

1.3. Corridor Schematic

An overall corridor schematic shown in **Figure 1-1** depicts the functional operation of I-5 under the four Baseline variations. Text call-out boxes direct attention to specific projects or operational features within the corridor. **Figure 1-2** depicts the existing I-5 corridor lane configurations as of 1999. **Figure 1-3** depicts planned 2020 I-5 corridor lane configurations based on current and planned widening from Main Street to 99th Street but not including the following improvements: widening through Delta Park, ramp improvements or widening through Rose Quarter, or I-205/I-5 interchange modifications currently under study.

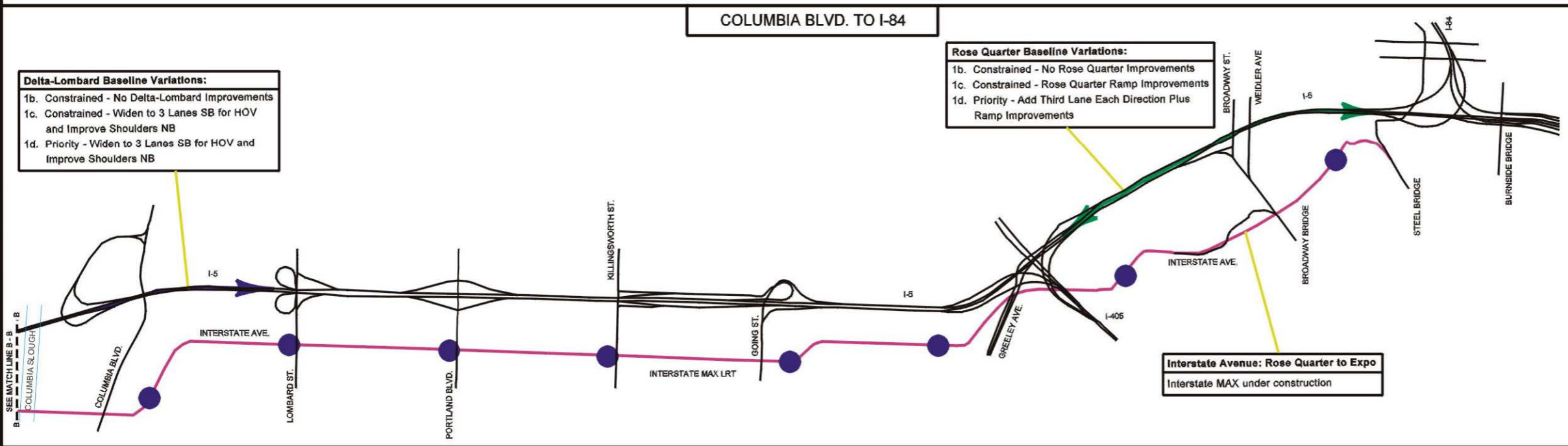
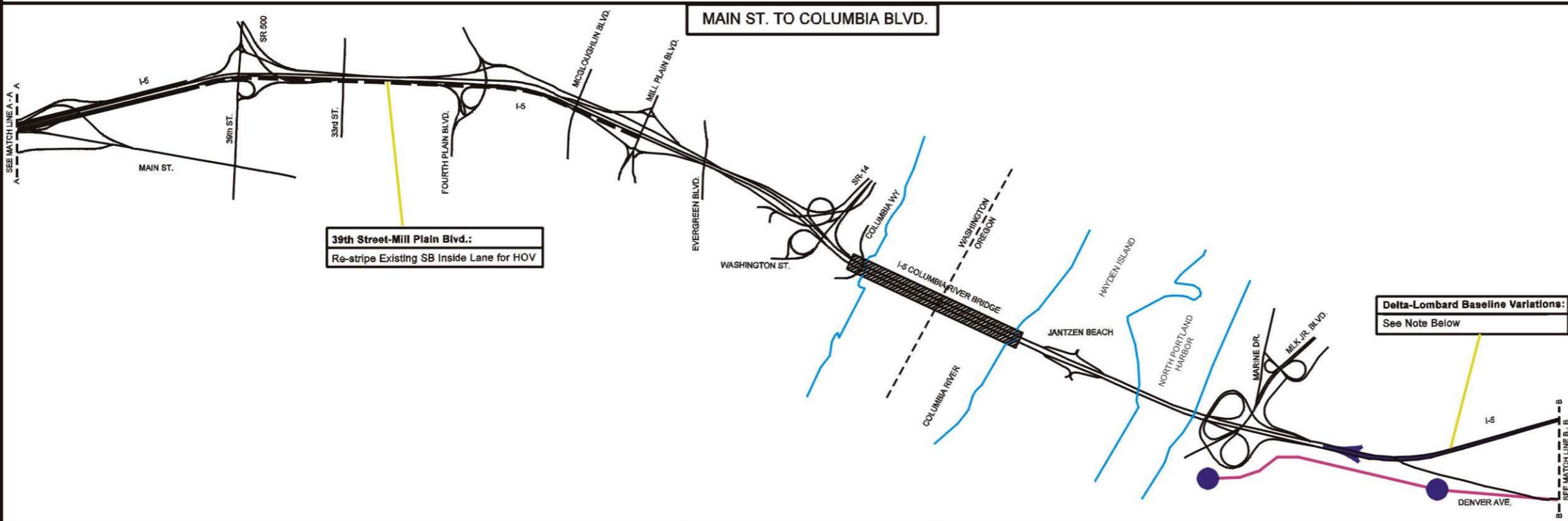
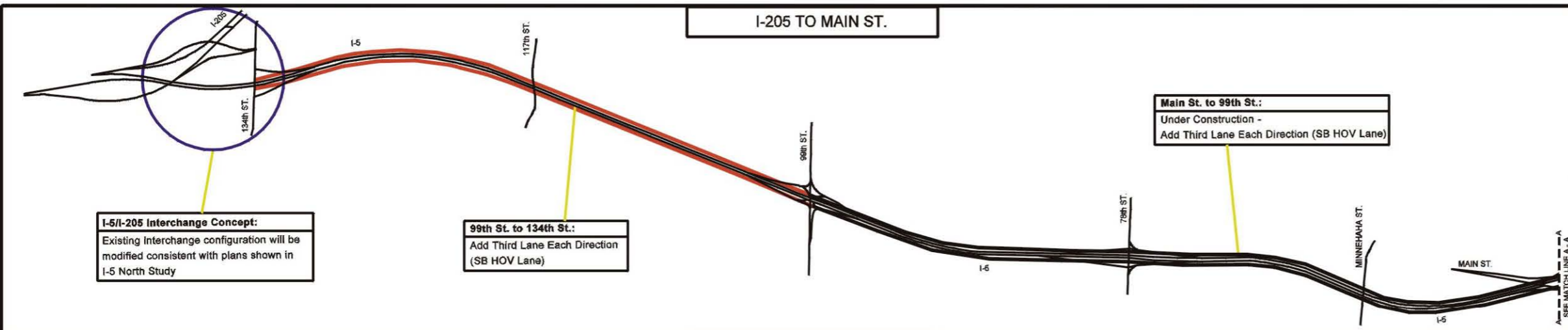
1.4. Rose Quarter Improvements

Under Option Package 1c, ramp revisions would be made along I-5 between the Broadway/Weidler corridor and I-84. In the southbound direction, the off-ramp to eastbound I-84 would be relocated in advance of the southbound on-ramp to I-5 from Williams, thereby eliminating the existing short southbound weaving area. The relocated off-ramp to I-84 would be "braided" over or under the on-ramp from Williams. A short ramp would provide a connection between the Williams and the I-84 ramp for traffic from the Rose Quarter area to eastbound I-84.



LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations
- Project Limits



Revision Date: 7-17-01

FIGURE 1-1
I-5 2020 Baseline Variations

ODOT0364/base.dgn/RSLP/7-17-01



DAVID EVANS AND ASSOCIATES, INC.
2828 S.W. CORBETT AVENUE PORTLAND, OREGON 97201 (503)223-6663



LEGEND
 Existing HOV lane

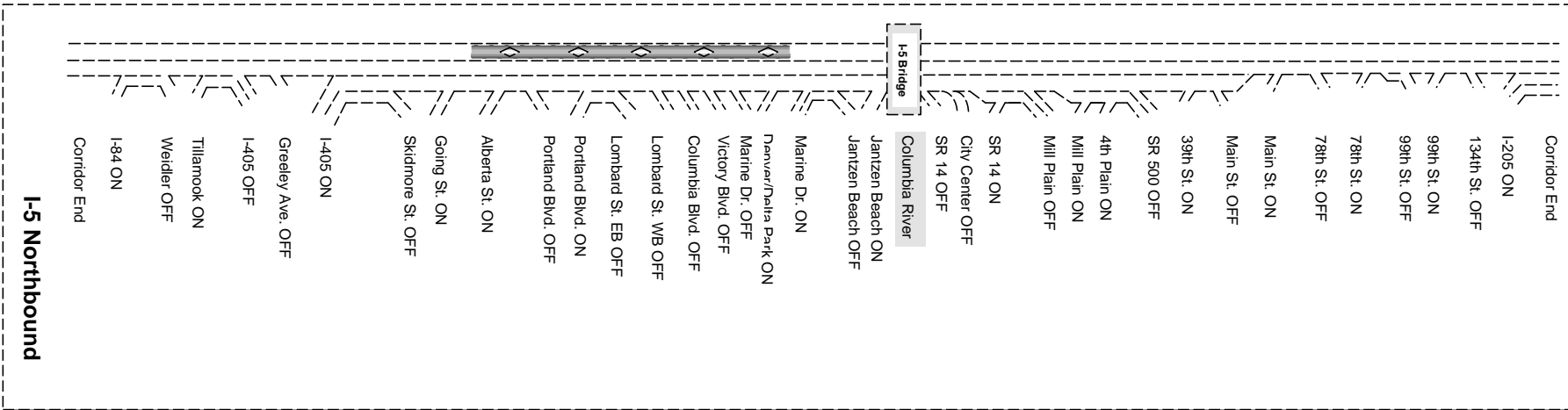
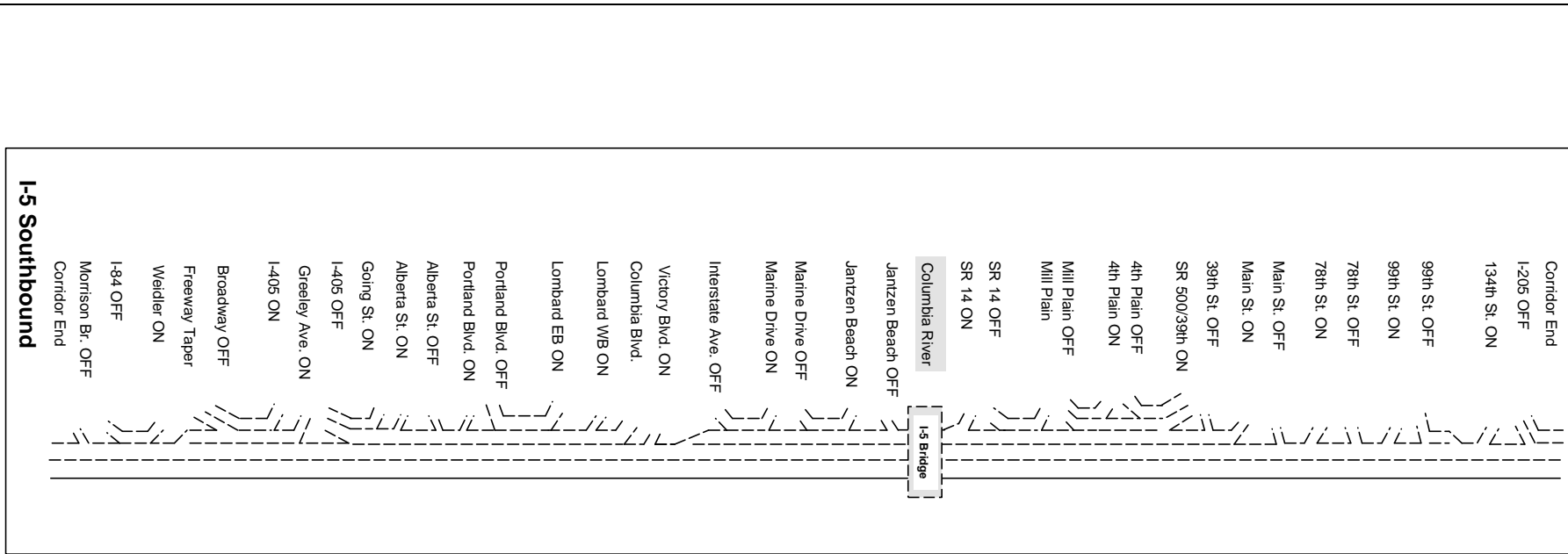



FIGURE 1-2
1999 EXISTING CONDITION I-5 CORRIDOR
LANE CONFIGURATION



DAVID EVANS AND ASSOCIATES, INC.
2828 S.W. CORBETT AVENUE PORTLAND, OREGON 97201 (503)223-6663



LEGEND

 Existing HOV lane

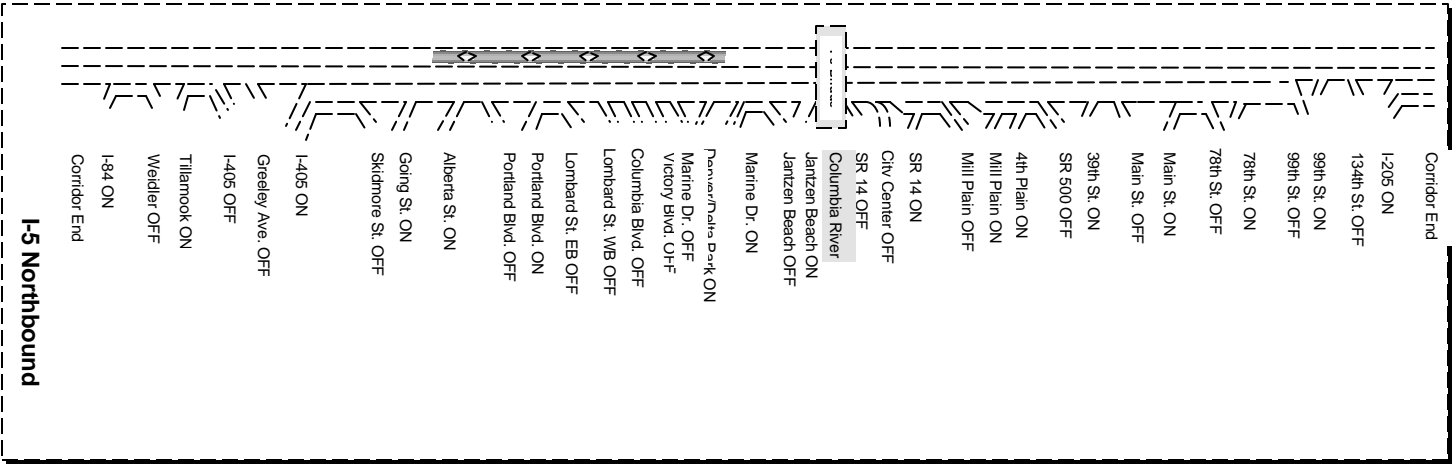
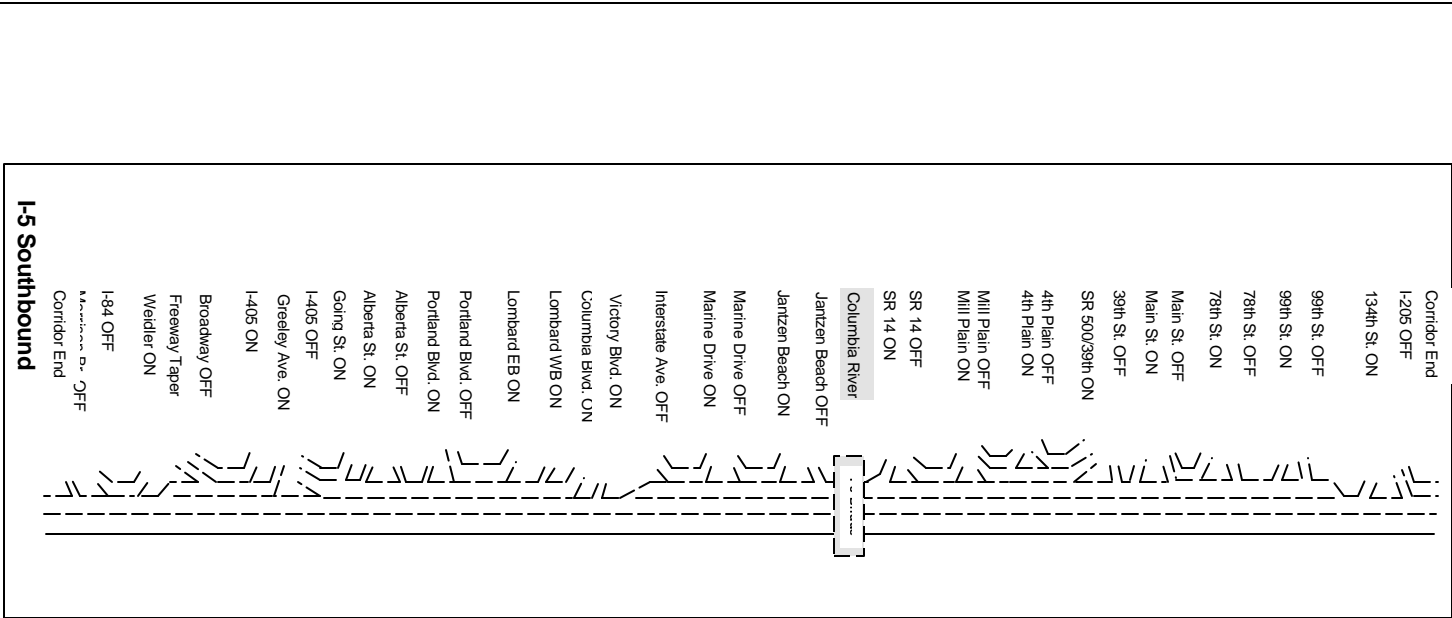


FIGURE 1-3
2020 BASELINE I-5 CORRIDOR
LANE CONFIGURATION

In the northbound direction, the off-ramp to Weidler would be relocated in advance of the northbound on-ramp to I-5 from I-84, thereby eliminating the existing short northbound weaving area. As above, the relocated off-ramp would be “braided” over or under the on-ramp from I-84. A short ramp connection would provide access from westbound I-84 directly to the Weidler off-ramp.

Under Option Package 1c, there would be no mainline widening along I-5.

In Option Package 1d, I-5 would be widened to provide a new third mainline travel lane in each direction between I-405 and the ramps to and from I-84. In addition, ramp revisions would be made along I-5 between I-405 and I-84.

In the southbound direction, the ramps south of Broadway-Weidler would be braided similarly to Option Package 1c, but a new on-ramp serving Weidler traffic only would connect with the new off-ramp to eastbound I-84, thereby reducing the amount of traffic on the Williams on-ramp (which would be fed primarily by Broadway and Vancouver Avenue to the north, as further discussed below).

The southbound off-ramp from I-5 to Broadway/Weidler would be relocated further to the north. About midway between the relocated ramp’s exit from I-5 and traffic signal with Broadway, a relocated Vancouver Avenue would connect with the roadway, providing a modified access route for southbound travelers on the local street system north of Weidler.

In the northbound direction, the ramps would be configured similarly to Option Package 1c. However, in Option Package 1d, traffic from the Morrison Bridge will bypass the northbound weave section at Broadway/Weidler by connecting on the ramp from westbound I-84, thereby further reducing turbulence on northbound I-5 near the I-84 junction.

A current study managed by the City of Portland is also reviewing Rose Quarter modifications along I-5. Variations between recommendations from the City’s study will need to be compared to the system description herein.

This section last revised on 7-18-01

2.0. OPTION PACKAGE 2: EXPRESS BUS WITHOUT CORRIDOR-WIDE CAPACITY INCREASE

2.1. Road Network Description

Option Package 2 involves the operation of directional peak period express bus transit service between Clark County and the Expo Center/PIR Interstate Max transit center. This option does not include a corridor-wide capacity increase but does involve an increase in Columbia River crossing capacity along a new four-lane joint use arterial and HOV/express bus bridge.

Key features of this option package include the following:

- Converts the inside existing/planned third northbound travel lane from Mill Plain Blvd. to 134th Street for afternoon peak period HOV use
- Establishes a new four-lane joint use arterial and HOV/express bus bridge across the Columbia River -- serving Hayden Island and matching existing/planned HOV lanes in Oregon and Washington
- Results in a northbound HOV system from Going Street to 134th Street and a southbound HOV system from 134th Street to approximately Lombard Street
- Includes direct express bus ramps to/from Expo/PIR transit center
- Results in removal of the existing I-5/Hayden Island interchange and provides a new connection with Hayden Island via the new bridge
- Includes HOV specific facility treatments (see Section 2.4)
- Provides truck access between Marine Drive and the new arterial/HOV facility

Option Package 2 will be designed, modeled, and evaluated as described herein. There are currently no identified variations being tested.

2.2. Transit Network Description (Non-express buses)

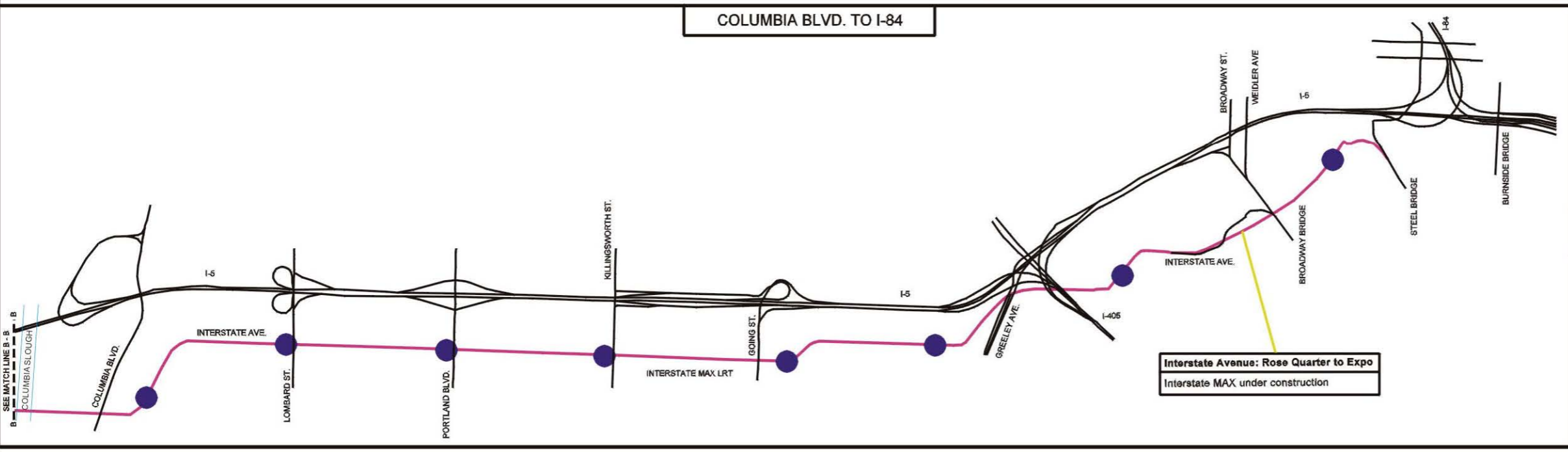
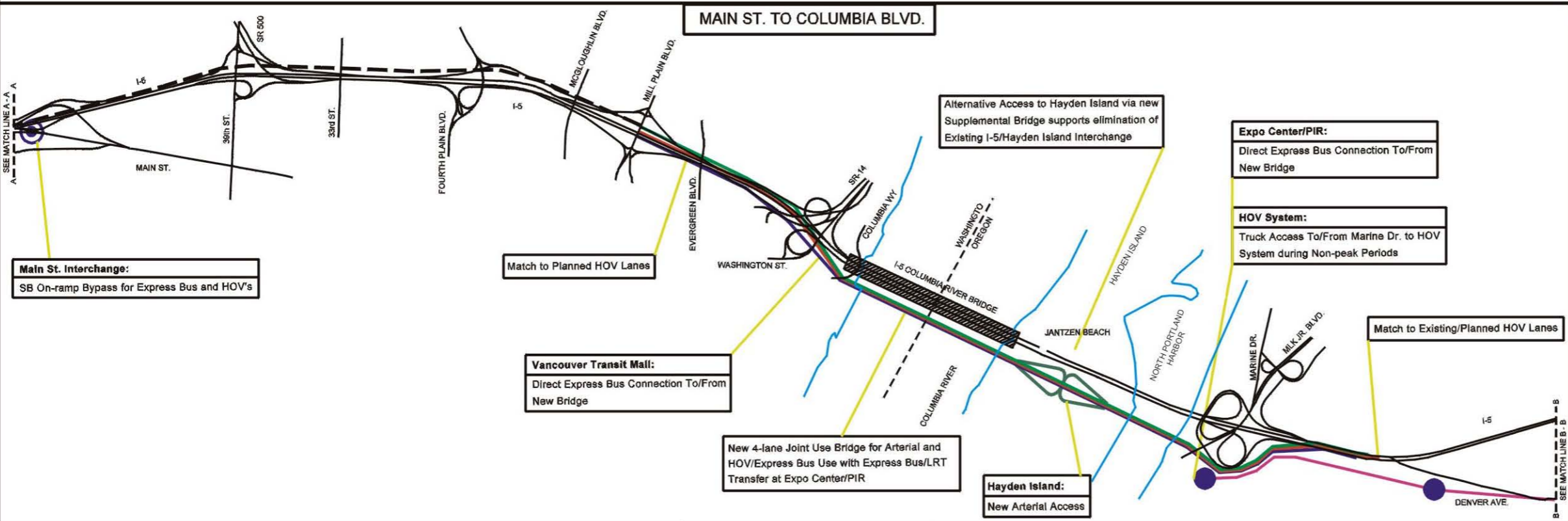
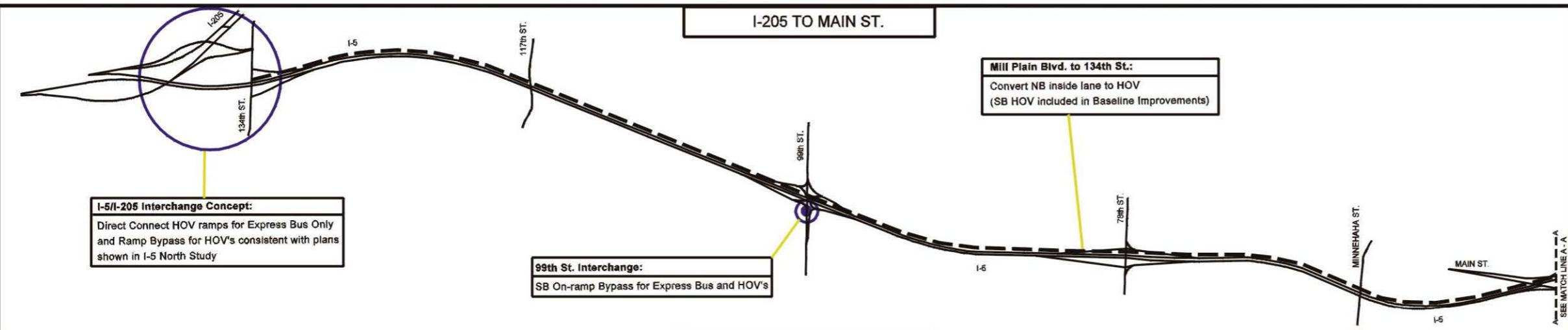
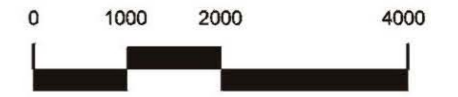
The Tri-met and C-Tran transit network descriptions for this option package follow:

Tri-Met: Same as defined for the *Priority Baseline* (Option Package 1d) described in Section 1.3.

C-TRAN: The C-TRAN Express Bus network includes new park-and-ride capacity at existing lots and at new park-and-ride lots. It also includes express bus service from those lots to the PIR Interstate MAX station in the I-5 corridor.

2.3. Corridor Schematic

An overall corridor schematic shown in **Figure 2-1** depicts the functional operation of I-5 under the Option Package 2 express bus system. Text call-out boxes direct attention to specific projects or operational features within the corridor.



LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations
- Ramp Bypass for Express Bus and HOV's

Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1).

Note 2: Implement Interchange improvements to better manage Weaving and Merging Maneuvers between SR 14 and SR 500 only. See Figures 2-5 through 2-7.

Revision Date: 7-17-01

FIGURE 2-1
Option Package 2: Express Bus without
Corridor-wide Capacity Increase

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2.4. Express Bus Service Plan

Figure 2-2 depicts C-Tran’s proposed regional express bus service plan for Option Package 2 with express bus service terminating at Expo/PIR along I-5 and at Parkrose LRT station along I-205. Bus headways can be used to determine the number of buses traveling to/from PIR during peak periods. Although no express bus service is shown along I-205 across the Columbia River, C-Tran has indicated that a Route #165 express bus line would travel to/from the Parkrose park-and-ride lot.

2.5. Express Bus Facility Descriptions

The 1999 Clark County HOV Study presented a recommended year 2017 regional HOV system. From that recommended system, it was assumed for this study that only those facility improvements that directly support express bus service, rather than general use of HOV lanes by autos, would be incorporated into Option Package 2. Where practicable, all HOV types will be allowed to use the express bus facilities. Only the following facilities meet this criteria and will be modeled and included in conceptual designs:

- Single-lane ramp meter bypasses at the southbound I-5 on-ramps from 99th Street and Main Street interchanges
- Direct-connect HOV drop ramps for express buses only and a southbound I-5 ramp meter bypass lane for HOVs as part of new I-5/134th/139th interchange reconfiguration

2.6. Park-and-Ride Facilities

The C-TRAN Express Bus network includes new park-and-ride capacity at existing lots and at new park-and-ride lots. It also includes express bus service from those lots to the Expo/PIR Interstate MAX station in the I-5 corridor. The park-and-ride lot locations and capacities are listed below:

TABLE 2-1 EXISTING/PLANNED EXPRESS BUS PARK-AND-RIDE FACILITIES		
P&R Facility	Existing Capacity	Option Package 2 Capacity
Battle Ground Park-and-ride	35 spaces	300 spaces
BPA Park & Ride	250 spaces	400 spaces
Salmon Creek Park-and-ride	479 spaces	600 spaces
Washougal Park-and-ride	40 spaces	600 spaces
Evergreen Park-and-ride	290 spaces	300 spaces
Fishers Landing Park-and-ride	550 spaces	900 spaces
Ridgefield Junction Park-and-ride	35 spaces	600 spaces
Planned 99th St. P&R (2 yrs out)	N/A	600 spaces
Fairgrounds	N/A	800 spaces
219th	N/A	600 spaces
Central County	N/A	600 spaces
TOTAL	1,679 spaces	6,300 spaces

Sources: C-Tran and Tri-Met

Dial-A-Ride Zone 1

Dial-A-Ride Zone 2

Dial-A-Ride Zone 2

Dial-A-Ride Zone 3

DRAFT 2020 Limited Bus Option

C-TRAN Routes <ul style="list-style-type: none"> 1 Fruit Valley 2 Lincoln/Felida 3 City Center 4 Fourth Plain 6 Hazel Dell 7 Battle Ground 9 Battle Ground Shuttle 14 Fourth Plain Rapid 19 Frenchman's Bar 25 St. Johns 26 WSU Shuttle 30 Burton 32 Evergreen/Andresen 37 Mill Plain 39 Clark College/Medical Center 49 49th Street 50 Central County Rapid Bus 71 Highway 99 72 Orchards 76 NE 76th/Sifton 78 78th Street 80 Van Mall/SW Fisher's 87 Van Mall/SW WA Med Ctr. 92 Camas/Washougal 93 SE 34th/Lacamas 	Commuter Routes <ul style="list-style-type: none"> 106 I-5 Limited 114 Camas/Washougal Limited 136 Salmon Creek Limited 140 Salmon Creek/Central Rapid 155 Parkrose Limited 178 Battle Ground Limited 179 Evergreen Limited 183 Fairgrounds Limited 185 Central County Limited 198 99th Street Limited 220 219th Street Limited
---	--

Dial-A-Ride Zones

- Dial-A-Ride Zone 1 (Route #61)
- Dial-A-Ride Zone 2 (Route #62)
- Dial-A-Ride Zone 3 (Route #63)

Transit Center Locations

- 7th Street
- Fisher's Landing
- Vancouver Mall

Park & Ride Locations

- Battle Ground
- BPA (Bonneville Power Admin.)
- Salmon Creek
- Ridgefield
- Evergreen
- Washougal
- 99th Street/Stockford
- Central County
- Fairgrounds
- 219th Street Park & Ride

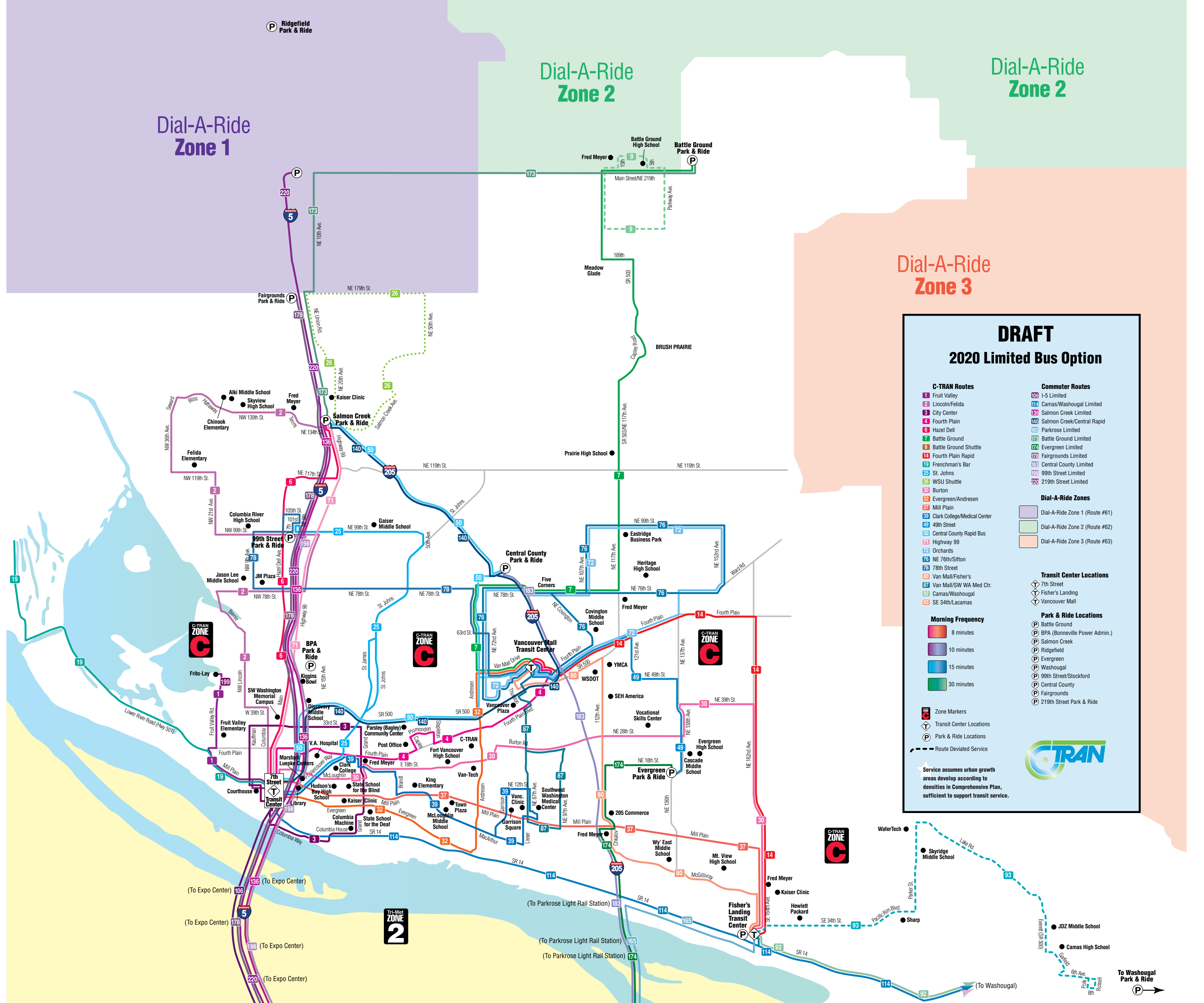
Morning Frequency

- 8 minutes
- 10 minutes
- 15 minutes
- 30 minutes

Legend

- Zone Markers
- Transit Center Locations
- Park & Ride Locations
- Route Deviated Service

Service assumes urban growth areas develop according to densities in Comprehensive Plan, sufficient to support transit service.

To Washougal Park & Ride

Although planned park-and-ride capacity will be used as an input into the travel demand modeling, park-and-ride lot capacity will not be constrained to input levels by the model. Through an equilibration procedure, park-and-ride capacity will be adjusted to accommodate and reflect transit ridership demand. This equilibration process allows transit demand under express bus and the LRT options to be compared fairly.

2.7. River Crossing Options

Option Package 2 includes a new four-lane joint use arterial and HOV/express bus bridge. This bridge would supplement the existing I-5 Columbia River structures (six lanes), resulting in 10 lanes of river crossing capacity. Key features of the new bridge depicted in **Figure 2-3** include the following:

- New interchange providing arterial and freeway access to/from I-5, downtown Vancouver, and Hayden Island
- Supports removal of existing I-5/Hayden Island interchange
- Serves as HOV/express bus bypass of the existing I-5 Bridge bottleneck
- Provides direct-connection express bus ramps to/from Expo/PIR transit center and I-5
- Provides Marine Drive link for use by freight trucks during off-peak periods
- Links existing/planned corridor HOV system in Oregon and Washington

A detailed functional schematic of this concept with number of lanes and ramp connections is shown in **Figure 2-4**.

2.8. Corridor Interchange Revisions

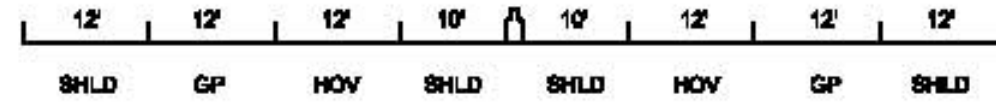
Option Package 2 includes modifications to the existing interchange system between SR 14 and SR 500 to address weaving, merging, and diverging issues. These modifications are common to all new bridge concepts presented under Option Packages 2, 3, 6, and 7. The conceptual interchange modifications along I-5 in Washington are functionally depicted in **Figure 2-5**.

Interchange modifications to address weaving, merging, and diverging issues in Oregon are not assumed to be integrated into the corridor unless the corridor is widened for a fourth lane in each direction as described under Option Packages 6 and 7.

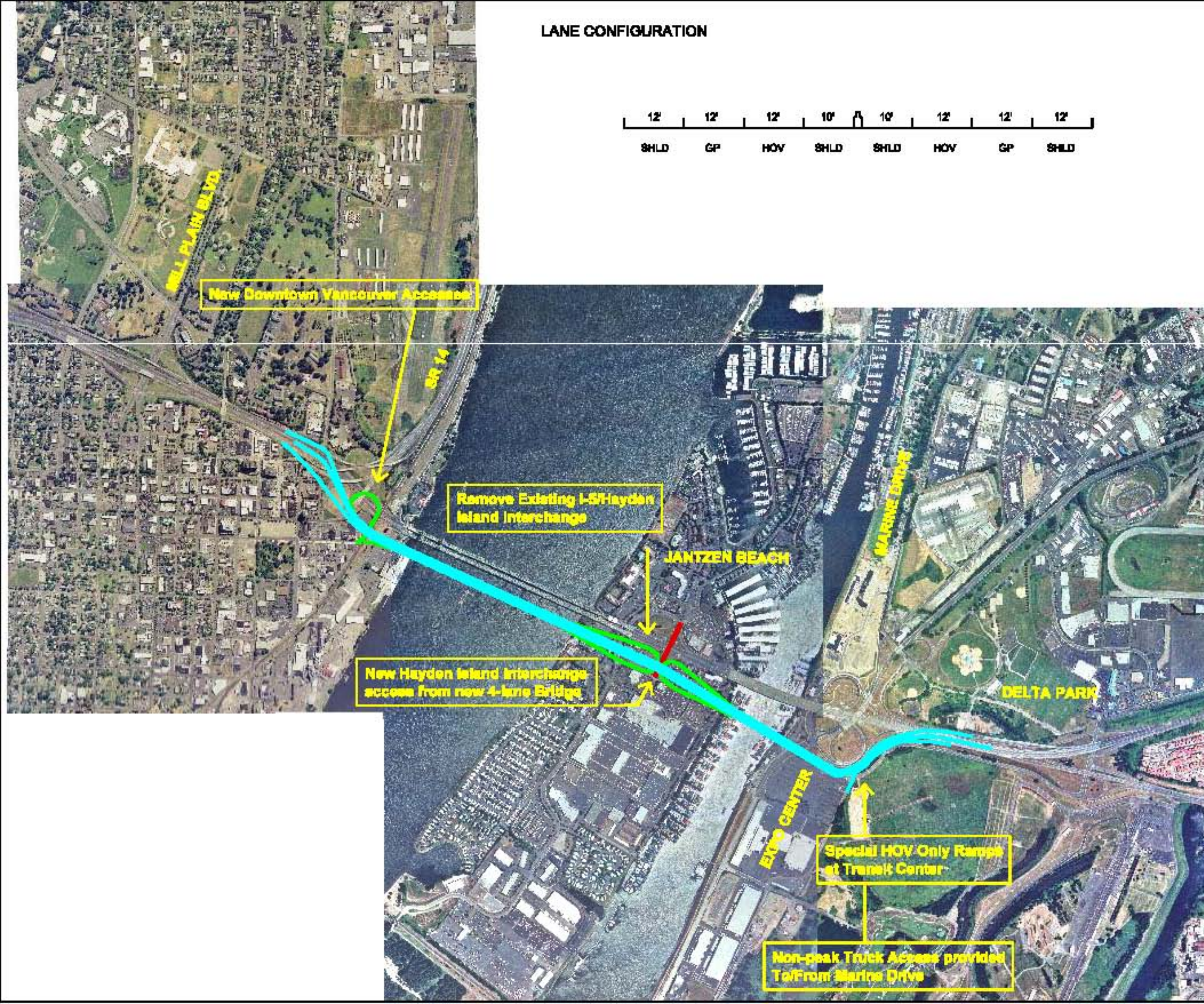
It should be noted that the ultimate interchange configurations may change from those shown as conceptual layout and design move forward. However, these functional descriptions provide guidance to the designers to address interchange spacing and operation issues during the evaluation.

This section last revised on 7-18-01.

LANE CONFIGURATION



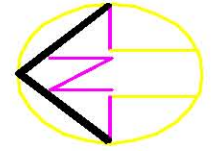
LEGEND:



Revision Date: 7-17-01

FIGURE 2-3

4-Lane Bridge Concept



NOT TO SCALE

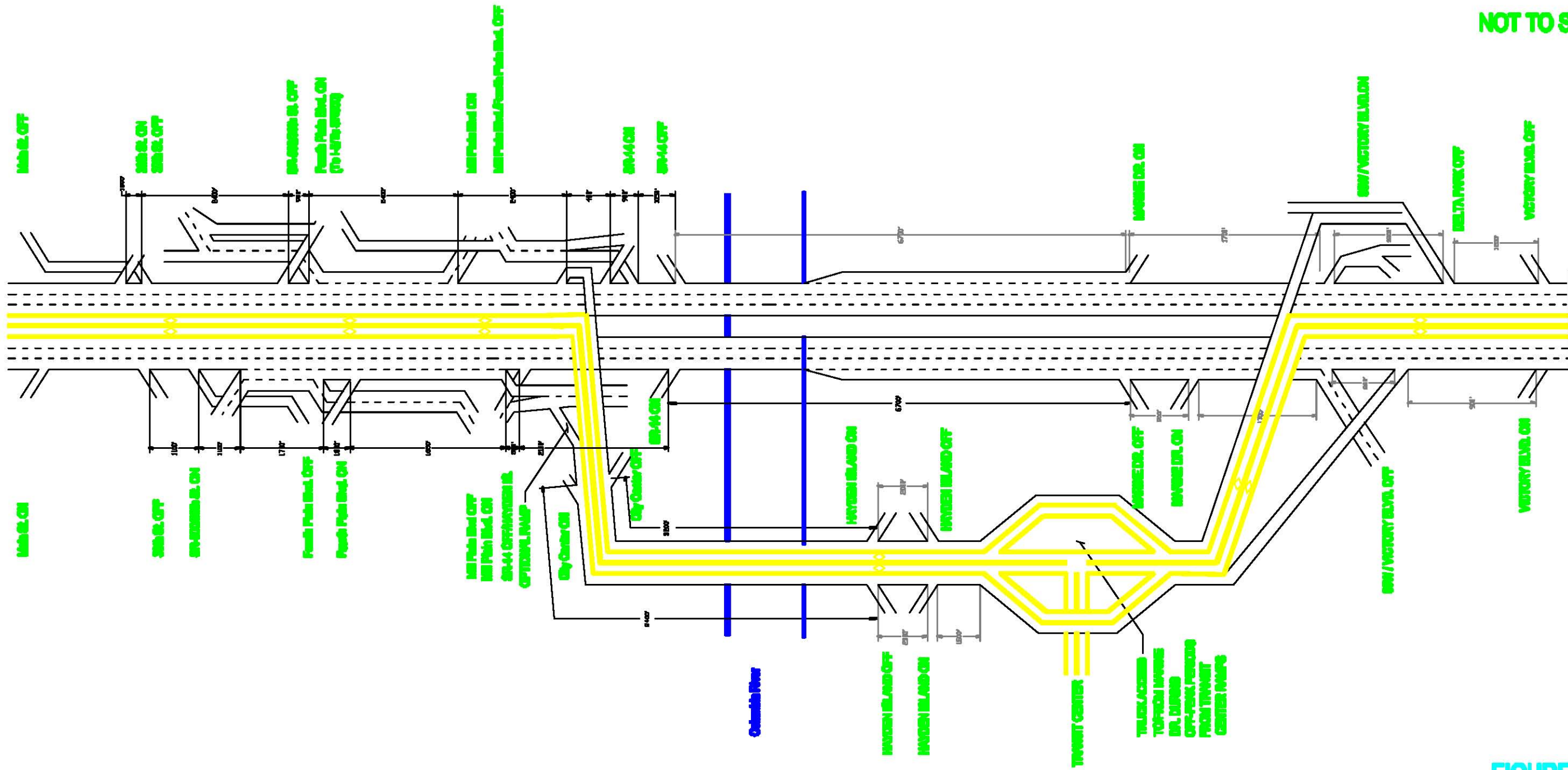


FIGURE 2-4
I-5 CORRIDOR CONFIGURATION
WITH 4-LANE BRIDGE

3.0. OPTION PACKAGE 3: LIGHT RAIL TRANSIT (LRT) WITHOUT CORRIDOR-WIDE CAPACITY INCREASE

3.1. Road Network Description

Option Package 3 involves investment in a regional light rail transit (LRT) system without corridor-wide freeway capacity increases. Three variations have been established for this option package to test the performance/benefits of two separate investment levels in light rail, construction of an arterial parallel to I-5 from Vancouver south to Columbia Blvd., and no investment in I-5 freeway capacity. Key features of each variation follow:

Option Package 3a: Loop LRT system (SR 500) with joint LRT/arterial bridge

Key features of this option package include the following:

- Establishes a new four-lane arterial roadway west of and parallel to I-5, with access to downtown Vancouver, Hayden Island, Marine Drive, and Columbia Blvd.
- Includes a new joint use arterial/LRT bridge across the Columbia River to supplement the existing I-5 structures, increasing Columbia River crossing capacity to 10 lanes
- Includes an LRT loop system with the following segments:
 - ◆ Expo park-and-ride to Clark College
 - ◆ Clark College to 83rd park-and-ride lot with service to Vancouver Mall
 - ◆ 83rd park-and-ride to Parkrose transit center with service to Vancouver Mall

Option Package 3b: LRT from Expo P&R to Clark College only on LRT only bridge

Key features of this option package include the following:

- Includes LRT segment from Expo/PIR to Clark College only
- LRT crosses the Columbia River on an LRT-only bridge
- Assumes no investment in I-5 freeway or parallel arterial roadways
- Represents a pure LRT only option

Option Package 3c: LRT from Expo P&R to Clark College only with joint use arterial/HOV bridge

Highway and Columbia River crossing improvements under this option package are nearly identical to Option Package 2. The addition of LRT into Clark County is the principal difference from Option Package 2. Key features of this option package are include the following:

- Establishes a new four-lane joint use arterial and HOV/express bus bridge across the Columbia River serving Hayden Island and matching existing/planned HOV lanes in Oregon and in Washington
- Includes LRT segment from Expo/PIR to Clark College only
- Converts the northbound existing/planned third travel lane from Mill Plain Blvd. to 134th Street for HOV use during the p.m. peak period
- Results in a northbound HOV system from Going Street to 134th Street and a southbound HOV system from 134th Street to approximately Lombard Street

This technical document is a discussion draft for PAG level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a "work in progress" and does not reflect final recommendations or the individual views of any project team member.

- Includes direct express bus ramps to/from Expo/PIR transit center to I-5
- Results in removal of the existing I-5/Hayden Island interchange – access to Hayden Island would be provided via the new bridge
- Includes HOV specific facility treatments (see Section 2.4)

3.2. Transit Network Description

The transit network descriptions associated with Option Packages 3 a, b, and c are presented in Table 3-1.

TABLE 3-1 OPTION PACKAGE 3 TRANSIT NETWORK DESCRIPTIONS		
Option Package Variation	Tri-Met	C-Tran
3a: Loop LRT system with joint LRT/arterial bridge	Same as Priority Baseline- See Section 1.3	C-Tran bus network for Loop LRT system under development
3b: LRT from Expo to Clark college with LRT only bridge	Same as Priority Baseline- See Section 1.3	C-Tran bus network for Clark college LRT system under development
3c: LRT from Expo to Clark College only with joint LRT/arterial bridge	Same as Priority Baseline- See Section 1.3	C-Tran bus network for Clark college LRT system under development

Source: Metro

3.3. Corridor Schematic

Overall corridor schematics for Option Packages 3a, 3b, and 3c are shown in **Figures 3-1, 3-2, and 3-3**, respectively, and depict the functional operation of I-5 under each option package variation. Text call-out boxes direct attention to specific projects or operational features within the corridor.

3.4. LRT Loop System Schematic

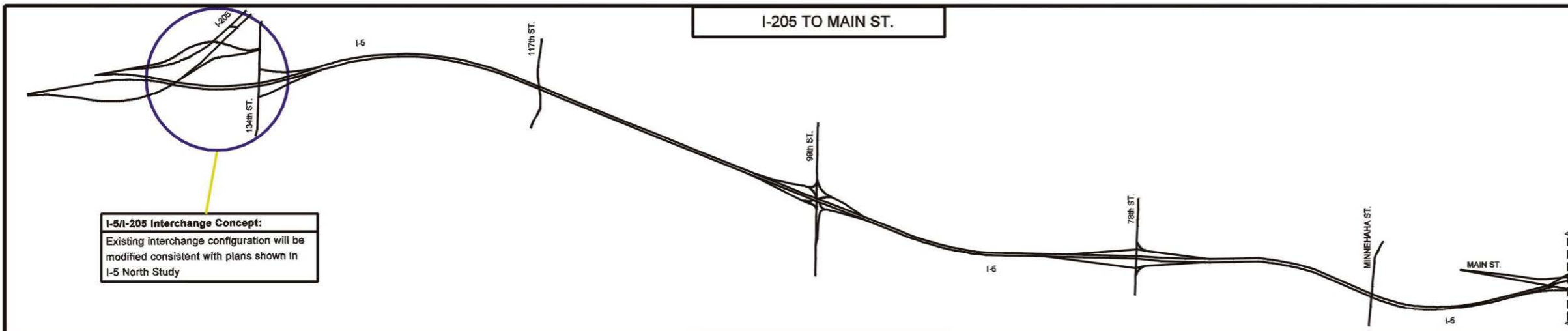
Tri-Met staff led an effort to develop conceptual alignments including station and park-and-ride locations for the full LRT loop system as shown in **Figure 3-4**.

3.5. Park-and-Ride Facilities

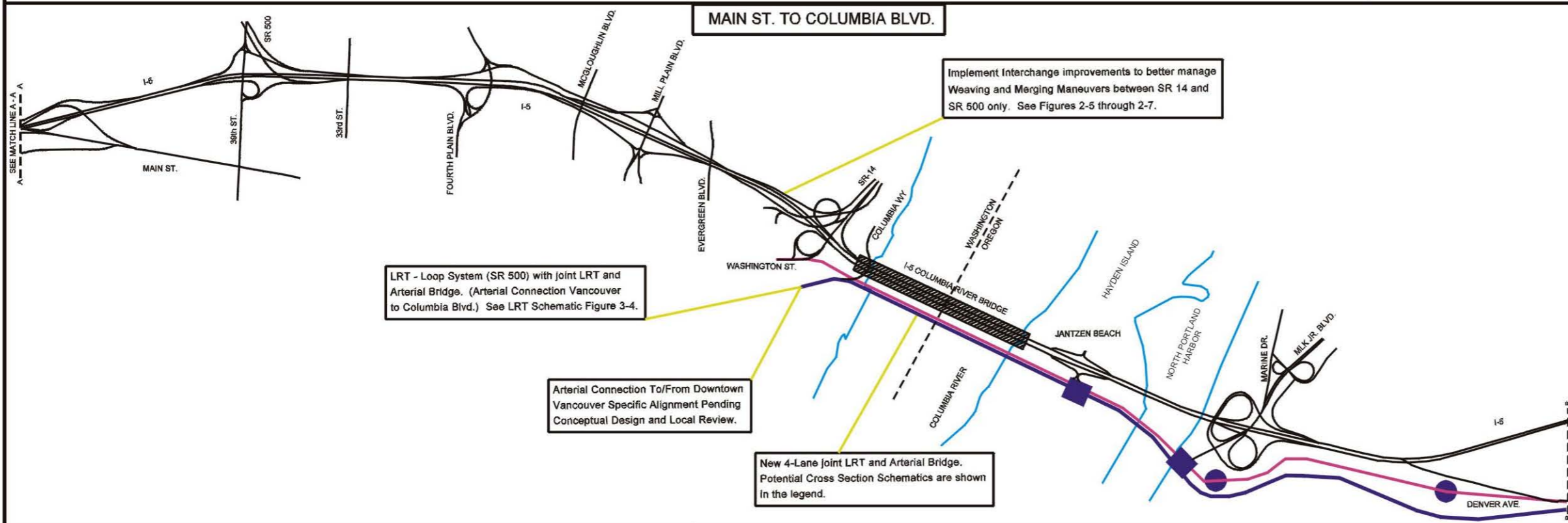
Table 3-2 lists the planned park-and-ride facilities supporting the Clark County loop LRT system as well as the Airport and Interstate Max systems.

This technical document is a discussion draft for PAG level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a “work in progress” and does not reflect final recommendations or the individual views of any project team member.

ODOT0364/LRT3a.dgn/RSLP/7-17-01



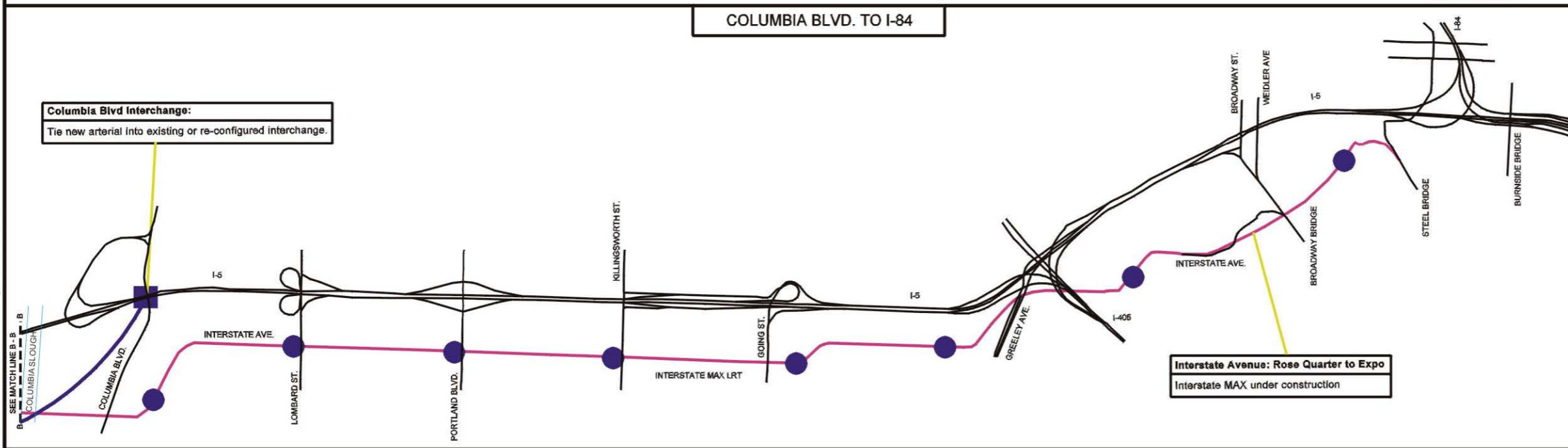
Portland / Vancouver
I-5
Transportation and Trade
Partnership



LEGEND:

- Interstate MAX LRT Alignment
- New Arterial
- Interstate MAX LRT Stations
- New 4-lane Arterial Connections

Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1).



Potential Arterial Bridge Cross Sections
(Bike/pedestrian Facilities to be provided but not shown)

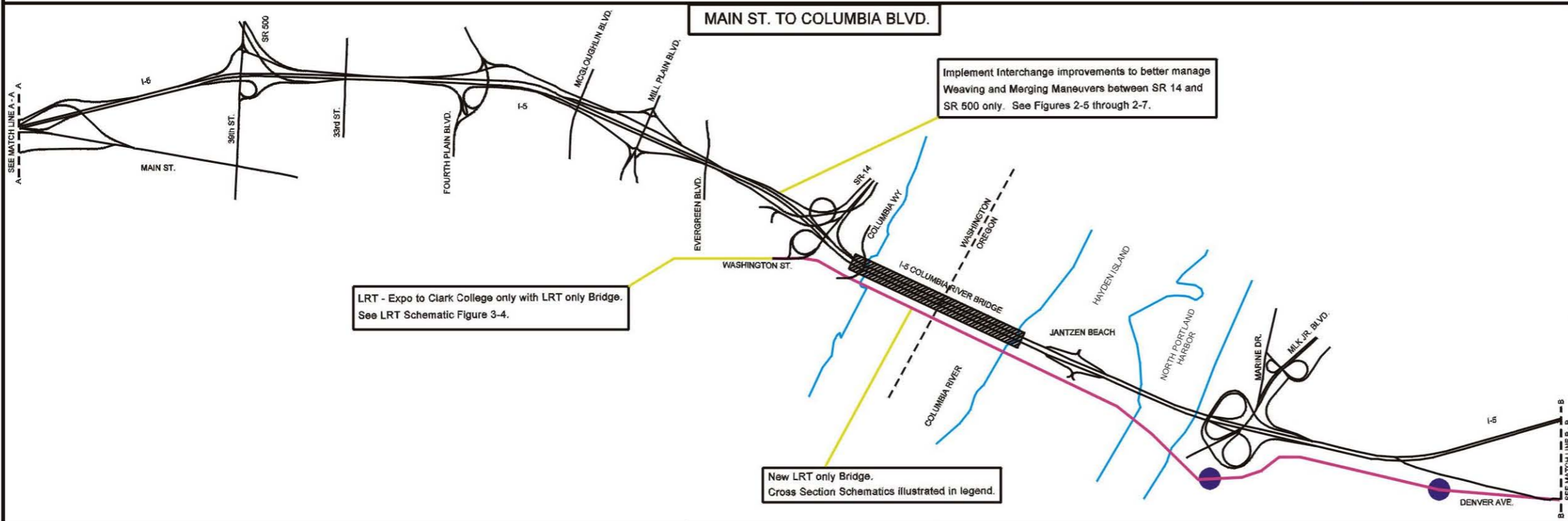
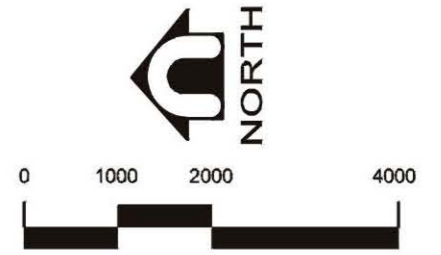
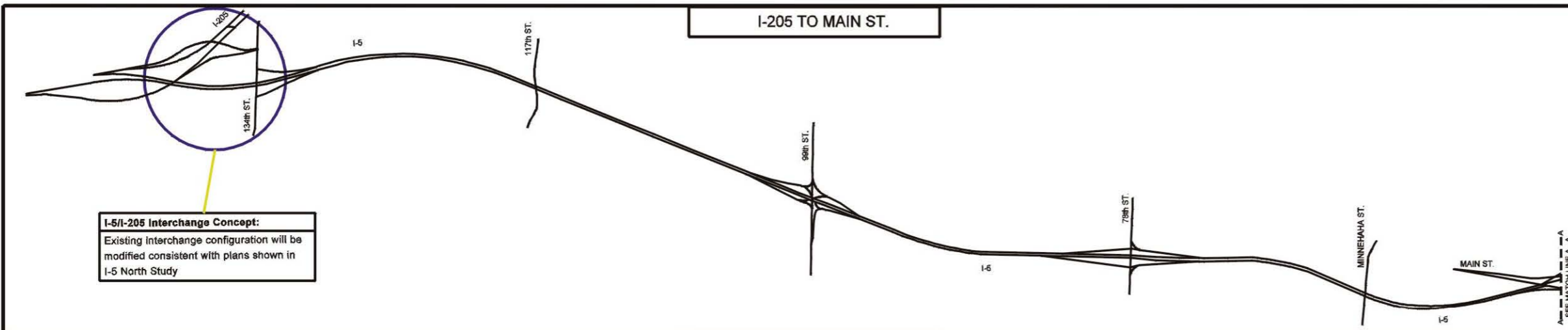
GP - General Purpose Vehicle Use
LRT - Light Rail Transit

Revision Date: 7-17-01

FIGURE 3-1
Option Package 3: LRT without Additional Corridor Freeway Capacity - Option 3a (Loop System with joint LRT and Arterial Bridge)

Option Package Functional Descriptions

ODOT0364/LRT3b.dgn/RSLP/7-17-01

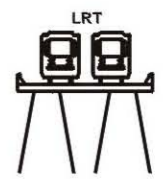


LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations

Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1).

LRT Only Bridge Cross Section



Note 2: Consider opportunities to incorporate new/better bike/pedestrian connections via a new LRT Bridge.

Revision Date: 7-17-01

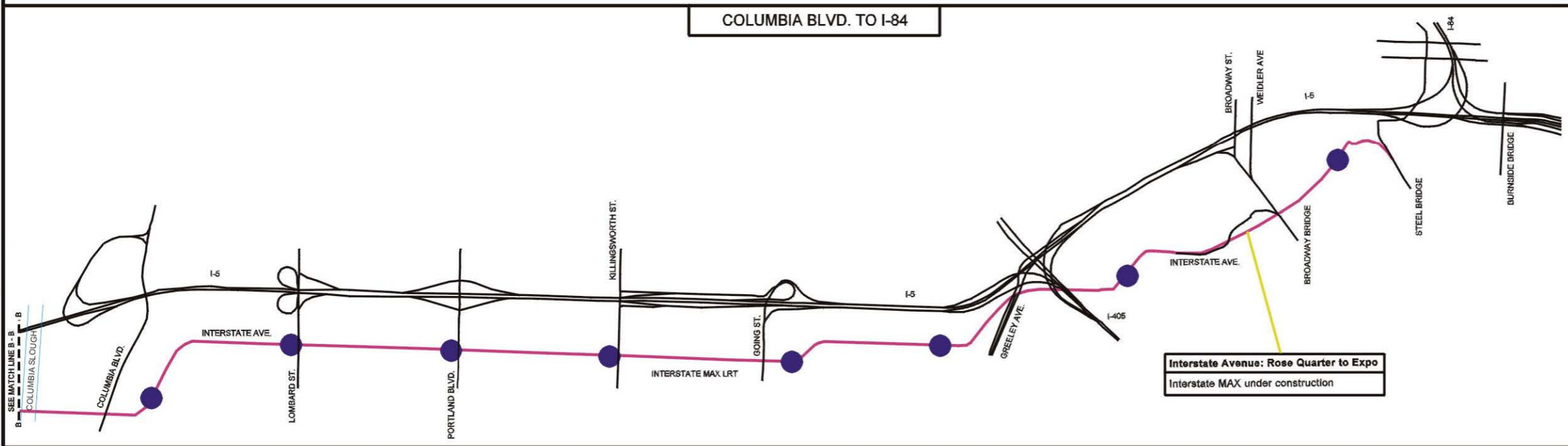
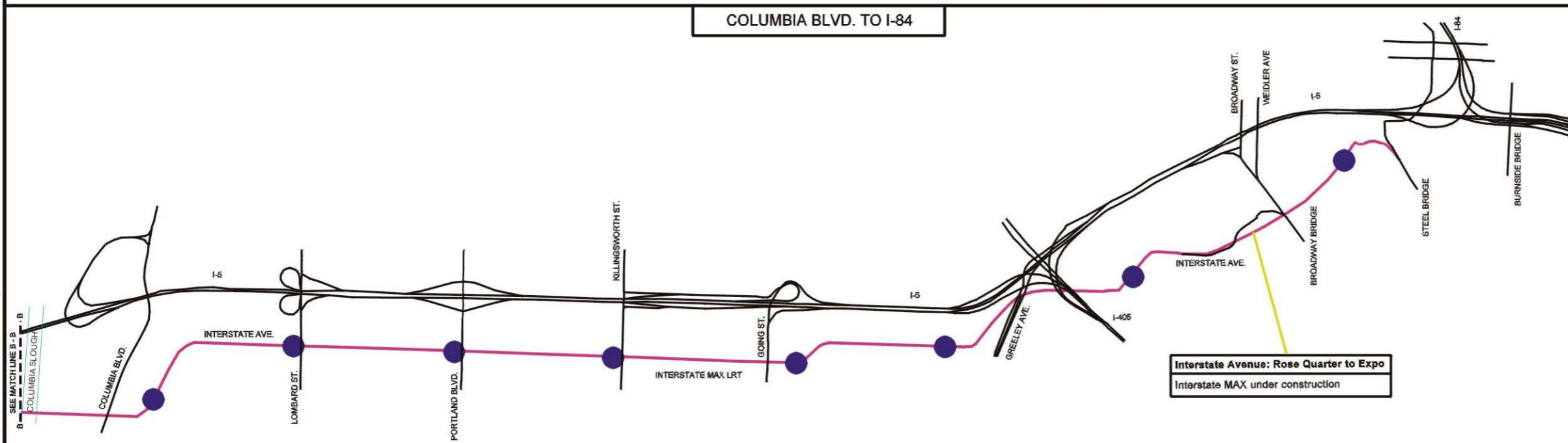
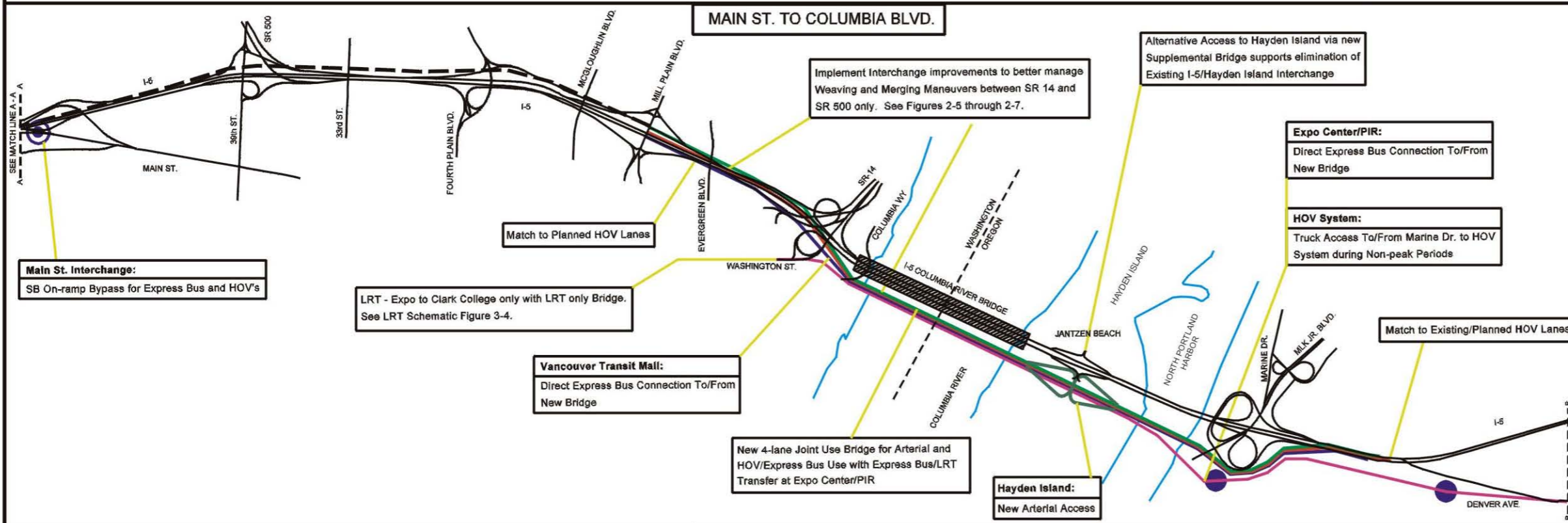
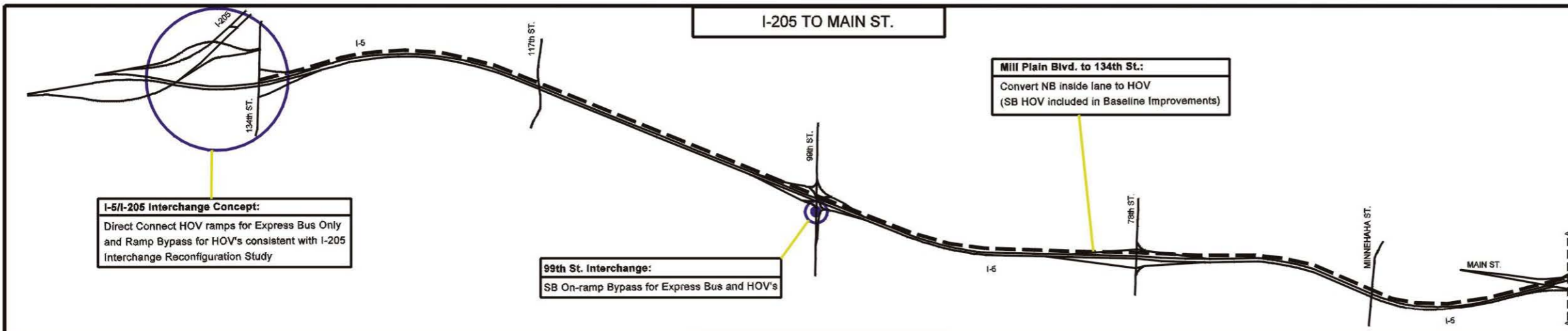


FIGURE 3-2
Option Package 3: LRT without Additional Corridor Freeway Capacity - Option 3b (Expo to Clark College only with LRT only Bridge)

ODOT0364/LRT3c.dgn/RSLP/7-17-01



Portland / Vancouver
I-5
Transportation and Trade
Partnership

LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations
- Ramp Bypass for Express Bus and HOV's

Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1).

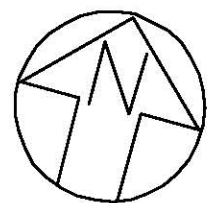
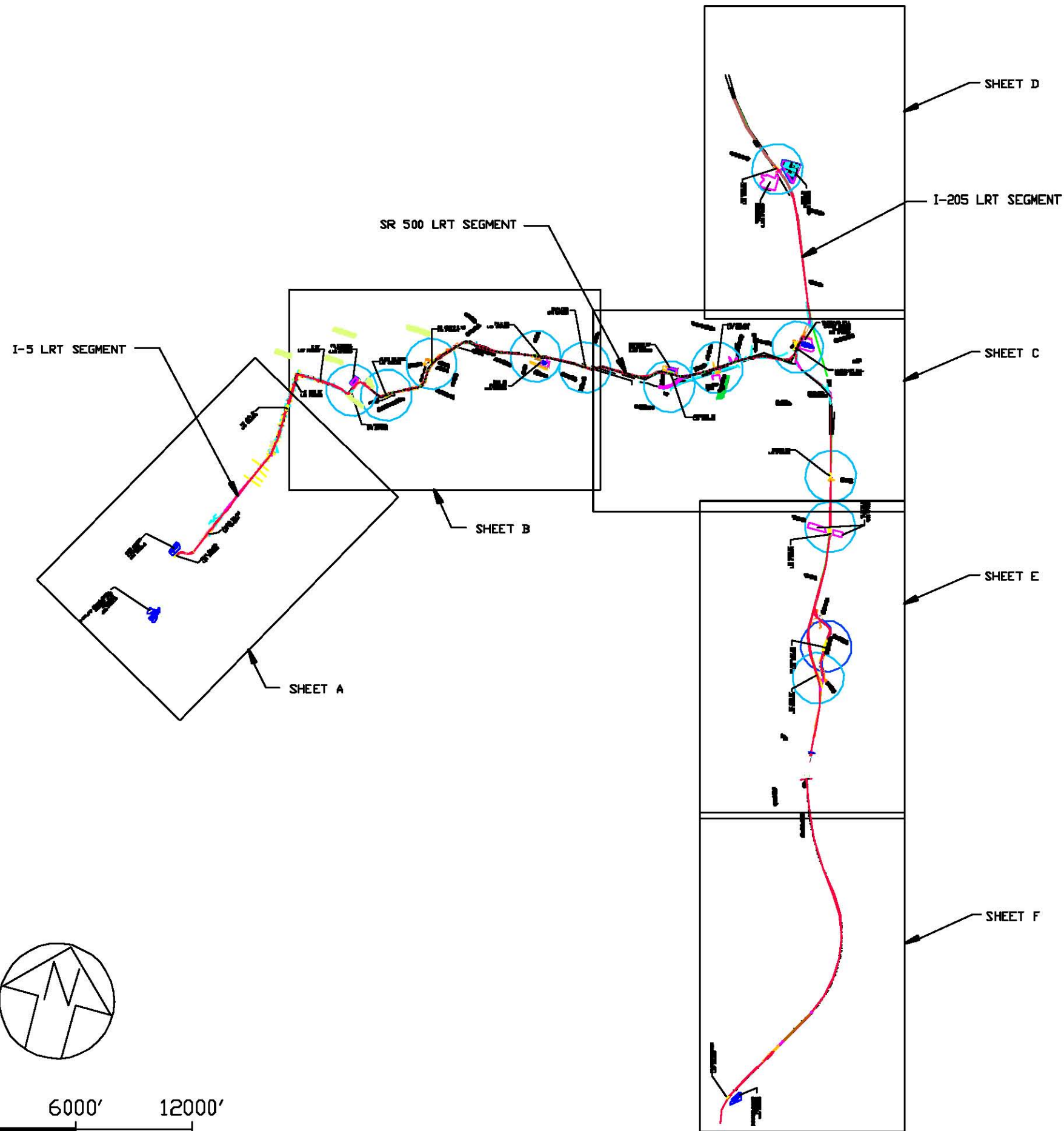
Potential Arterial Bridge Cross Sections
(Bike/pedestrian Facilities to be provided but not shown)

GP - General Purpose Vehicle Use
HOV - High Occupancy Vehicle Use
LRT - Light Rail Transit

Revision Date: 7-17-01

FIGURE 3-3
Option Package 3: LRT without Additional Corridor Freeway Capacity - Option 3c (Expo to Clark College only with LRT and Arterial/HOV Bridge)

Option Package Functional Descriptions

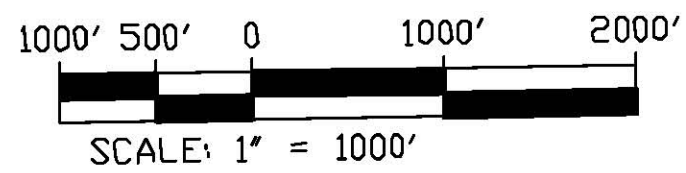
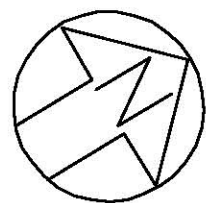
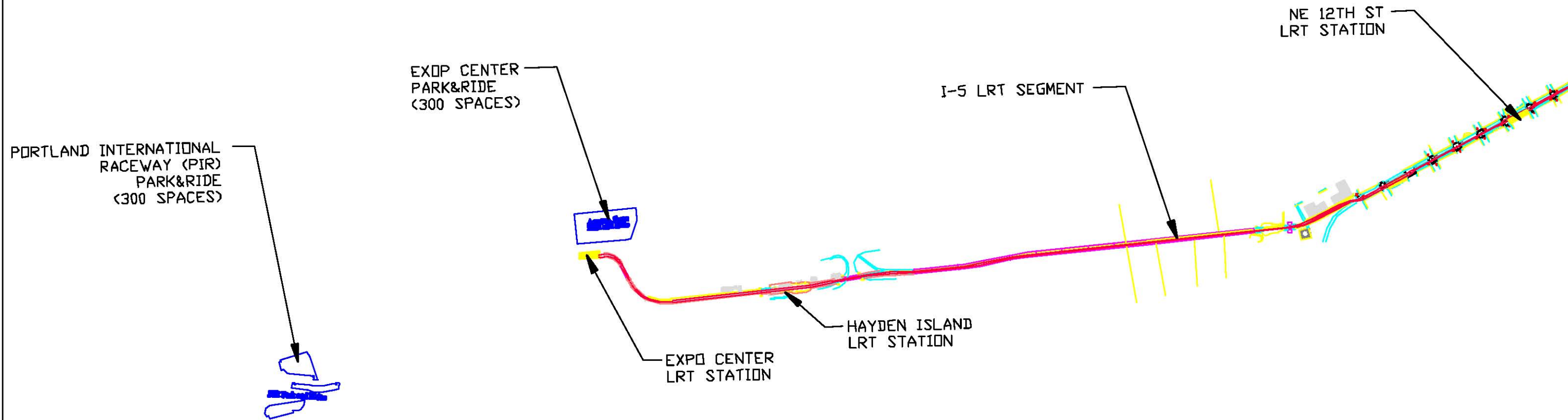


6000' 3000' 0 6000' 12000'

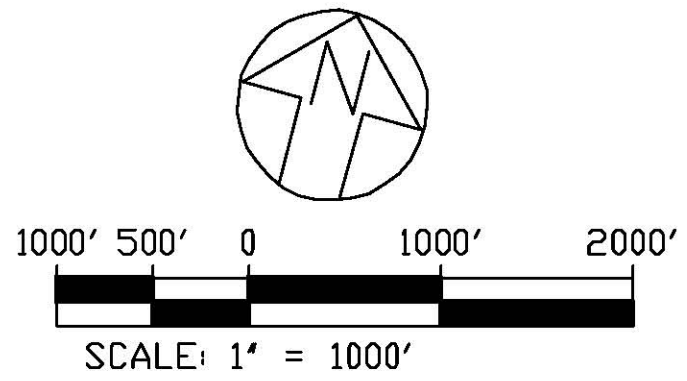
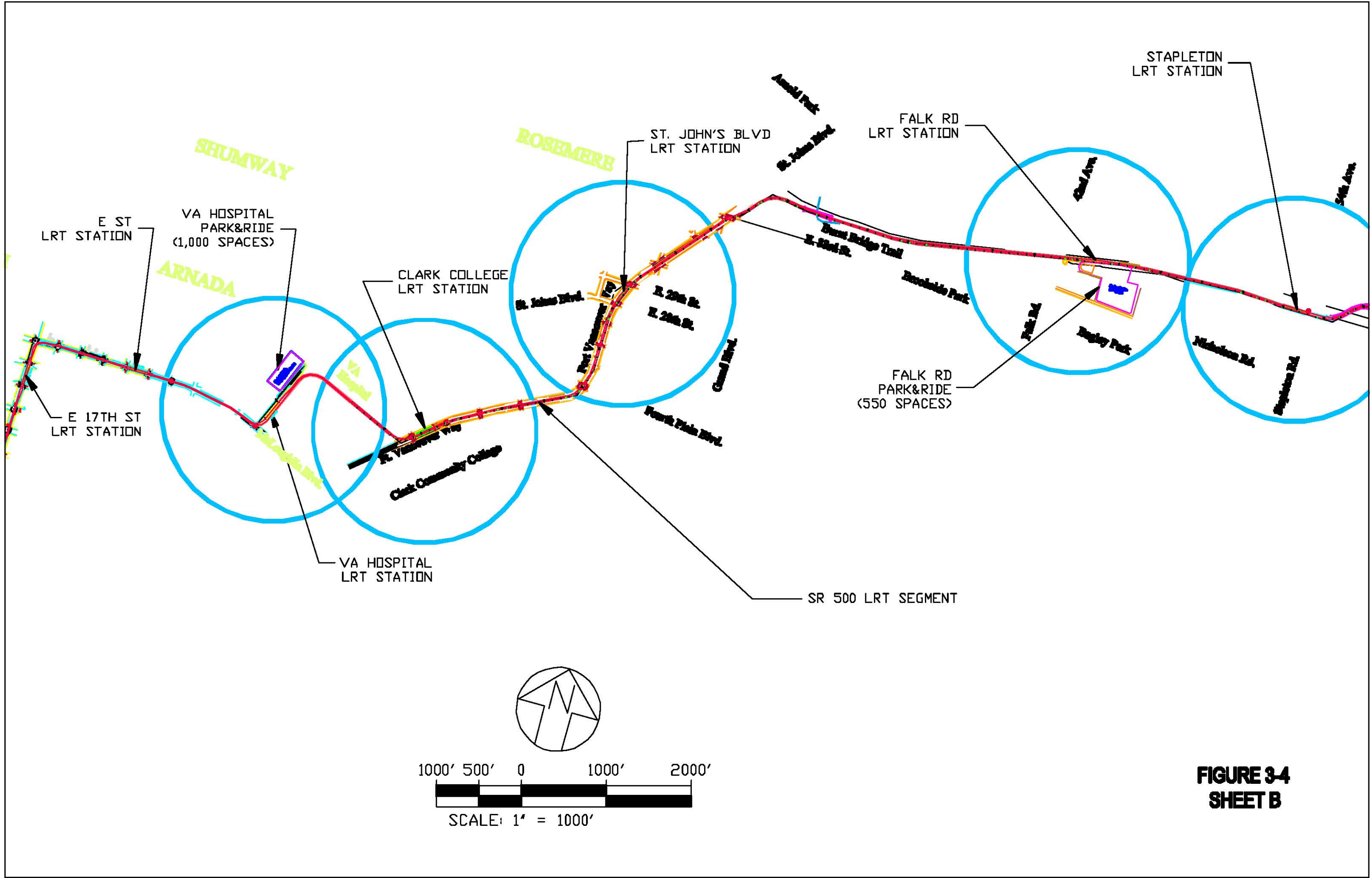


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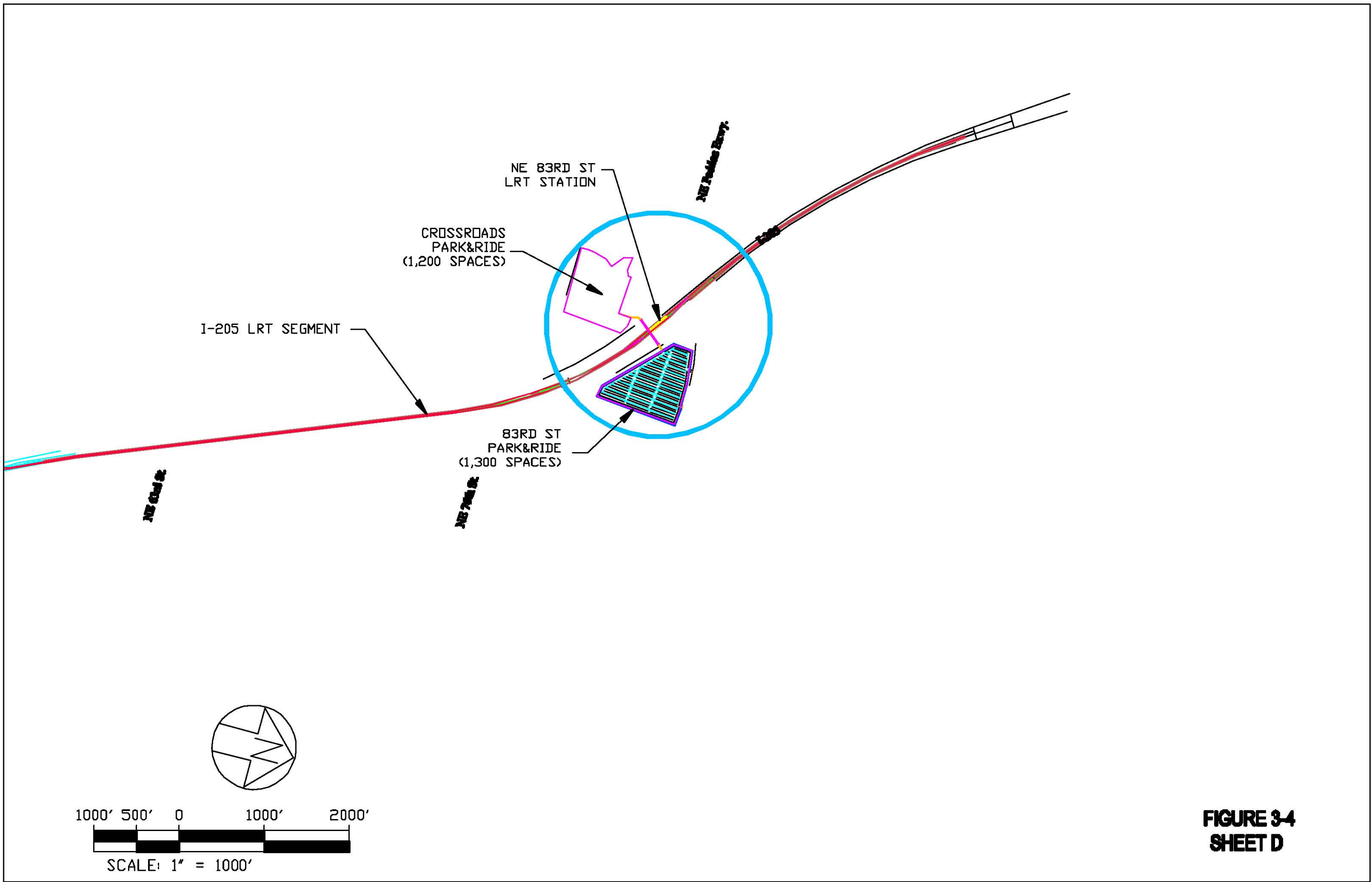
FIGURE 3-4
CLARK COUNTY LRT LOOP SYSTEM



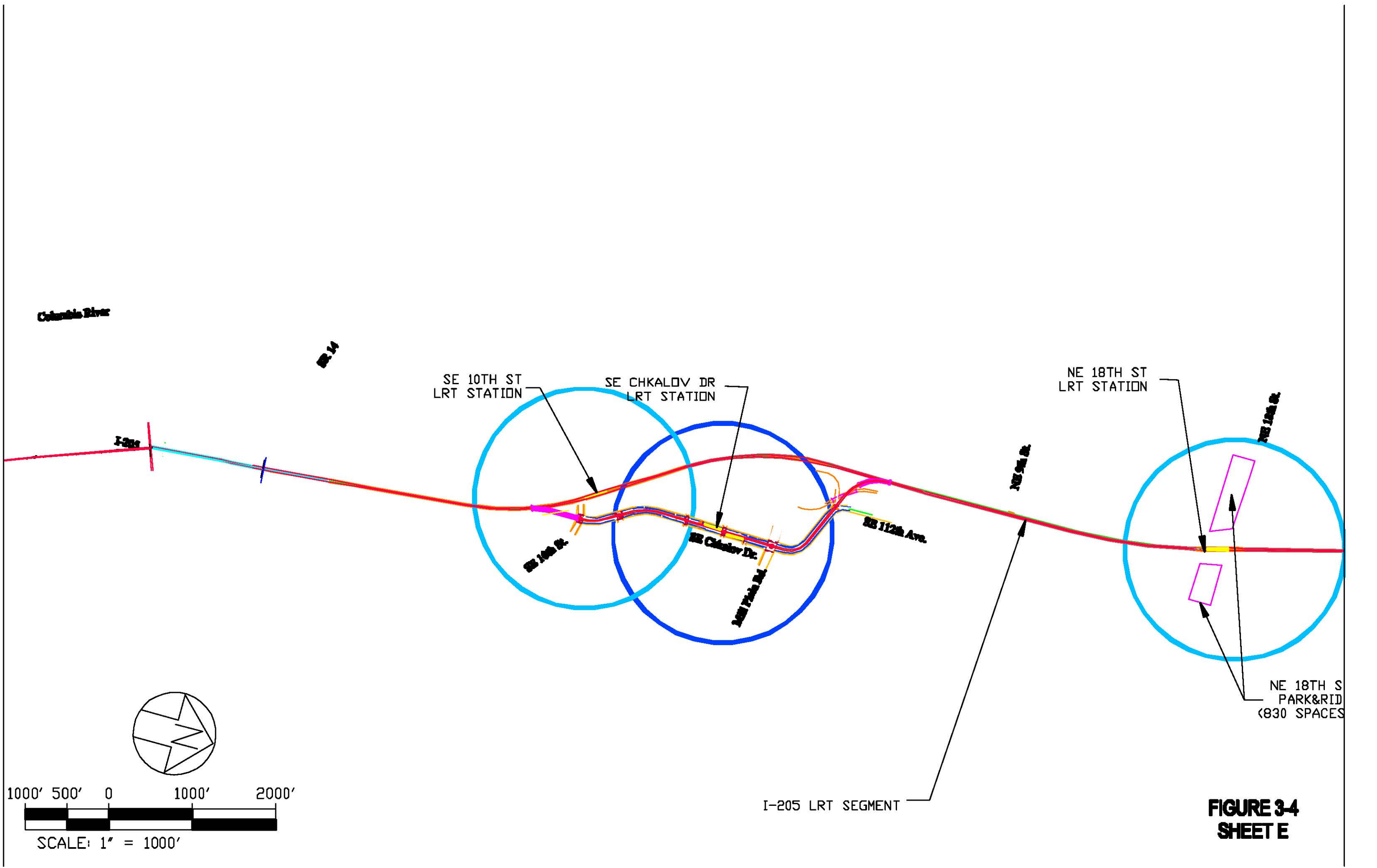
**FIGURE 3-4
SHEET A**



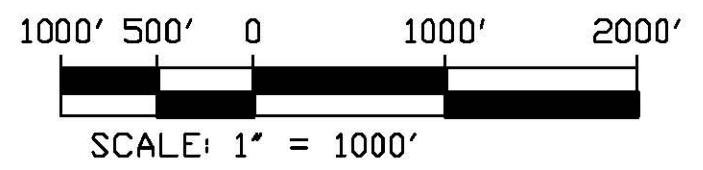
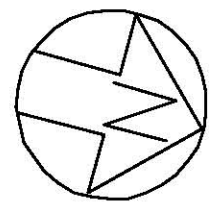
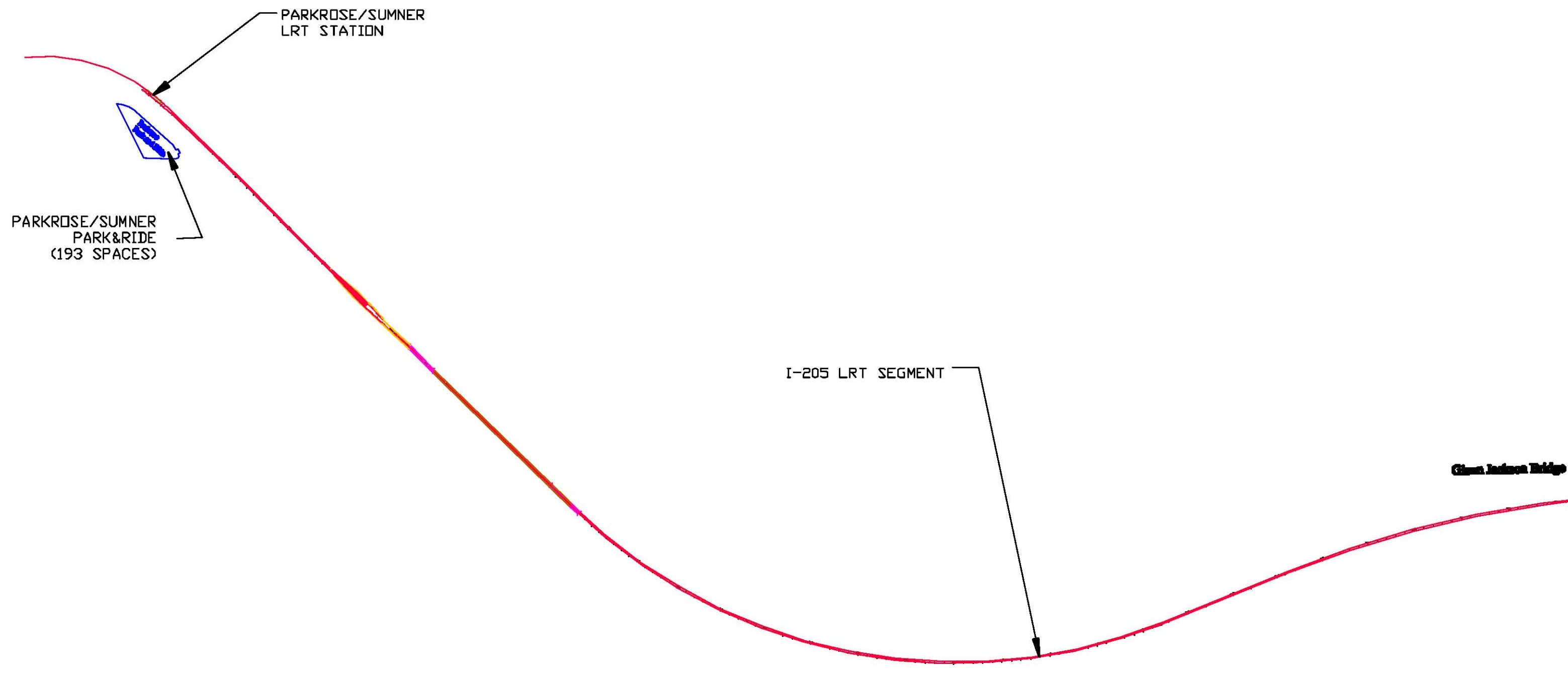
**FIGURE 3-4
SHEET B**



**FIGURE 3-4
SHEET D**



**FIGURE 3-4
SHEET E**



**FIGURE 3-4
SHEET F**

TABLE 3-2 PLANNED LRT PARK-AND-RIDE LOCATIONS AND CAPACITY	
LRT System/P&R Facility	Planned Capacity
Airport MAX	
• Parkrose/Sumner TC	193 spaces ¹
Interstate MAX	
• PIR	300 spaces ¹
• Expo Center	300 spaces ¹
Subtotal	793 spaces
Clark Co. LRT Loop System	
• I-5 @ VA Hospital	1000 spaces ²
• SR 500 @ Falk Rd.	550 spaces ¹
• SR 500 @ Andresen Rd.	1000 spaces ²
• SR 500 @ Vancouver Mall TC	910 spaces ¹
• I-205 @ Crossroads	1200 spaces ¹
• I-205 @ 83 rd Avenue	1300 spaces ¹
• I-205 @ NE 18 th Street	830 spaces ¹
Subtotal	6790 spaces
TOTAL	7583 spaces

1. Surface parking

2. Parking structure

Sources: C-Tran and Tri-Met

Although planned park-and-ride capacity will be used as input into the travel demand modeling, park-and-ride capacity will be unconstrained by the model. Through an equilibration procedure, park-and-ride capacity will be adjusted to reflect transit ridership demand. This equilibration process allows transit demand under LRT and express bus options to be compared fairly.

3.6. River Crossing Options

Each of the Option Package 3 variations includes a different Columbia River Bridge concept consisting of a new bridge to supplement the existing I-5 Bridge structures:

Option Package 3a: Loop LRT system with joint LRT/arterial bridge

Option Package 3b: LRT from Expo/PIR to Clark College on LRT only bridge

Option Package 3c: LRT from Expo/PIR to Clark College with joint use arterial/HOV bridge

The key features of each are presented below in Table 3-3:

This technical document is a discussion draft for PAG level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a “work in progress” and does not reflect final recommendations or the individual views of any project team member.

**TABLE 3-3
KEY FEATURES OF OPTION PACKAGE 3 RIVER CROSSING CONCEPTS**

Option Package	Figure Nos.	Key Features of River Crossing Concepts
3a	See Fig. 3-1	<ul style="list-style-type: none"> • Includes a new joint use arterial/LRT bridge across the Columbia River to supplement the existing I-5 structures, increasing Columbia River crossing capacity to 10 lanes for auto use plus LRT • LRT may be carried in a double-deck or adjacent configuration
3b	See Fig. 3-2	<ul style="list-style-type: none"> • LRT carried across Col. River on LRT only bridge • No change in use of existing I-5 Bridge structures (six lanes)
3c	See Fig. 2-3 & Fig. 2-4	<ul style="list-style-type: none"> • Same as Option Package 2 (see Section 2.7) with 10 lanes of auto capacity across the Columbia River

3.7. Corridor Interchange Revisions

Same as Option Package 2. (See Section 2.8.)

This section last revised 7-18-01.

4.0. OPTION PACKAGE 4: COMMUTER RAIL

Commuter Rail

- *The Governors' Task Force adopted a decision to defer analysis of this option package pending completion of the corridor rail study. Currently being conducted as a separate task under the overall I-5 Transportation and Trade Partnership Study.*

This section last revised 7-18-01.

5.0. OPTION PACKAGE 5: PLANNED REGIONAL BUS WITH CORRIDOR-WIDE CAPACITY INCREASE

Planned Regional Bus w/ additional corridor-wide capacity

- *The Governors' Task Force adopted a decision to merge elements of Option Package 5 into Option Package 6 for evaluation. Option Package 5 will not be evaluated as a separate option package.*

This section last revised 7-18-01.

6.0. OPTION PACKAGE 6: EXPRESS BUS WITH CORRIDOR-WIDE CAPACITY INCREASE

6.1. Road Network Description

Option Package 6 involves operation of directional express bus transit service in I-5 HOV lanes between Clark County and downtown Portland. It also includes I-5 widening for a fourth travel lane in each direction between I-405 and I-205 and would require additional Columbia River Bridge crossing capacity.

Key features of this option package include the following:

- Widens I-5 from 134th Street to approximately I-405 to support operation of three general purpose lanes and one HOV lane in each direction
- Results in a directional corridor HOV system from 134th Street to approximately I-405
- Includes additional Columbia River crossing capacity compatible with 4-lane, 6-lane and 10-lane bridge crossing concepts
- Includes HOV specific facility treatments such as a directional HOV/express bus connection between I-5 and SR 14 to/from the south.

As currently proposed, Option Package 6 will only be designed and evaluated as an HOV system and not also as a reversible lane system. Option Package 7 will be modeled (but not designed) only as a reversible lane system for performance comparison to the Option Package 6 HOV system. If reversible lane system performance is deemed promising under Option 7, a reversible lane system may be evaluated for Option Package 6 and designed under Option Package 7.

6.2. Transit Network Description

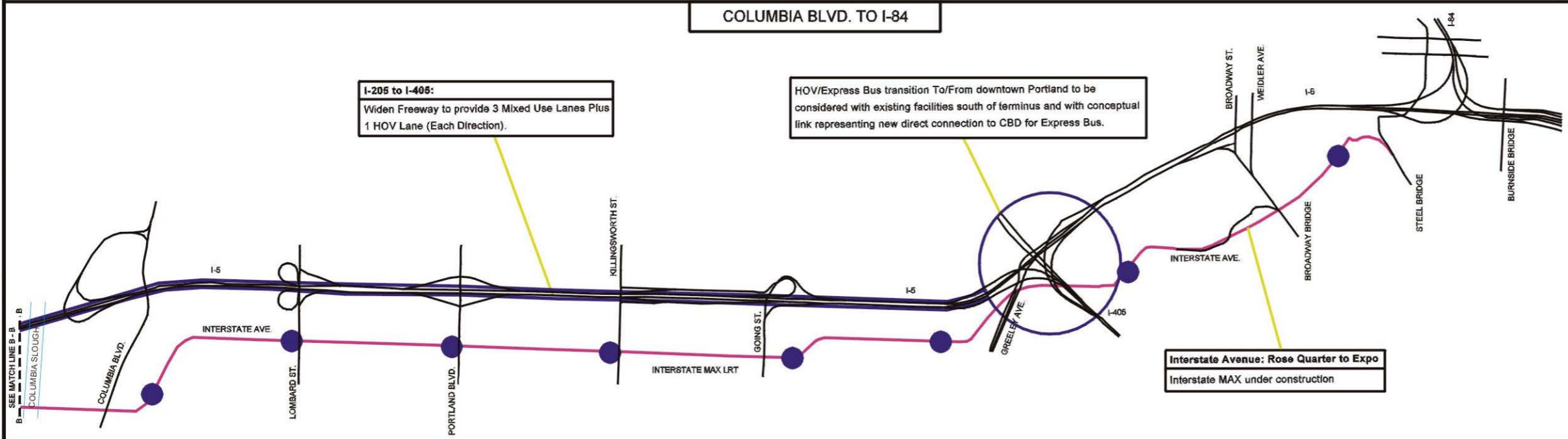
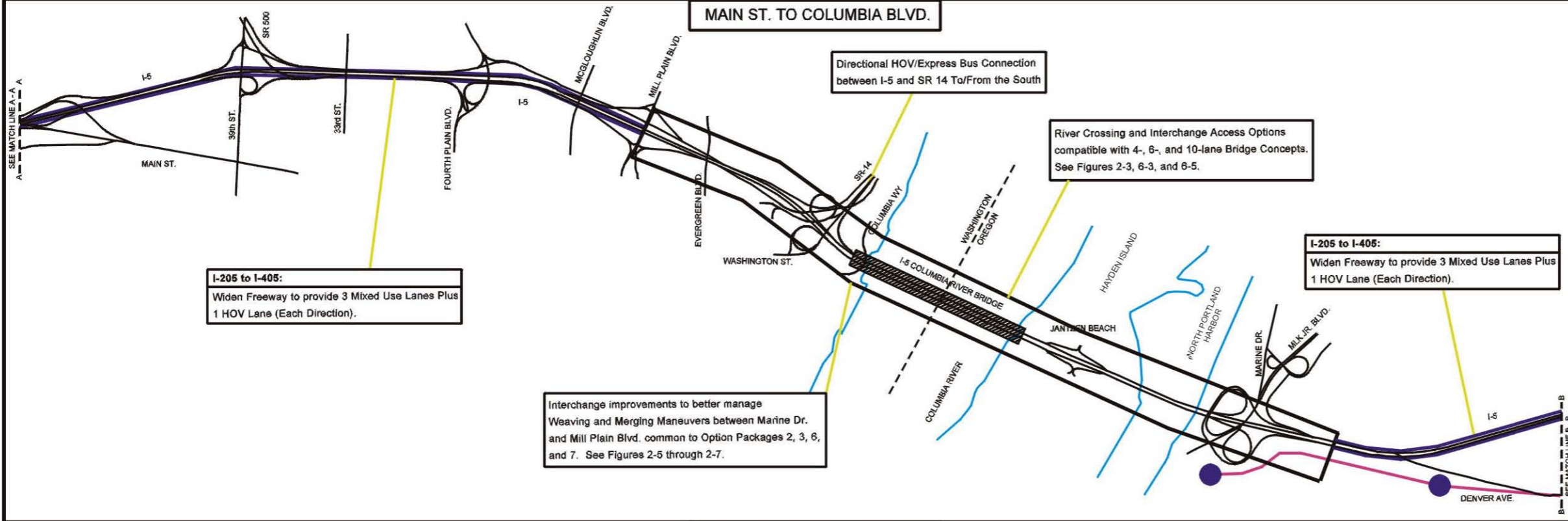
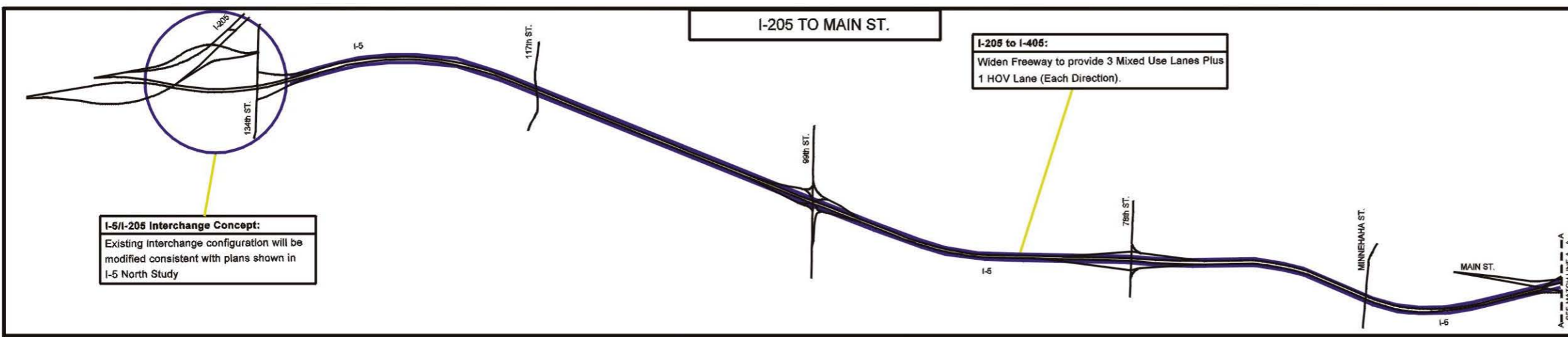
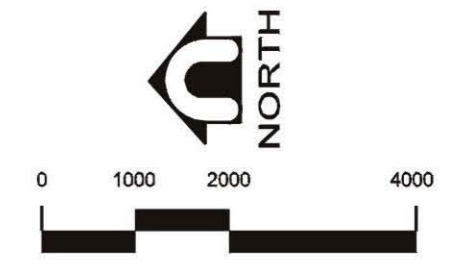
This network will be modeled in conjunction with highway scenarios that include expanded freeway capacity (with express lanes or HOV lanes) across the Columbia River and freeway widening through North Portland (in addition to Delta Park and Rose Quarter).

Tri-Met: Same as defined for the *Priority Baseline* (Option Package 1d) described in Section 1.3.

C-TRAN: The C-TRAN network will be similar to the Express Bus (PIR) network with added park-and-ride capacity and new express bus service. With this scenario, express bus routes from the Fishers Landing and Central County park-and-ride lots will no longer cross the river on the I-205 bridge but will be routed west on SR 14 and utilize the I-5 capacity improvements.

6.3. Corridor Schematic

An overall corridor schematic shown in **Figure 6-1** depicts the functional operation of I-5 under the Option Package 6 HOV lane express bus system. Text call-out boxes direct attention to specific projects or operational features within the corridor.



LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations

Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1).

Note 2: This HOV concept is also compatible with Option Package 7.

Note 3: A new 6-lane bridge would not access Marine Dr., Hayden Is., or SR 14. The existing I-5 Columbia River structure would provide I-5 access to these destinations.

Note 4: A new 10-lane bridge would replace the two existing I-5 Columbia River Structures.

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FIGURE 6-1
Option Package 6: Express Bus with additional Corridor-wide Capacity (for HOV only)

ODOT0364/HOVwid.dgn/RSLP/7-17-01

6.4. Express Bus Service Plan

Figure 6-2 depicts C-Tran's regional express bus service plan in support of Option Package 6 with I-5 express bus service to downtown Portland and I-205 express bus service destined to downtown Portland routed along I-205.

To the extent practicable, the service plan funnels express bus service to the I-5 corridor from I-205 via SR 14. Service from I-205 destined to downtown Portland is routed along SR 14 and I-5 rather than I-205 and I-84 in recognition of identified corridor HOV and other general freeway facility improvements along I-5 and the forecast underutilization of SR 14.

6.5. Express Bus Facility Descriptions

- Same as Option Package 2 (see Section 2-4) plus implementation of a directional HOV/express bus connection between I-5 and SR 14 to/from the south.

6.6. Park-and-Ride Facilities

Same as Option Package 2 (See Section 2-5).

6.7. River Crossing Options

Option Package 6 results in an 8-lane freeway corridor on both sides of the Columbia River. Columbia River Bridge crossing concepts under this option package are consistent with a 4-lane bridge concept shown previously under Option Package 2, or with 6-lane and 10-lane bridge concepts. This option package will be modeled and designed with 6-lane and 10-lane bridge concepts as described below.

- **4-Lane Bridge:** This option package is compatible with a new supplemental four-lane bridge as shown with Option Package 2 (See **Figures 2-3 and 2-4**). This bridge increases Columbia River crossing auto capacity to 10 lanes and results in removal of the existing I-5/Hayden Island interchange. However, a four-lane bridge concept will not be modeled or designed with this option package because performance of such a facility will be tested under Option Packages 2 and 3.
- **6-lane Bridge:** A new 6-lane bridge concept is depicted in **Figure 6-3**. As shown, this concept provides a new eastern mainline express bypass facility with no interchange access between Marine Drive and SR 14. The new bridge would peel off from the I-5 mainline in Oregon and Washington and would be configured with two general purpose lanes and one HOV lane in each direction. Access to Marine Drive, Hayden island, and SR 14 would continue to be provided from the I-5 mainline across the existing I-5 Columbia River Bridges.

As shown, this option carries 12 roadway lanes across the Columbia River (6 each direction) serving local access and through trips. This option provides an opportunity to use one of the existing I-5 structures for LRT. Engineers will determine the number of lanes that can feasibly be retained for auto use across the existing I-5 Bridge structures while tying blending back in to the mainline on each end of the new bridge. This bridge concept will be modeled and designed with Option Packages 6 and 7.

Dial-A-Ride Zone 1

Dial-A-Ride Zone 2

Dial-A-Ride Zone 2

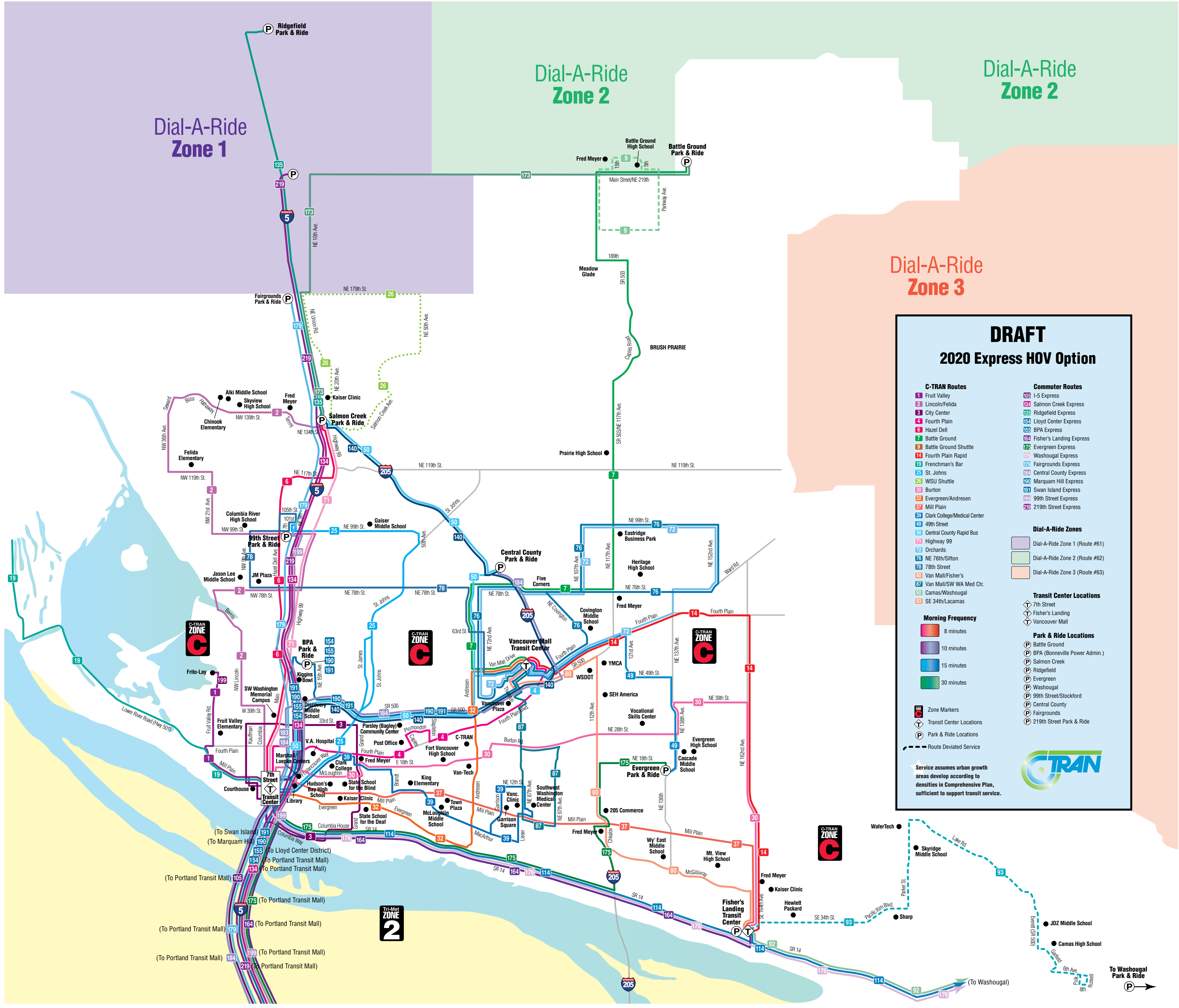
Dial-A-Ride Zone 3

DRAFT 2020 Express HOV Option

- C-TRAN Routes**
 - 1 Fruit Valley
 - 2 Lincoln/Felida
 - 3 City Center
 - 4 Fourth Plain
 - 6 Hazel Dell
 - 7 Battle Ground
 - 9 Battle Ground Shuttle
 - 14 Fourth Plain Rapid
 - 19 Frenchman's Bar
 - 25 St. Johns
 - 26 WSU Shuttle
 - 30 Burton
 - 32 Evergreen/Andresen
 - 37 Mill Plain
 - 39 Clark College/Medical Center
 - 49 49th Street
 - 50 Central County Rapid Bus
 - 71 Highway 99
 - 72 Orchards
 - 76 NE 76th/Sifton
 - 78 78th Street
 - 80 Van Mall/Fisher's
 - 87 Van Mall/SW WA Med Ctr.
 - 92 Camas/Washougal
 - 93 SE 34th/Lacamas
- Commuter Routes**
 - 105 I-5 Express
 - 134 Salmon Creek Express
 - 135 Ridgefield Express
 - 154 Lloyd Center Express
 - 155 BPA Express
 - 164 Fisher's Landing Express
 - 175 Evergreen Express
 - 176 Washougal Express
 - 179 Fairgrounds Express
 - 184 Central County Express
 - 190 Marquam Hill Express
 - 191 Swan Island Express
 - 199 99th Street Express
 - 219 219th Street Express
- Dial-A-Ride Zones**
 - Dial-A-Ride Zone 1 (Route #61)
 - Dial-A-Ride Zone 2 (Route #62)
 - Dial-A-Ride Zone 3 (Route #63)
- Transit Center Locations**
 - 7th Street
 - Fisher's Landing
 - Vancouver Mall
- Park & Ride Locations**
 - Battle Ground
 - BPA (Bonneville Power Admin.)
 - Salmon Creek
 - Ridgefield
 - Evergreen
 - Washougal
 - 99th Street/Stockford
 - Central County
 - Fairgrounds
 - 219th Street Park & Ride
- Morning Frequency**
 - 8 minutes
 - 10 minutes
 - 15 minutes
 - 30 minutes
- Legend**
 - Zone Markers
 - Transit Center Locations
 - Park & Ride Locations
 - Route Deviated Service



Service assumes urban growth areas develop according to densities in Comprehensive Plan, sufficient to support transit service.



To Washougal Park & Ride



LEGEND:

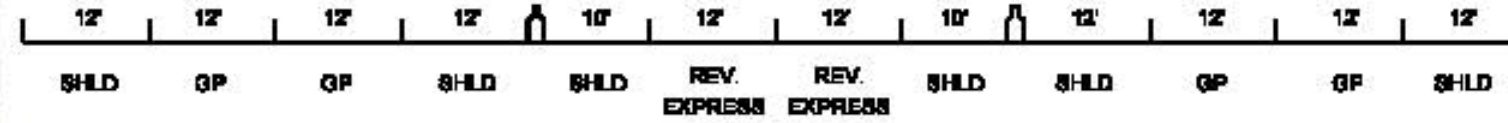
Revision Date: 7-17-01

FIGURE 6-3

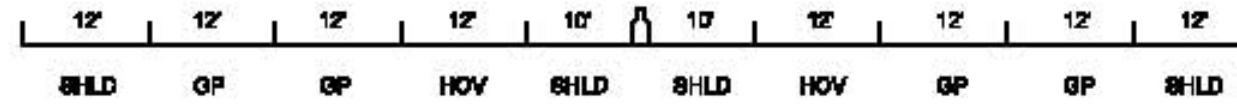
6-Lane Bridge Concept

LANE CONFIGURATIONS

6-LANE WITH REVERSIBLE EXPRESS LANES



6-LANE WITH HOV LANES



No change to existing access between I-5 and Marine Drive, Hayden Island, and SR 14 Interchanges

JANTZEN BEACH

MARINE DRIVE

DELTA PARK

EXPO CENTER

WILL PLANK BLVD

SR 14

A detailed 6-lane Bridge concept with number of lanes and ramp connections is shown in **Figure 6-4**.

- **10-lane Bridge:** A new 10-lane bridge concept is depicted in **Figure 6-5**. This concept provides a new 10-lane Columbia River crossing with three general purpose lanes, one HOV lane, and one auxiliary lane between Hayden Island and SR 14 in each direction. This bridge would replace the existing I-5 bridge structures. Engineers will determine if grade constraints of this type of structure allow LRT to be carried on the structure versus needing an adjacent LRT only bridge. This bridge concept will initially be modeled and designed with Option Package 6 only. Based on performance results, it may be modeled and designed under Option Package 7.

A detailed 10-lane Bridge concept with number of lanes and ramp connections is shown in **Figure 6-6**.

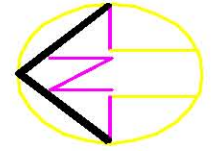
- **Tunnels:** Engineers will continue to review the feasibility of 4-lane and 6-lane tunnel options. Refer to March 20, 2001 option package description report for schematics.
- **Connections:** HOV connections between I-5 and I-405 (Fremont Bridge) need to be conceptually designed

6.8. Corridor Interchange Revisions

Modifications to the existing interchange system between SR 14 and SR 500 to address existing/forecast weaving, merging, and diverging issues are common to Option Packages 2, 3, 6, and 7. The conceptual interchange modifications in Washington are functionally depicted in **Figure 2-5**.

Figures 6-7a, 6-7b, and 6-7c depict conceptual interchange revisions in Oregon between I-405 and Columbia Blvd. with and without braided ramps. **Figure 6-8** depicts an alternative option to revise interchange operations in Oregon between Marine Drive and Hayden Island.

This section last revised 7-18-01.



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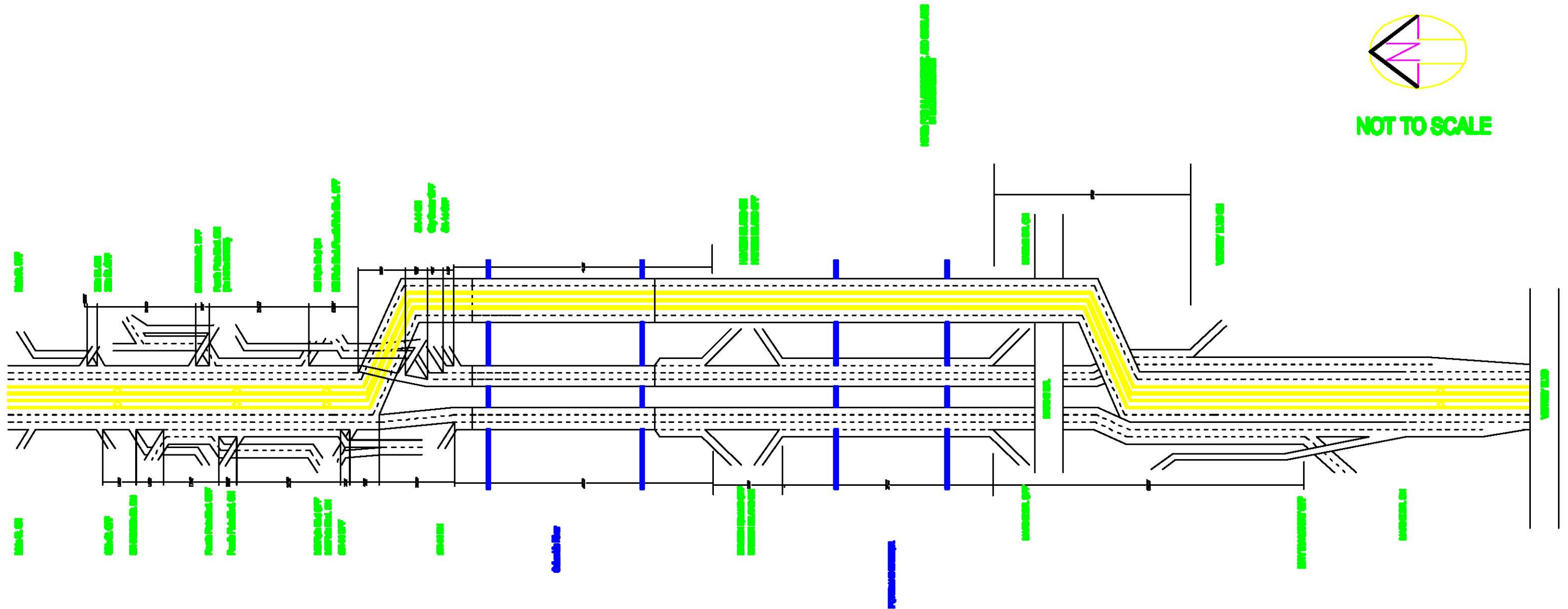


FIGURE 6-4
I-5 CORRIDOR CONFIGURATION
WITH 6-LANE BRIDGE



LEGEND:

Revision Date: 7-17-01

FIGURE 6-5

10-Lane Bridge Concept

LANE CONFIGURATION

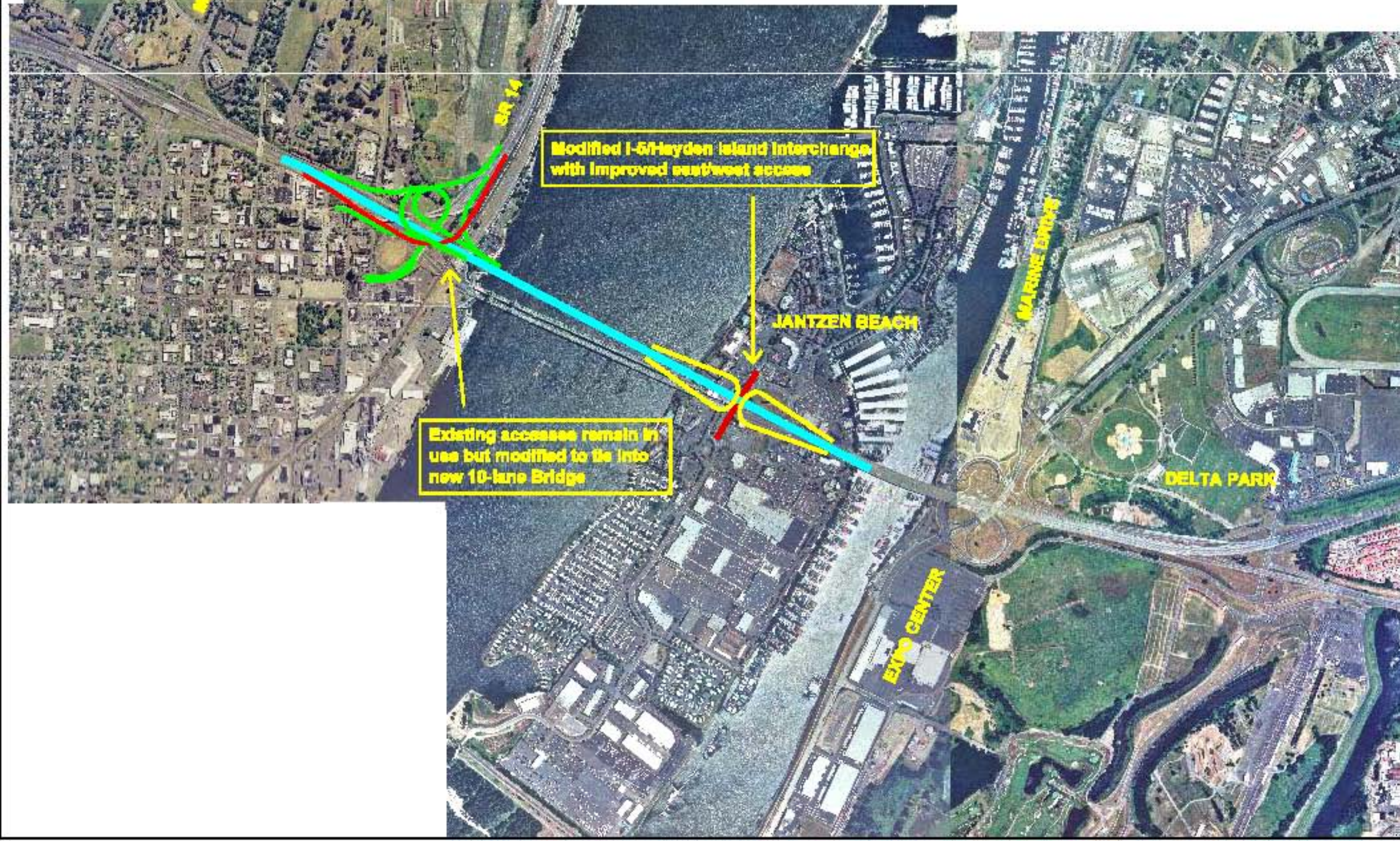
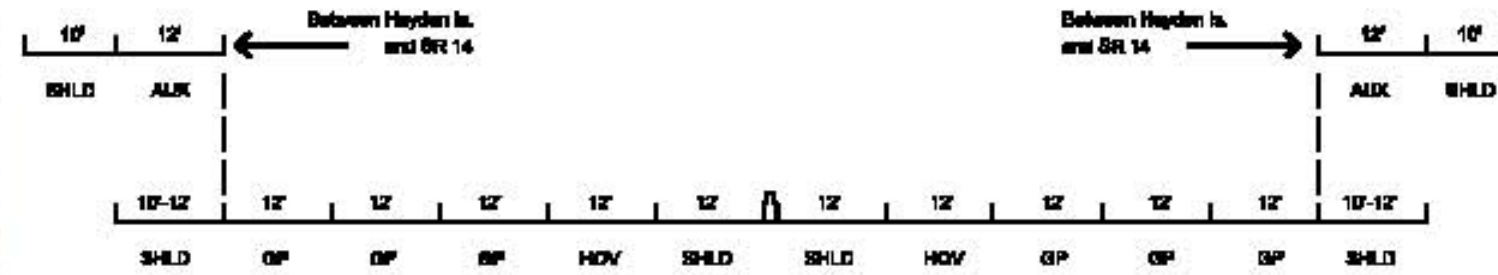
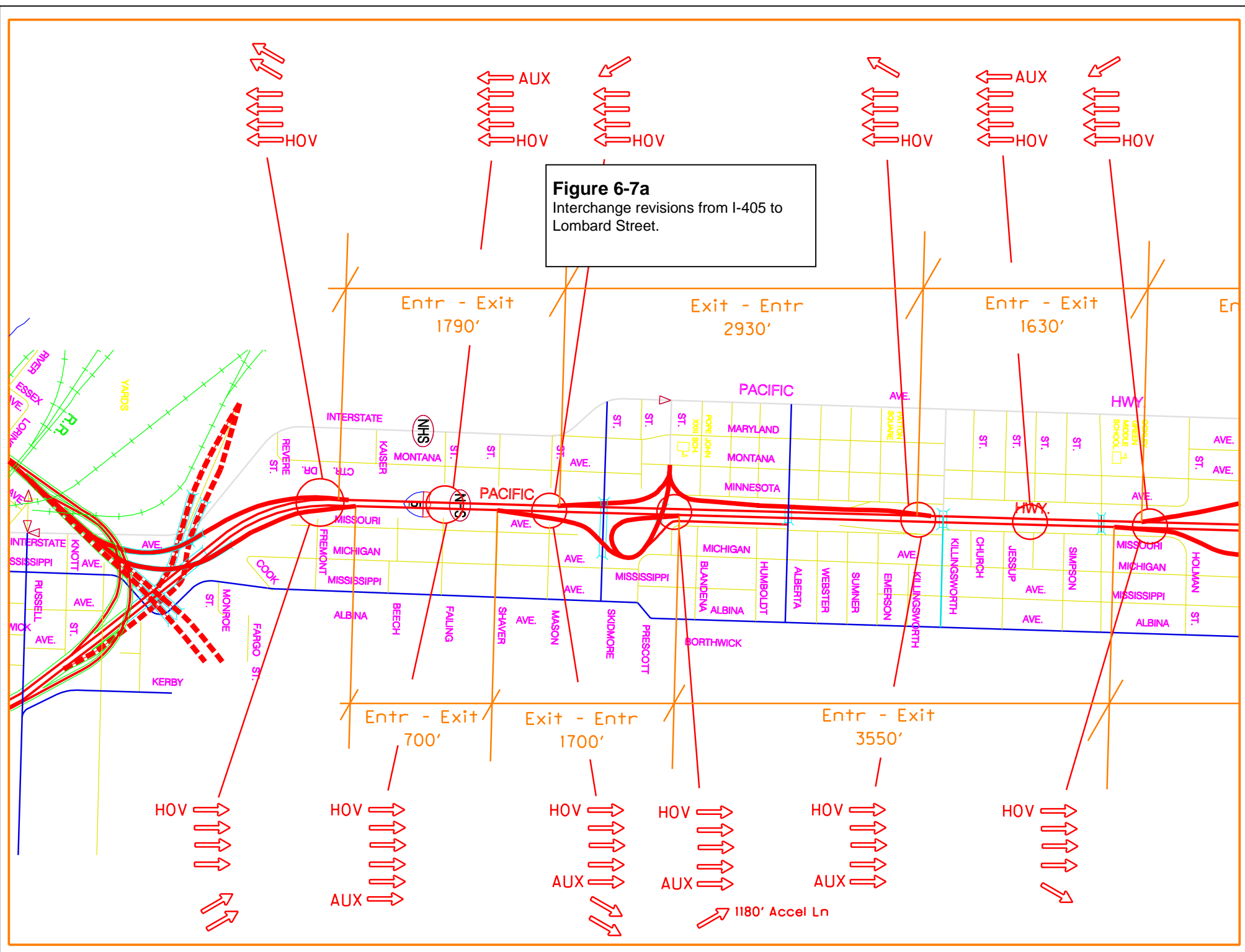


Figure 6-7a
Interchange revisions from I-405 to
Lombard Street.



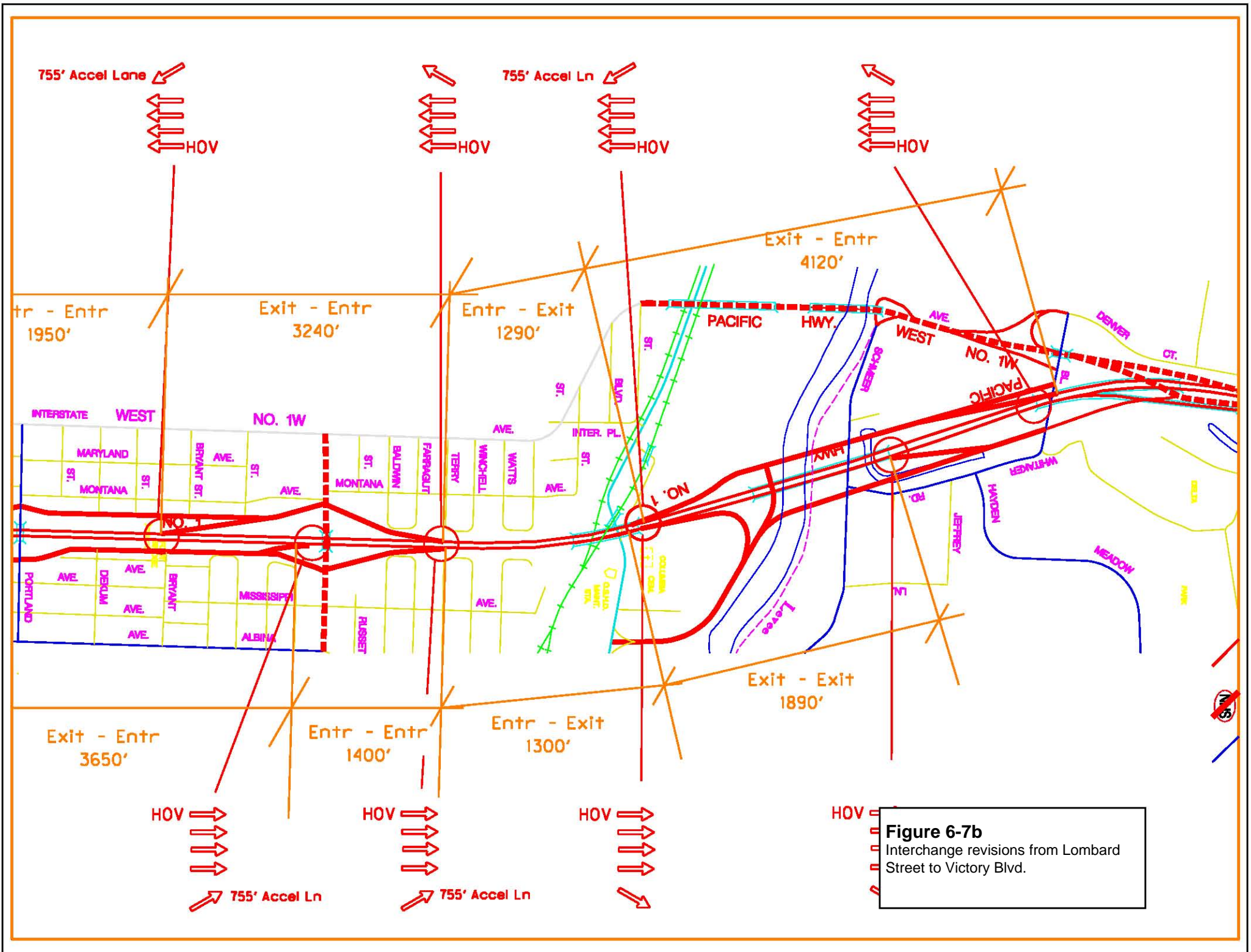


Figure 6-7b
 Interchange revisions from Lombard
 Street to Victory Blvd.

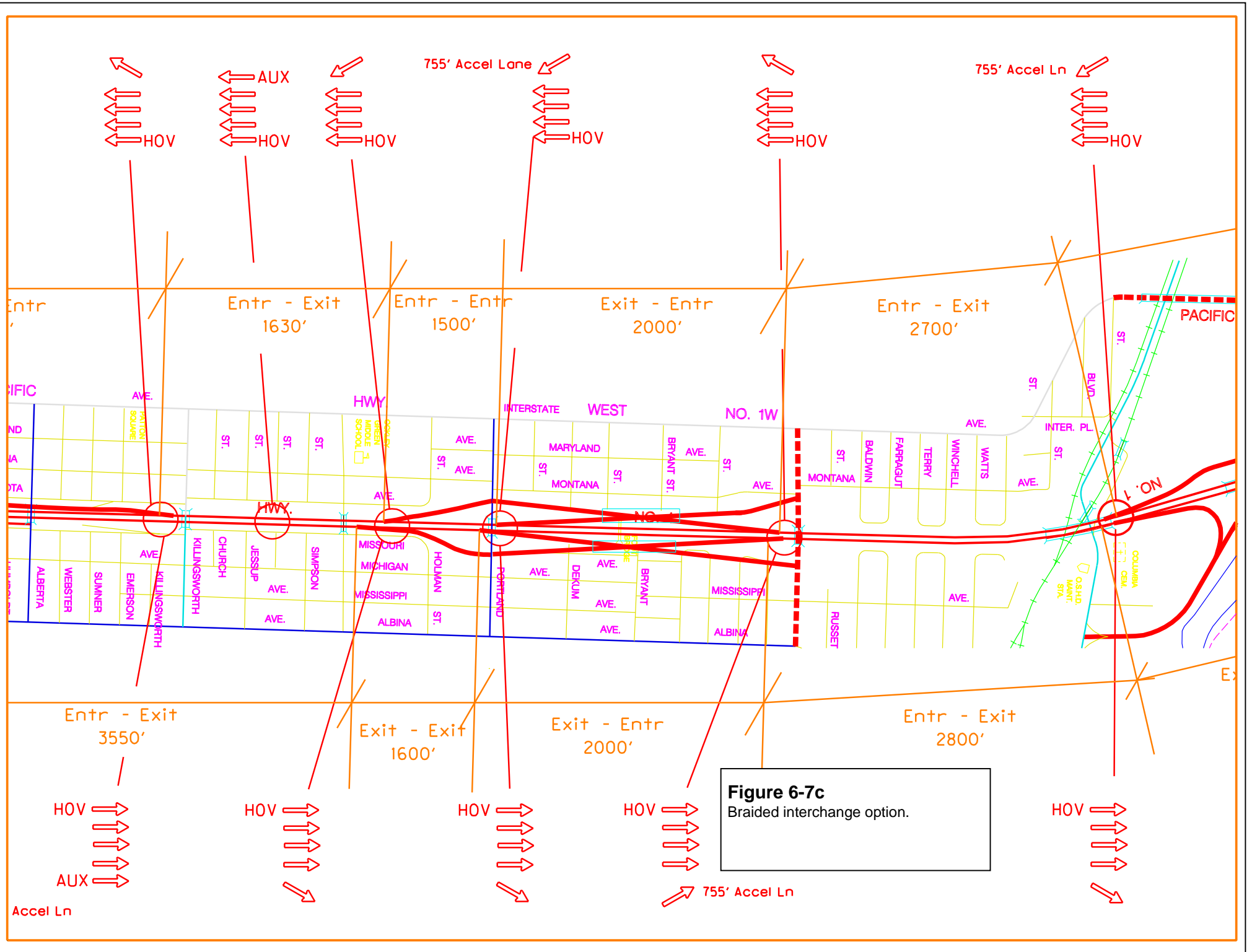
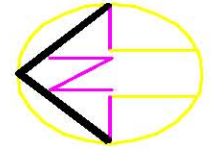


Figure 6-7c
Braided interchange option.



NOT TO SCALE

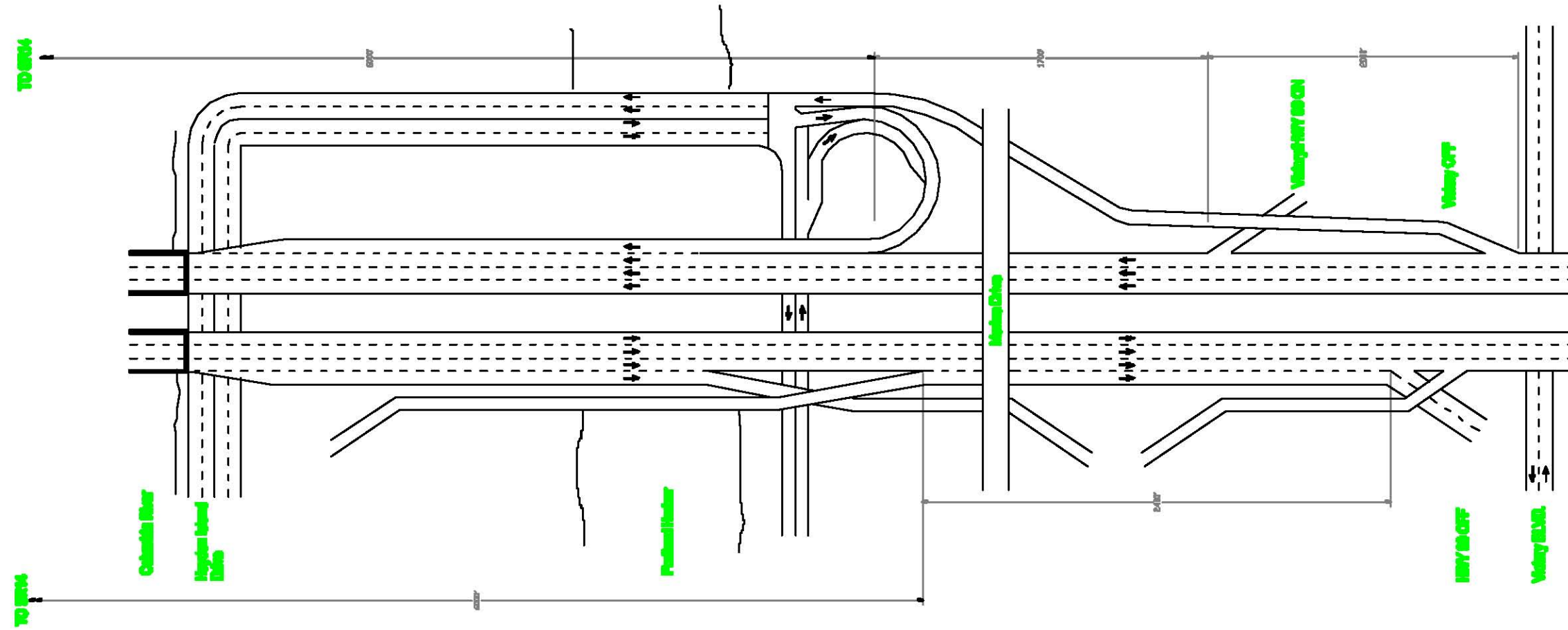


FIGURE 6-8
POSSIBLE MARINE DR/HAYDEN ISLAND
INTERCHANGE CONFIGURATION

7.0. OPTION PACKAGE 7: LIGHT RAIL TRANSIT (LRT) WITH CORRIDOR-WIDE CAPACITY INCREASE

7.1. Road Network Description

Option Package 7 involves investment in an LRT loop system, as well as a corridor-wide highway capacity increase in the form of a two-lane reversible express lane facility on I-5 between 134th Street and I-405.

Key features of this package include:

- Provides the only option package resulting in five lanes of peak direction roadway capacity, including HOV, and provides the maximum person-carrying capacity among all of the alternatives being considered
- Includes an LRT loop system with the following segments:
 - ◆ Expo P&R to Clark College
 - ◆ Clark College to 83rd P&R lot with service to Vancouver Mall
 - ◆ 83rd P&R to Parkrose transit center with service to Vancouver Mall
- Includes limited express lane access at 134th Street, SR 500, SR 14, Columbia Blvd., and I-405/I-5
- Compatible with 4-lane, 6-lane, and 10-lane Columbia River Bridge concepts and with Columbia River tunnel concepts

7.2. Transit Network Description

The following transit network description applies to Option Package 7 (consistent with corridor-wide freeway widening for a fourth lane between 134th Street and I-405 third lane widening through Rose Quarter:

Tri-Met: Same as defined for the *Priority Baseline* (Option Package 1d) described in Section 1.3.

C-TRAN: The C-TRAN bus network for the Full Loop LRT scenario is currently under development.

7.3. Corridor Schematic

An overall corridor schematic shown in **Figure 7-1** depicts the functional operation of I-5 under the Option Package 7 reversible express lane system. Text call-out boxes direct attention to specific projects or operational features within the corridor.

7.4. LRT Loop System Schematic

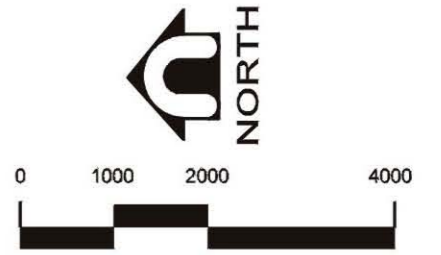
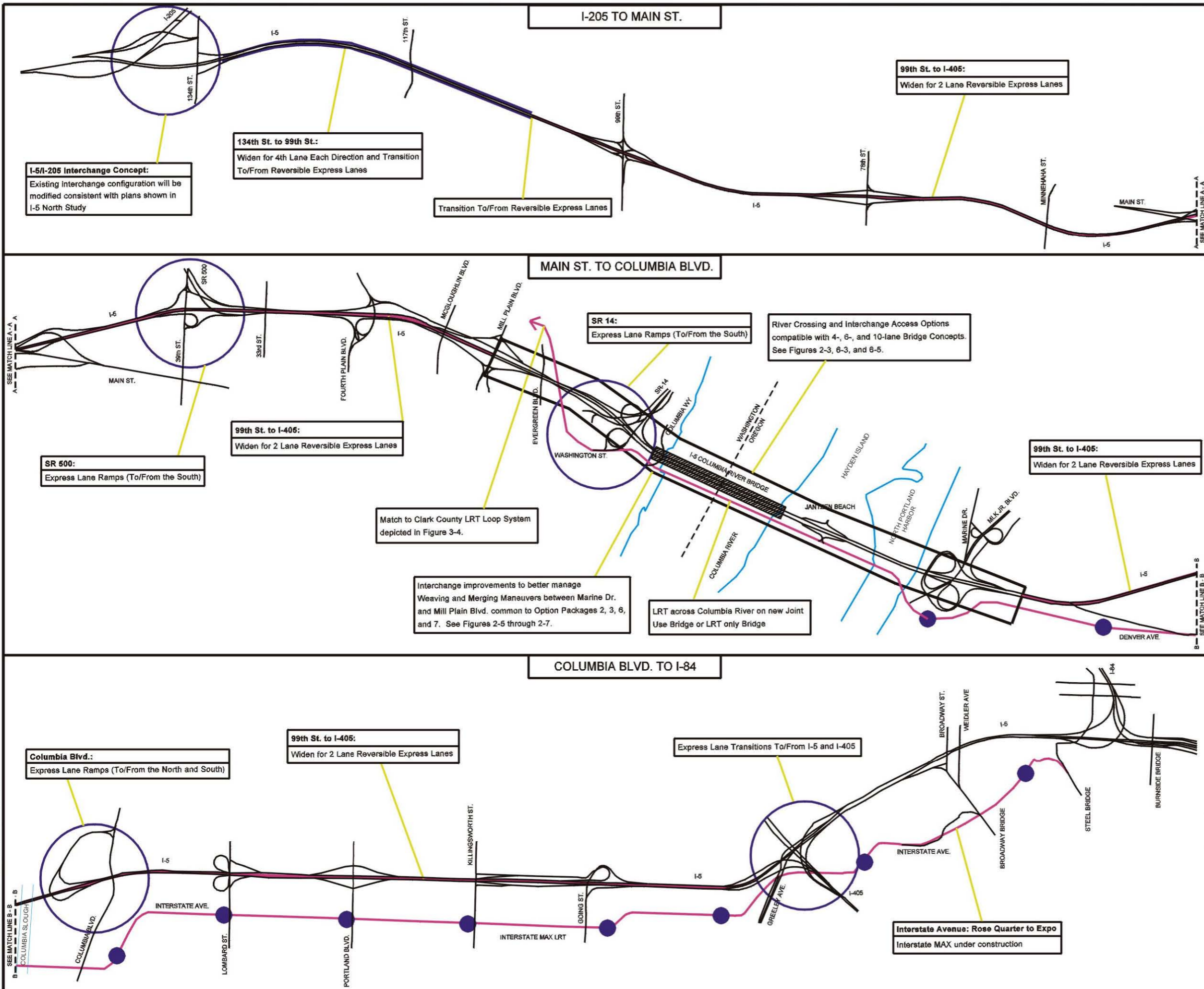
See Section 3-3.

7.5. Park-and-Ride Facilities

See Section 3-4.

This technical document is a discussion draft for PAG level review and below and is specifically targeted to the detailed level of information needed by the conceptual engineering and modeling teams. It is a “work in progress” and does not reflect final recommendations or the individual views of any project team member.

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LEGEND:

- Interstate MAX LRT Alignment
- Interstate MAX LRT Stations

- Note 1: This option package assumes all of the projects in the Priority Baseline Network (see Figure 1-1) including widening to 3 lanes each direction from I-84 to I-405.
- Note 2: This reversible lane concept is also compatible with Option Package 6.
- Note 3: A new 6-lane bridge would not access Marine Dr., Hayden Is., or SR 14. The existing I-5 Columbia River structure would provide I-5 access to these destinations.
- Note 4: A new 10-lane bridge would replace the two existing I-5 Columbia River Structures.
- Note 5: Corridor configuration includes 3 lanes in each direction plus the 2-lane reversible express lane facility between I-405 and 134th St.

Revision Date: 7-17-01

FIGURE 7-1
Option Package 7: LRT with Corridor-wide Capacity Increase (for reversible lanes only)

7.6. River Crossing Options

River crossing options for Option Package 7 are similar to those described under Option Package 6. See Section 6-7 and **Figures 2-3, 6-3, and 6-4**, respectively for 4-lane, 6-lane, and 10-lane bridge concepts including a description of the number of lanes crossing the Columbia River.

Initially, only a 6-lane bridge concept will be modeled and designed with Option Package 7. Based on performance results of a 10-lane bridge concept associated with Option Package 6, a 10-lane bridge option may be modeled and designed with Option Package 7. Design of the overall reversible express lane system (separate from a 6-lane bridge structure) has been postponed until at least September 2001.

Engineers will continue to review the feasibility of 4-lane and 6-lane tunnel options. Refer to March 20, 2001 option package description report for schematics.

7.7. Corridor Interchange Revisions

Same as Option Package 6. (See Section 6.8.)

This section last revised 7-18-01.

8.0. OPTION PACKAGE 8: NEW WESTERN ARTERIAL CORRIDOR

8.1. Road Network Description

This Option Package builds upon the Option Package 1d (Priority Baseline) and involves construction of a new arterial connecting US 30 near the Linnton neighborhood and St. John's Bridge in Portland to Vancouver at Mill Plain Blvd. In concept, the arterial would be four lanes (two in each direction) with bicycle lanes and sidewalks. Access to/from the arterial and adjacent street system would be limited to Mill Plain Blvd., Hayden Island, Marine Drive, Columbia Blvd., Lombard Street, and US 30.

The arterial would follow an alignment from Vancouver near Mill Plain Blvd. across the Columbia River along North Portland Road. Just north of Columbia Blvd., the arterial would transition to a grade-separated structure above the existing BNSF rail lines to a point just north of the Willamette River. From there, the arterial would cross the Willamette River on a new bridge to US 30. Opportunities to design joint use auto/rail bridges will be considered for the Columbia River and Columbia Slough crossings.

The arterial is intended to draw "local" freight and general-purpose traffic between North Portland and Vancouver from I-5 and major east-west arterials including Columbia Blvd. and Lombard Street.

8.2. Transit Network Description

Refer to Option Package 1d (Priority Baseline) transit network description in Section 1-4.

8.3. Corridor Schematic

An overall corridor schematic of a new western arterial corridor is shown in **Figure 8-1**. Text call-out boxes direct attention to specific projects or operational features within the corridor.

8.4. River Crossing Options

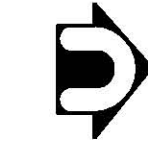
The 4-lane arterial would cross the Columbia River, Columbia Slough, and Willamette River in addition to following an alignment on structure through the BNSF rail corridor. Bridges over the Columbia River and Slough could be joint use arterial and Amtrak passenger rail. The bridge over the Willamette would likely not be joint use auto/rail.

A four-lane arterial bridge and cross-section would be similar to that shown in **Figure 3-1** for Option Package 3a.

8.5. Corridor Interchange Revisions

No change in existing I-5 interchange configuration/operation is assumed under this option package.

This section last revised 7-18-01.



(Not to Scale)

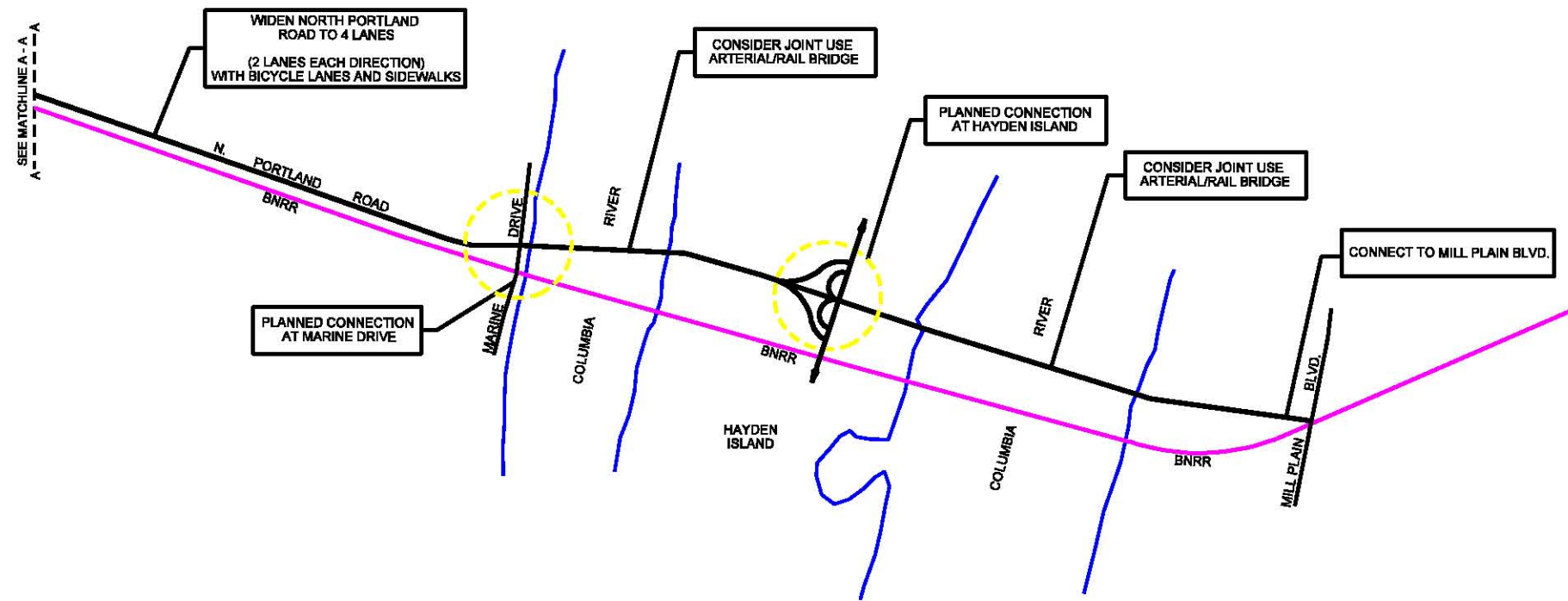
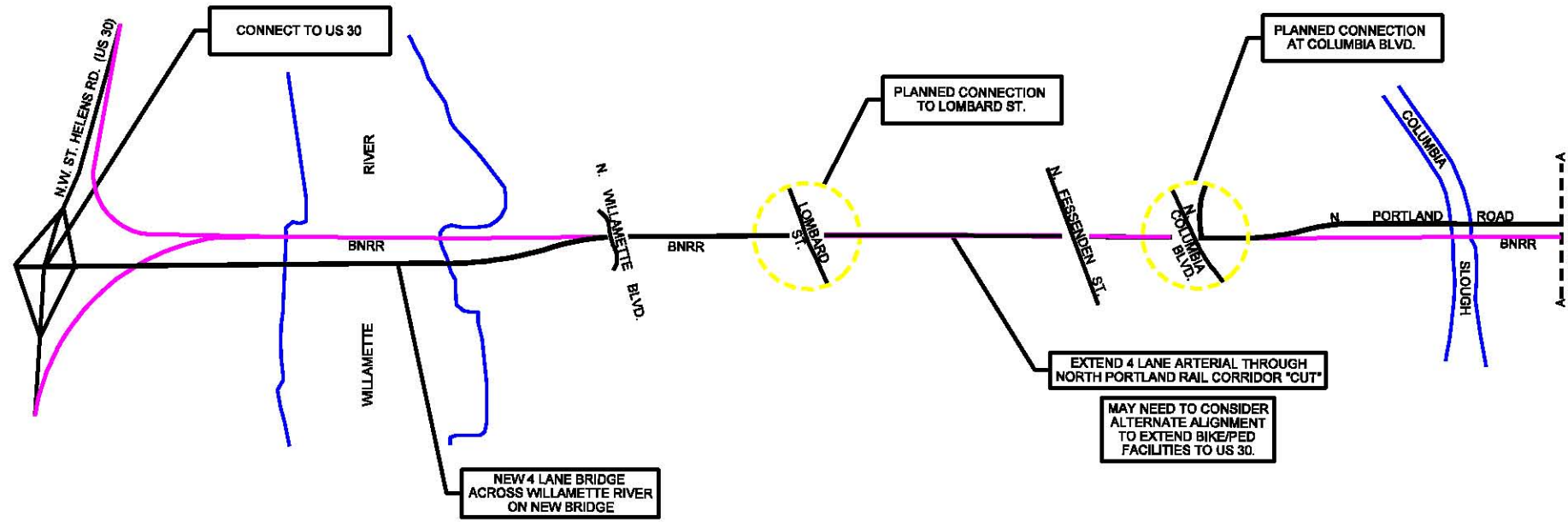


FIGURE 8-1

Option Package 8: New Western Arterial Corridor

9.0. OPTION PACKAGE 9: NEW FREEWAY

1. *New Freeway with Regional Bus*

- *Decision to drop from consideration adopted by GTF*

This section last revised 7-18-01.

10.0. OPTION PACKAGE 10: INCREASED TRANSPORTATION DEMAND MANAGEMENT (TDM) AND TRANSIT OPTION

10.1. Road Network Description

Building upon Option Package 1d (Priority Baseline) and the regional LRT loop system, this option package would incorporate an increased level of transportation demand management (TDM) measures beyond levels included in Option Packages 1 through 9. Table 10-1 presents Metro's preferred, priority, and financially constrained TDM factors. The TDM assumptions for Option Packages 1-10 include the following:

Option Packages 1-9

Oregon:

- Priority road network – including Delta Park and Rose Quarter
- Priority transit network – less LRT to Vancouver
- Priority TDM measures – See Table 10-1

Washington:

- 2020 constrained road network
- Slightly less than 2020 constrained transit network and service levels

Option Packages 10

Oregon:

- Constrained road network – no highway improvements in I-5 corridor
- Priority transit network plus LRT connections to Clark County
- Preferred TDM measures – See Table 10-1

Washington:

- Constrained road network
- Slightly less than 2020 constrained transit network and service levels, plus LRT loop system
- Priority-like TDM measures- chart to be developed for Clark Co.

10.2. Transit Network Description

Same as Option Package 1d (Priority Baseline) transit network description presented in Section 1-4.

10.3. Corridor Schematic

See **Figure 1-1** depicting the Priority Baseline corridor system.

This section last revised 7-18-01.



Table 10-1- Metro TDM Factors
(Attachment 1)
2000 Regional Transportation Plan
Transportation Analysis Zone Assumptions
and Non-SOV Modal Performance

2040 Grouping	2040 Group Characteristics	2020 Intersection Density <i>(connections per mile)</i>			2020 Parking Factors <i>(indexed to CBD in '94 dollars)</i>			2020 Transit Pass Factor <i>(% of Full Fare)</i>			2020 Fareless Areas <i>(for internal trips)</i>			Non-SOV Modal Performance <i>(combined share of non-SOV trips to, from and within 2040 grouping)</i>		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Central City 1 Downtown Business District	Highest planned employment and housing density in the region, with highest level of access by all modes. LRT exists and current land uses reflect planned mix and densities.	20	20	20	6.08	6.08	6.08	60%	60%	60%	X	X	X	48%	67%	67%
Central City 2 Lloyd District	Highest planned employment and housing density in the region, with highest level of access by all modes. LRT exists and current land uses reflect planned mix and densities.	20	20	20	3.94	3.94	3.94	60%	60%	60%	X	X	X	34%	46%	46%
Central City 3 Central Eastside Industrial District	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses do not reflect planned mix and densities.	20	20	20	2.96	2.96	2.96	65%	65%	65%	X	X		32%	43%	42%

(P) 2020 Preferred System
 (S) 2020 Priority system
 (FC) 2020 Financially Constrained System

2040 Grouping	2040 Group Characteristics	2020 Intersection Density <i>(connections per mile)</i>			2020 ParkingFactors <i>(indexed to CBD in '94 dollars)</i>			2020 Transit Pass Factor <i>(% of Full Fare)</i>			2020 Fareless Areas <i>(for internal trips)</i>			Non-SOV Modal Performance <i>(combined share of non-SOV trips to, from and within 2040 grouping)</i>		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Central City 4 River District and Northwest	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses approach planned mix and densities.	20	20	20	3.94	3.94	3.94	65%	65%	65%	X	X		37%	57%	57%
Central City 5 North Macadam District	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses do not reflect planned mix and densities.	18	18	18	3.04	3.04	3.04	65%	65%	65%	X	X		22%	42%	42%
Regional Centers - Tier 1 Gresham Gateway Beaverton Hillsboro	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses approach planned mix and densities.	>16	>16	>14	1.60	1.20	0.80	70%	75%	80%	X	X	X	32%	40%	39%
Regional Centers - Tier 1 Gresham Gateway Beaverton Hillsboro	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses approach planned mix and densities.	>16	>16	>14	1.60	1.20	0.80	70%	75%	80%	X	X	X	32%	40%	39%
Station Communities Tier 1 Banfield Corridor Westside Corridor	High housing density mixed with commercial services; highest level of access for transit, bike and walk; existing LRT.	>16	>14	>12	1.60	1.20	0.80	70%	75%	80%				35%	42%	41%

(P) 2020 Preferred System
(S) 2020 Priority system
(FC) 2020 Financially Constrained System

2040 Grouping	2040 Group Characteristics	2020 Intersection Density <i>(connections per mile)</i>			2020 ParkingFactors <i>(indexed to CBD in '94 dollars)</i>			2020 Transit Pass Factor <i>(% of Full Fare)</i>			2020 Fareless Areas <i>(for internal trips)</i>			Non-SOV Modal Performance <i>(combined share of non-SOV trips to, from and within 2040 grouping)</i>		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Station Communities Tier 2 South/North Corridor	Planned high housing density mixed with commercial services, with high level of transit, bike and walk; planned LRT. Current land uses do not reflect planned mix and densities.	>12	>12	>10	1.22	0.92	0.60	85%	90%	95%				36%	42%	42%
Town Centers - Tier 1 St. Johns Hollywood Lents Rockwood Lake Oswego Tualatin Forest Grove	Moderate housing and employment density planned, with high level of access by all modes. Currently has good mix of uses, well connected street system and good transit.	>16	>16	>16	0.90	0.68	0.45	75%	80%	85%				35%	40%	40%
Town Centers - Tier 2 West Portland Raleigh Hills Hillsdale Gladstone West Linn Sherwood Sunset Wilsonville Cornelius Orengo	Moderate housing and employment density planned, with high level of access by all modes. Currently has some mix of uses, moderately connected street system and some transit. Existing topography or physical barriers may limit bike and pedestrian travel.	>12	>12	>10	0.72	0.54	0.36	90%	95%	100%				32%	37%	37%
Town Centers - Tier 3 Fairview/Wood Village Troutdale Happy Valley Lake Grove Farmington Cedar Mill Tannasbourne	Moderate housing and employment density planned, with high level of access by all modes. Currently has modest mix of uses, poorly connected street system and poor transit. Existing topography or physical barriers may limit bike and pedestrian travel.	>10	>10	>8	0.55	0.41	0.28	100%	100%	100%				34%	37%	36%

2040 Grouping	2040 Group Characteristics	2020 Intersection Density <i>(connections per mile)</i>			2020 Parking Factors <i>(indexed to CBD in '94 dollars)</i>			2020 Transit Pass Factor <i>(% of Full Fare)</i>			2020 Fareless Areas <i>(for internal trips)</i>			Non-SOV Modal Performance <i>(combined share of non-SOV trips to, from and within 2040 grouping)</i>		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Town Centers - Tier 4 Pleasant Valley Damascus Bethany Murrayhill	Moderate housing and employment density planned, with high level of access by all modes. Currently undeveloped or developing urban uses, with skeletal street system and poor transit. Existing topography or physical barriers may limit bike and pedestrian travel.	>8	>8	>8	0.36	0.27	0.18	100%	100%	100%				37%	40%	39%
Mainstreets - Tier 1 Eastside Portland to 60th	Moderate housing and employment density planned, with high level of access by all modes. Currently has good mix of uses, well connected street system and good transit.	>16	>16	>14	0.90	0.68	0.45	100%	100%	100%				40%	45%	45%
Mainstreets - Tier 2 Remaining Region	Moderate housing and employment density planned, with high level of access by all modes. Currently has some mix of uses, moderate connectivity and some transit.	>12	>10	>8	0.72	0.54	0.36	100%	100%	100%				38%	43%	43%

2040 Grouping	2040 Group Characteristics	2020 Intersection Density (connections per mile)			2020 Parking Factors (indexed to CBD in '94 dollars)			2020 Transit Pass Factor (% of Full Fare)			2020 Fareless Areas (for internal trips)			Non-SOV Modal Performance (combined share of non-SOV trips to, from and within 2040 grouping)		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Corridors Full Region	Moderate housing and employment density planned, with high level of access by all modes. Currently has modest mix of uses, moderate connectivity and some transit.	>10	>10	>10	None	None	None	100%	100%	100%				36%	39%	39%
Inner Neighborhoods Full Region	Low density housing planned, with moderate level of access by all modes. Currently has moderate connectivity and some transit.	>10	>10	>10	None	None	None	100%	100%	100%				39%	42%	42%
Outer Neighborhoods - Tier 1 Current Urban Areas	Low density housing planned, with moderate level of access by all modes. Currently has poorly connected street system and little transit.	>8	>8	>8	None	None	None	100%	100%	100%				37%	40%	39%
Outer Neighborhoods - Tier 2 Urban Reserve Areas	Low density housing planned, with moderate level of access by all modes. Currently has skeletal street system and no transit.	>6	>6	>6	None	None	None	100%	100%	100%				36%	39%	38%
Employment Areas Full Region	Low density employment planned, with moderate level of access by all modes. Currently has poorly connected street system and limited transit.	>8	>8	>8	None	None	None	100%	100%	100%				28%	30%	29%

2040 Grouping	2040 Group Characteristics	2020 Intersection Density (connections per mile)			2020 Parking Factors (indexed to CBD in '94 dollars)			2020 Transit Pass Factor (% of Full Fare)			2020 Fareless Areas (for internal trips)			Non-SOV Modal Performance (combined share of non-SOV trips to, from and within 2040 grouping)		
		P	S	FC	P	S	FC	P	S	FC	P	S	FC	1994	2020 Preferred System	2020 Priority System
Industrial Areas - Tier 1 Rivergate Swan Island Airport	Low density employment planned, with high level of access by rail and truck freight, and moderate access by other modes. Currently has somewhat connected street system and some transit.	>10	>10	>10	None	None	None	100%	100%	100%				26%	27%	27%
Industrial Areas - Tier 2 South Shore Clackamas Tualatin Beaverton Sunset	Low density employment planned, with high level of access by rail and truck freight, and moderate access by other modes. Currently has developing street system and poor transit.	>8	>8	>8	None	None	None	100%	100%	100%				28%	28%	28%
Greenspaces Same as Tier 2 Outer Neighborhoods.	Recreational uses are planned, with moderate level of access by all modes	>6	>6	>6	None	None	None	100%	100%	100%				n/a	n/a	n/a
Rural Reserves Same as Tier 2 Outer Neighborhoods.	Urban uses are not planned in the foreseeable future. Currently has skeletal street system and no transit.	>6	>6	>6	None	None	None	100%	100%	100%				34%	37%	37%
Special Area 1 Portland International Airport		*	*	*	6.14	6.14	6.14	60%	60%	60%				<i>These places are relatively small geographic areas with special characteristics that make it difficult to determine actual non-SOV modal performance based on analysis of the regional model.</i>		
Special Area 2 Oregon Health Sciences University		*	*	*	1.86	1.86	1.86	60%	60%	60%						
Special Area 3 Oregon Zoo		*	*	*	1.86	1.86	1.86	100%	100%	100%						
Special Area 4 SMART (Wilsonville)		*	*	*	*	*	*	*	*	*	X	X	X		*	*

APPENDIX A

I-5 Trade Corridor Design Constraints

Aviation Clearance

Pearson Airpark is a general aviation airport located in Vancouver south of the Fort Vancouver National Historical Site and east of Interstate 5 (I-5). Pearson Airpark contains one east-west runway approximately 3200 feet in length; the runway centerline extended to the west is in approximately alignment with the north end of the most northerly I-5 truss span. The west end of the runway is approximately 2500 feet from the I-5 centerline. In accordance with FAA Part 77.25 Civil Airport Imaginary surfaces, the clearance (lower boundary of the usable airspace) for this runway extends from ground level 200 feet from the end of the runway at an upward slope of 20:1. Objections penetrating this surface into the runway airspace can be considered an obstruction to air navigation; the existing I-5 lift towers presently constitute an obstruction of the air space. Due to the obstruction of the I-5 lift towers, aircraft operations to the west of the runway are effectively restricted to an area to the north of the towers.

Navigation Clearances

In reference to the previous Columbia River Crossing Study, the river navigation clearances are controlled by the Thirteenth Coast Guard District, Aids to Navigation and Waterway Management Branch, Seattle, WA. That agency is the permitting authority for new bridge crossings. The agency has stated that the piers for all adjacent new structures must align with the piers on the existing I-5 Columbia River and Portland Harbor bridges and that existing vertical clearances beneath the spans must be maintained. For the same matter, it is assumed that the statement is applied to I-205 bridge and I-5 Columbia Slough bridge. The existing horizontal and vertical clearances for the related bridges are tabulated in the following table:

Bridge	Horizontal	Vertical
I-205	300'	144'
I-5 Columbia Slough	94'	44'
I-5 Portland Harbor	215'	35'
I-5 Columbia River	263'	178'
(Primary Shipping Channel)		
I-5 Columbia River	511'	46'
(Secondary Barge Channel)		
NWA ¹ Willamette	205' ²	161' ²
NWA Columbia Slough	94' ³	44' ³
NWA Portland Harbor	215' ⁴	35' ⁴
NWA Columbia River	263' ⁵	178' ⁵

¹New west arterial road

²According to the Steel Bridge

³According to I-5 Columbia Slough Bridge

⁴According to I-5 Portland Harbor Bridge

⁵According to I-5 Columbia River Bridge

Typical present marine traffic consists of 70% barge traffic with vertical clearance requirements of 60-80 feet.

Railroad Clearances

Union Pacific Railroad (UPRR) and Burlington Northern (BN) are the affected railroad organizations in this project. Their clearances requirements are tabulated in the following table for tangent tracks. Horizontal clearances are measured from centerline of nearest track. Vertical clearances are measured from top of rail.

<u>Company</u>	<u>Horizontal</u>	<u>Vertical</u>
UPRR	18' (9' in special case)	23'
BN	10'	23.6'

Horizontal clearances are to be increased 1-1/2" per degree of curve on curved tracks.

Park and Historical Site Impact

The adjacent parks and historical sites of this project include Fort Vancouver National Park in Vancouver, WA and Delta Park and the historical building at southwest of I-5 and Columbia Blvd. in Portland OR. The intent of the Section 4(f) of the US Department of Transportation Act statute and the policy of the Department of Transportation is to avoid public parks, recreation areas, refuges, and historic sites. In order to demonstrate that there is no feasible and prudent alternative to the use of Section 4(f) land, the evaluation must address location alternatives and design shifts that avoid the section 4(f) land. Supporting information must demonstrate that such alternatives results in unique problems. Unique problems are present when there are truly unusual factors or when the costs or community disruption reach extraordinary.

When making a finding that an alternative is not feasible and prudent, it is not necessary to show that any single factor presents unique problems. Adverse factors such as environmental impacts, safety and geometric problems, decreased traffic service, increase costs, and any other factors may be considered collectively.

APPENDIX B
Portland/Vancouver I-5 Transportation and Trade Partnership Project
Evaluation Measures for Option Packages

Evaluation Criteria		Evaluation Measures		Evaluation Data	Notes
1	Maintain or Improve Transportation Performance				
1.1	Improve travel times	A	Morning, mid-day and evening travel time for transit, autos and trucks to key locations via I-5.	<p>Area-to-area travel times for SOV, HOV, transit, and trucks for AM two-hour, PM two-hour, and mid-day time periods. Representative zones will be selected for the following areas:</p> <ul style="list-style-type: none"> • Downtown Portland (Pioneer Square) • Central Industrial Eastside District • Oregon Health Sciences University Hospital • Hillsboro • Wilsonville • Gresham • Gateway • Highway 212 (near Fred Meyer distribution center) • Lloyd Center • Portland International Airport • T-6 • Columbia Boulevard east of MLK (at NE 10th or NE 33rd) • Swan Island • Northwest Industrial Area (NW Yeon/NW 29th) • Low Income North Portland neighborhood (off Killingsworth near Albina, Williams, or MLK) • Vancouver neighborhood east of I-5 (near Fourth Plain/Fort Vancouver Way) • Vancouver CBD (7th/Washington) • Vancouver Mall (Fourth Plain north of SR 500) • Salmon Creek • Port of Vancouver • Clark Community College • Camas • Richfield • Battleground 	<ol style="list-style-type: none"> 1. Travel times will be reported in matrix (area-to-area) format. 2. Transit time will be generic transit time (i.e., no distinction between LRT vs. bus submodes). 3. SOV, HOV, and transit travel times will be taken from zone-to-zone travel time matrices. If SOV and HOV times are identical, then one (SOV/HOV) travel time value will be reported. 4. Truck times will be calculated as the sum of link travel times along specific truck routes, where applicable. 5. I-5 may or may not be used for travel between specific area pairs. 6. Areas shown in list reflect interest in improving travel times to industrial areas, major activity centers, and residential areas.
		B	Improve travel times: Morning, mid-day and evening travel time for transit, autos and trucks from key locations to I-5.	<p>Node-to-node peak direction travel times from key locations to nearest I-5 ramp for SOV, HOV, transit, and trucks for AM two-hour, PM two-hour and mid-day time periods. Representative nodes will be selected for the following areas:</p> <ul style="list-style-type: none"> • Portland International Airport • T-6 • Columbia Boulevard east of MLK (at NE 10th or NE 33rd) • Low Income North Portland neighborhood (off Killingsworth near Albina, Williams, or MLK) • Vancouver CBD (7th/Washington) • Vancouver Mall • Port of Vancouver • Clark Community College 	<ol style="list-style-type: none"> 1. Areas shown in list include only those areas for Evaluation Measure A with direct access to I-5. 2. Total node-to-node travel time will include time on I-5 ramp. Time on I-5 ramp only will also be shown separately. 3. Mid-day times may not be peak directional.
1.2	Maintain or reduce congestion	A	Morning and evening percentage of highway lane miles in study area exceeding capacity (level of service "F").	1. Percentage and total lane-miles at or exceeding capacity for AM two-hour and PM two-hour time periods for:	VHD/VMT ratio also to be considered.
		B	Morning and evening percentage of arterial lane miles in study area exceeding capacity (level of service "F").	<ul style="list-style-type: none"> • I-5 and I-205 • highways and major arterials • truck routes • all roadways in study area 	
		C	Morning and evening total rush hours of delay within study area (non-transit modes only).	<ol style="list-style-type: none"> 2. Plots showing above facilities by V/C ratio range (e.g., 0.8 - 0.9, 0.9 - 1.0, and >1.0). 3. Total VHD, VMT, and VHT for AM two-hour and PM two-hour time 	

APPENDIX B
Portland/Vancouver I-5 Transportation and Trade Partnership Project
Evaluation Measures for Option Packages

Evaluation Criteria		Evaluation Measures		Evaluation Data	Notes
				periods for study area.	
1.3	Promote transportation choices	A	Number and percentage of person trips by SOV, HOV, transit, bicycle, and pedestrian for study area for daily and evening time periods.	Same as evaluation measure.	Bicycle and pedestrian trips available for daily time period only. For reporting, these trips may be combined if no significant differences in trips for individual modes between option packages.
		B	Number and percentage of person trips from downtown Vancouver and downtown Portland by SOV, HOV, transit, bicycle, and pedestrian for daily and evening time periods.	Same as evaluation measure.	Bicycle and pedestrian trips available for daily time period only.
		C	Number of people able to cross Columbia River for evening time period.	Number and percentage of person trips by mode (SOV, HOV, transit, bicycle, and pedestrian) crossing Columbia River during PM two-hour time period between following Portland and Vancouver districts (see attachment): <i>Portland Districts</i> <ul style="list-style-type: none"> • District 1 - Central Portland • District 2 - North Portland north of Lombard, west of I-5 (includes Rivergate) • District 3 - Columbia Corridor from I-5 to NE 148th • District 4 - North Portland south of Lombard, west of I-5 (includes Swan Island) • District 5 - North/Northeast Portland north of I-84 • District 6 - West Portland • District 7 - SE Portland south of I-84 • District 8 - East Multnomah County east of I-205 • District 9 - Washington County • District 10 - Clackamas County • District 17 - Northwest Portland Industrial Area (includes Forest Park and Sauvie Island) <i>Vancouver Districts</i> <ul style="list-style-type: none"> • District 11 - Vancouver west of I-5, south of Padden • District 12 - Central Vancouver - I-5 to Andresen, south of Padden • District 13 - Andresen to Clark County line • District 14 - Camas/Washougal and east of Clark County • District 15 - Vancouver - Main Street to 134th to 72nd • District 16 - North Clark County to 72nd (includes Battleground) 	1. Number and percentage of trips will be reported in matrix (district-to-district) format. 2. Bicycle and pedestrian trips available for daily time period only.
		D	Change in vehicle miles traveled (VMT) for evening time period.	Change in VMT compared to _____ Alternative for all trips in study area (except commercial and transit trips) for PM two-hour time period.	Compute for subareas also?
1.4	Enhance public safety	A	Change in number of traffic conflict points (difficult merges, for example).	Same as evaluation measure.	To be determined based on demand and/or operational model results.
		B	Impacts on emergency vehicle access.	Same as evaluation measure.	See above.
		C	Impacts on incident management access.	Same as evaluation measure.	See above.
		D	Bridge height encroachment into Pearson Airpark flight path.	Evaluation data to be determined by others.	
1.5	Improve travel reliability	A	Total exclusive right-of-way by mode.	Same as evaluation measure.	Conceptual engineering task to determine lane-miles for truck lanes, HOV, bus, LRT, etc.
		B	Duration of "rush hour" congestion.	Same as evaluation measure.	Peak spreading impacts to be determined for <u>select locations</u> based on Phase I methodology.

APPENDIX B
Portland/Vancouver I-5 Transportation and Trade Partnership Project
Evaluation Measures for Option Packages

Evaluation Criteria		Evaluation Measures		Evaluation Data	Notes
		C	<i>Dollar cost of bridge lift delays for transit, autos, and trucks.</i>	<i>Evaluation data to be determined by others.</i>	
1.6	Minimize impacts on other highways and streets	A	Change in "rush hour" traffic (autos and trucks) on highways and streets adjacent to study area.	Total traffic volume (autos and trucks) and percentage change in traffic volume compared to _____ Alternative for PM two-hour time period along following screenlines (see attachment): A Columbia River (I-5 and I-205) B Columbia Slough (North Portland Road to 33 rd) C West of I-5 in Portland from Greeley to Marine Drive D East of I-5 in Portland from I-84 to Marine Drive E1 South of Killingsworth from Greeley to MLK E2 South of Killingsworth from 33 rd to 102 nd F1 South of Fourth Plain (Vancouver) from Simpson Road to Stapleton Road F2 South of Fourth Plain (Vancouver) from Andresen to 112 th G1 West of I-5 in Vancouver from Washington Street/6 th to Main Street G2 West of I-5 in Vancouver from Minnehaha to 99 th H1 East of I-5 in Vancouver from SR 14 to SR 500 H2 East of I-5 in Vancouver from 54 th to 99 th	1. Evaluation data will be displayed on plots. 2. Screenlines will allow changes in traffic to be tracked along parallel and adjacent facilities. 3. Traffic volume and percentage change in traffic volume will also be shown for individual facilities along screenlines. Percentage changes will be shown within ranges (e.g., ±5%, ±5% - ±20%, etc.). 4. Should auto and truck volumes be displayed separately?
2	Support Trade and Freight Movement and the Regional Economy				
2.1	Improve strength of regional industrial areas	A	"Rush hour" and non-"rush hour" travel time for autos and trucks from key locations to I-5.	See 1.1.B for industrial areas.	
		B	Percentage of truck route lane miles over capacity during rush hours.	See 1.2.A and 1.2.B for truck routes.	
2.2	Increase business savings within study area	A	Daily value of reduced time spent in traffic by trucks and rail.	1. Value of reduced VHD for trucks compared to _____ Alternative within study area. 2. Value of reduced VHD for rail compared to _____ within study area.	1. Computed as difference in VHD x value of time for trucks. 2. To be determined in Rail Study.
2.3	Minimize impacts to water navigation		<i>Evaluation measures to be determined by others.</i>		
2.4	Reduce freight delay	A	Mid-day and evening travel time for trucks from key locations to I-5.	See 1.1.B for industrial areas.	
3	Maintain and Enhance Quality of Life				
3.1	Reduce spillover traffic into neighborhoods	A	Traffic volumes (autos and trucks) on selected roads.	See 1.6.A.	
3.2	Support adopted city plans		<i>Evaluation measures to be determined by others (also see 1.6.A).</i>		
3.3	Air quality impacts	A	Production of standard pollutants within study area.	Same as evaluation measure.	Method of estimation to be determined.
3.4	Noise impacts		To be determined.		
3.5	Impacts to water resources		<i>Evaluation measures to be determined by others.</i>		
3.6	Other land use impacts		<i>Evaluation measures to be determined by others.</i>		

APPENDIX B
Portland/Vancouver I-5 Transportation and Trade Partnership Project
Evaluation Measures for Option Packages

Evaluation Criteria		Evaluation Measures		Evaluation Data	Notes
3.7	Average commute time	A	Average work trip time.	Average PM peak period travel time for SOV, HOV, and transit to all destinations from: <ul style="list-style-type: none"> • Salmon Creek • Vancouver CBD • North Portland • Portland CBD • selected industrial areas 	
3.8	Vehicle occupancy vs. capacity	A	Average auto vehicle occupancy at Columbia River screenline.	Same as evaluation measure.	
3.9	Annual transit ridership	A	Daily transit ridership across Columbia River within I-5 corridor and study area.	Same as evaluation measure.	Trips will be broken down by transit submode (LRT vs. bus).
3.10	Time cost of travel (by mode)	A	Cost of total travel time by mode (SOV, HOV, transit, and trucks) within study area for PM two-hour time period.	Same as evaluation measure.	For each mode, cost will be calculated as Σ link travel time x no. of link trips x value of time for all links in study area.
4	Minimize Impacts to the Environment	A	Change in access	Qualitative information based on factors such as availability of transit, congestion levels, connectivity, and other factors. Daily VMT	
		B	Energy consumption <i>Remaining evaluation measures to be identified by others.</i>		
5	Support Regional Land Use Plans		Evaluation measures to be determined using Metroscope model.		
6	Distribute Benefits, Costs, and Impacts Equitably	A	Modal usage of I-5 by origin-destination pair for evening time period.	Number and percentage of person trips by mode (SOV, HOV, transit, bicycle, and pedestrian) between districts for PM two-hour time period using following I-5 links: <ul style="list-style-type: none"> • between I-405 and Going St. • Columbia River bridge • between SR 500 and Fourth Plain Blvd. 	<ol style="list-style-type: none"> 1. Number and percentage of trips will be reported in matrix (district-to-district) format. 2. Districts are same as those listed in 1.3.C (also see attachment). 3. Bicycle and pedestrian trips available for daily time period only.
7	Evaluate Project Capital and Operating Costs		<i>Evaluation measures to be determined by others.</i>		