INTERSTATE 5 COLUMBIA RIVER CROSSING

Utilities Technical Report

May 2008

TO:	Readers of the CRC Technical Reports
FROM:	CRC Project Team
SUBJECT:	Differences between CRC DEIS and Technical Reports

The I-5 Columbia River Crossing (CRC) Draft Environmental Impact Statement (DEIS) presents information summarized from numerous technical documents. Most of these documents are discipline-specific technical reports (e.g., archeology, noise and vibration, navigation, etc.). These reports include a detailed explanation of the data gathering and analytical methods used by each discipline team. The methodologies were reviewed by federal, state and local agencies before analysis began. The technical reports are longer and more detailed than the DEIS and should be referred to for information beyond that which is presented in the DEIS. For example, findings summarized in the DEIS are supported by analysis in the technical reports and their appendices.

The DEIS organizes the range of alternatives differently than the technical reports. Although the information contained in the DEIS was derived from the analyses documented in the technical reports, this information is organized differently in the DEIS than in the reports. The following explains these differences. The following details the significant differences between how alternatives are described, terminology, and how impacts are organized in the DEIS and in most technical reports so that readers of the DEIS can understand where to look for information in the technical reports. Some technical reports do not exhibit all these differences from the DEIS.

Difference #1: Description of Alternatives

The first difference readers of the technical reports are likely to discover is that the full alternatives are packaged differently than in the DEIS. The primary difference is that the DEIS includes all four transit terminus options (Kiggins Bowl, Lincoln, Clark College Minimum Operable Segment (MOS), and Mill Plain MOS) with each build alternative. In contrast, the alternatives in the technical reports assume a single transit terminus:

- Alternatives 2 and 3 both include the Kiggins Bowl terminus
- Alternatives 4 and 5 both include the Lincoln terminus

In the technical reports, the Clark College MOS and Mill Plain MOS are evaluated and discussed from the standpoint of how they would differ from the full-length Kiggins Bowl and Lincoln terminus options.

Difference #2: Terminology

Several elements of the project alternatives are described using different terms in the DEIS than in the technical reports. The following table shows the major differences in terminology.

DEIS terms	Technical report terms
Kiggins Bowl terminus	I-5 alignment
Lincoln terminus	Vancouver alignment
Efficient transit operations	Standard transit operations
Increased transit operations	Enhanced transit operations

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

Difference #3: Analysis of Alternatives

The most significant difference between most of the technical reports and the DEIS is how each structures its discussion of impacts of the alternatives. Both the reports and the DEIS introduce long-term effects of the full alternatives first. However, the technical reports then discuss “segment-level options,” “other project elements,” and “system-level choices.” The technical reports used segment-level analyses to focus on specific and consistent geographic regions. This enabled a robust analysis of the choices on Hayden Island, in downtown Vancouver, etc. The system-level analysis allowed for a comparative evaluation of major project components (replacement versus supplemental bridge, light rail versus bus rapid transit, etc). The key findings of these analyses are summarized in the DEIS; they are simply organized in only two general areas: impacts by each full alternative, and impacts of the individual “components” that comprise the alternatives (e.g. transit mode).

Difference #4: Updates

The draft technical reports were largely completed in late 2007. Some data in these reports have been updated since then and are reflected in the DEIS. However, not all changes have been incorporated into the technical reports. The DEIS reflects more recent public and agency input than is included in the technical reports. Some of the options and potential mitigation measures developed after the technical reports were drafted are included in the DEIS, but not in the technical reports. For example, Chapter 5 of the DEIS (Section 4(f) evaluation) includes a range of potential “minimization measures” that are being considered to reduce impacts to historic and public park and recreation resources. These are generally not included in the technical reports. Also, impacts related to the stacked transit/highway bridge (STHB) design for the replacement river crossing are not discussed in the individual technical reports, but are consolidated into a single technical memorandum.

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Cover Sheet

Interstate 5 Columbia River Crossing

Utilities Technical Report:

Submitted By:

Roger Kitchin

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TABLE OF CONTENTS

List of Exhibits

Appendices

ACRONYMS

Acronym	Description
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AFS	American Fisheries Society
APE	Area of Potential Effect
API	Area of Potential Impact
AQMA	Air Quality Management Area
AST	Above Ground Storage Tank
BIA	Bridge Influence Area
BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
BPA	Bonneville Power Administration
BRT	Bus Rapid Transit
C	Candidate
CAA	Clean Air Act
CBD	Central Business District
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CIR	Color Infrared
CMP	Corrugated Metal Pipe
CO	Carbon Monoxide
COE	U.S. Army Corps of Engineers
CRL	Confirmed Release List and Inventory
CTWSRO	Confederated Tribes of the Warm Springs Reservation of Oregon
dB	Decibel
dBA	A-weighted decibel
DCNP	Depressional, Closed-Non Permanently Flooded
DEIS	Draft Environmental Impact Statement
DEQ	Oregon Department of Environmental Quality
DLCD	Department of Land Conservation and Development
DO	Dissolved Oxygen
DOI	U.S. Department of Interior
DOGAMI	Oregon Department of Geology and Mineral Industries
DRG	Digital Raster Graphic
DSL	Oregon Division of State Lands
EA	Environmental Assessment
ECSI	Environmental Cleanup Site Information System
EDR	Environmental Data Resources, Inc.
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System

Acronym	Description
ESA	Endangered Species Act
ESH	Essential Salmonid Habitat
ESU	Evolutionarily Significant Unit
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
FIRM	Flood Insurance Rate Maps
Ft	feet/foot
FONSI	Finding of No Significant Impact
FRS	Facility Registry System
FTA	Federal Transit Administration
FTTS	FIFRA/TSCA Tracking System
GA	General Authorization
GIS	Geographic Information System
GMA	Growth Management Act
GPS	Global Positioning System
HAZMAT	Hazardous Materials/Incidents
HCT	High Capacity Transit
HGM	Hydrogeomorphic
HMIRS	Hazardous Materials Information Reporting System
HSIS	Hazardous Substance Information Survey
HUC	Hydrological Unit Code
L_{dn}	24-hour, Time Weighted, A-weighted Sound Levels
LE	Listed Endangered
L_{eq}	Energy Average Sound Levels
L_{max}	Maximum Noise Levels
LOS	Level of Service
LRS	Linear Referencing System
LRT	Light Rail Transit
LT	Listed Threatened
LUST	Leaking Underground Storage Tank
Mgd	million gallons per day
Mi	mile
Min	minute
MOA	Memorandum of Agreement
MP	Milepost
MPO	Metropolitan Planning Organization
Mph	Miles per hour
MSFCMA	Magnuson-Stevens Fisheries Conservation and Management Act
MTCA	Model Toxics Control Act
MTIP	Metropolitan Transportation Improvement Plan
MTP	Metropolitan Transportation Plan

Acronym	Description
NAAQS	National Ambient Air Quality Standards
NB	northbound
NEPA	National Environmental Policy Act
NFA	No Further Action
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration for Fisheries
NO_x	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OAR	Oregon Administrative Rule
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish & Wildlife
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
ONHP	Oregon Natural Heritage Program
OR-GAP	Oregon Gap Analysis Project
ORNHIC	Oregon Natural Heritage Information Center
OHW	Ordinary High Water Line
ORS	Oregon Revised Statutes
PCBs	Polychlorinated Biphenyls
PE	Proposed Endangered
PEMC	Palustrine Emergent Seasonally Flooded
PM_{10}	Particulate Matter (10 microns or less in size)
PPM	Parts Per Million
PT	Proposed Threatened
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RCW	Revised Code of Washington
REA	Revised Environmental Assessment
REO	Regional Ecosystem Office
RLIS	Regional Land Information System
ROD	Record of Decision
ROW	right-of-way
RPC	Rare Plant Crew
RTC	Regional Transportation Commission
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	southbound
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan

Acronym	Description
SOC	Federal Species of Concern
“SoI”	Species of Interest
SMA	Shoreline Management Act
SNR	Sensitive Noise Receptors
SPILLS	Spill Data
SRA	Sensitive Resource Areas
SRSAM	Salmon Resource Sensitive Area Mapping project
SSTS	Section 7 (FIFRA) Tracking System
STIP	State Transportation Improvement Plan
SWF/LF	Solid Waste Facilities List
TAZ	Transportation Analysis Zone
TCP	Traditional Cultural Properties
TDM	Transportation Demand Management
TEA-21	Transportation Equity Act for the 21st Century
TIP	Transportation Improvement Program
TPR	Transportation Planning Rule
TSCA	Toxic Substances and Control Act
TSP	Transportation System Management
UGA	Urban Growth Area
UGB	Urban Growth Boundary
UPRR	Union Pacific Railroad
UPSP	Union Pacific-Southern Pacific
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
V/C	Volume to Capacity Ratio
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WDFW	Washington Department of Fish and Wildlife
WRD	Oregon Department of Water Resources
WSDOT	Washington State Department of Transportation

1. Summary

1.1 Introduction

This technical report describes existing utilities and the expected effect on them from project construction and operations. The utilities identified in the vicinity of the Columbia River Crossing (CRC) project include: water, sanitary sewer, electrical supply, natural gas, and communications. Stormwater drainage is not included in this report—it is covered in the Water Quality and Ecosystems Technical Reports.

1.2 Description of the Alternatives

The alternatives being considered for the CRC project consist of a diverse range of highway, transit and other transportation choices. Some of these choices—such as the number of traffic lanes across the river—could affect transportation performance and impacts throughout the bridge influence area or beyond. These are referred to as "system-level choices." Other choices—such as whether to run high-capacity transit (HCT) on Washington Street or Washington and Broadway Streets—have little impact beyond the area immediately surrounding that proposed change and no measurable effect on regional impacts or performance. These are called "segment-level choices." This report discusses the impacts from both system- and segment-level choices, as well as "full alternatives." The full alternatives combine system-level and segment-level choices for highway, transit, pedestrian, and bicycle transportation. They are representative examples of how project elements may be combined. Other combinations of specific elements are possible. Analyzing the full alternatives allows us to understand the combined performance and impacts that would result from multimodal improvements spanning the bridge influence area.

Following are brief descriptions of the alternatives being evaluated in this report, which include:

- System-level choices,
- Segment-level choices, and
- Full alternatives.

1.2.1 System-Level Choices

System-level choices have potentially broad influence on the magnitude and type of benefits and impacts produced by this project. These options may influence physical or operational characteristics throughout the project area and can affect transportation and other elements outside the project corridor as well. The system-level choices include:

- River crossing type (replacement or supplemental)
- High-capacity transit mode (bus rapid transit or light rail transit)
- Tolling (no toll, I-5 only, I-5 and I-205, standard toll, higher toll)

This report compares replacement and supplemental river crossing options. A replacement river crossing would remove the existing highway bridge structures across the Columbia River and replace them with three new parallel structures—one for I-5 northbound traffic, another for I-5 southbound traffic, and a third for HCT, bicycles, and pedestrians. A supplemental river crossing would build a new bridge span downstream of the existing I-5 bridge. The new supplemental bridge would carry southbound I-5 traffic and HCT, while the existing I-5 bridge would carry northbound I-5 traffic, bicycles, and pedestrians. The replacement crossing would include three through-lanes and two auxiliary lanes for I-5 traffic in each direction. The supplemental crossing would include three through-lanes and one auxiliary lane in each direction.

Two types of HCT are being considered—bus rapid transit and light rail transit. Both would operate in an exclusive right-of-way through the project area, and are being evaluated for the same alignments and station locations. The HCT mode—LRT or BRT—is evaluated as a system-level choice. Alignment options and station locations are discussed as segment-level choices. BRT would use 60-foot or 80-foot long articulated buses in lanes separated from other traffic. LRT would use one- and two-car trains in an extension of the MAX line that currently ends at the Expo Center in Portland.

Under the efficient operating scenario, LRT trains would run at approximately 7.5 minute headways during the peak periods. BRT would run at headways between 2.5 and 10 minutes depending on the location in the corridor. BRT would need to run at more frequent headways to match the passenger-carrying capacity of the LRT trains. This report also evaluates performance and impacts for an increased operations scenario that would double the number of BRT vehicles or the number of LRT trains during the peak periods.

1.2.2 Segment-Level Choices

1.2.2.1 Transit Alignments

The transit alignment choices are organized into three corridor segments. Within each segment the alignment choices can be selected relatively independently of the choices in the other segments. These alignment variations generally do not affect overall system performance but could have important differences in the impacts and benefits that occur in each segment. The three segments are:

- Segment A1 – Delta Park to South Vancouver
- Segment A2 – South Vancouver to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

In Segment A1 there are two general transit alignment options - offset from, or adjacent to, I-5. An offset HCT guideway would place HCT approximately 450 to 650 feet west of I-5 on Hayden Island. An adjacent HCT guideway across Hayden Island would locate HCT immediately west of I-5. The alignment of I-5, and thus the alignment of an adjacent HCT guideway, on Hayden Island would vary slightly depending upon the river crossing and highway alignment, whereas an offset HCT guideway would retain the same station location regardless of the I-5 bridge alignment.

HCT would touch down in downtown Vancouver at Sixth Street and Washington Street with a replacement river crossing. A supplemental crossing would push the touch down location north to Seventh Street. Once in downtown Vancouver, there are two alignment options for HCT—a two-way guideway on Washington Street or a couplet design that would place southbound HCT on Washington Street and northbound HCT on Broadway. Both options would have stations at Seventh Street, 12th Street, and at the Mill Plain Transit Center between 15th and 16th Streets.

From downtown Vancouver, HCT could either continue north on local streets or turn east and then north adjacent to I-5. Continuing north on local streets, HCT could either use a two-way guideway on Broadway or a couplet on Main Street and Broadway. At 29th Street, both of these options would merge to a two-way guideway on Main Street and end at the Lincoln Park and Ride located at the current WSDOT maintenance facility. Once out of downtown Vancouver, transit has two options if connecting to an I-5 alignment: head east on 16th Street and then through a new tunnel under I-5, or head east on McLoughlin Street and then through the existing underpass beneath I-5. With either option HCT would connect with the Clark College Park and Ride on the east side of I-5, then head north along I-5 to about SR 500 where it would cross back over I-5 to end at the Kiggins Bowl Park and Ride.

There is also an option, referred to as the minimum operable segments (MOS), which would end the HCT line at either the Mill Plain station or Clark College. The MOS options provide a lower cost, lower performance alternative in the event that the full-length HCT lines could not be funded in a single phase of construction and financing.

1.2.2.2 Highway and Bridge Alignments

This analysis divides the highway and bridge options into two corridor segments, including:

- Segment A – Delta Park to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

Segment A has several independent highway and bridge alignment options. Differences in highway alignment in Segment B are caused by transit alignment, and are not treated as independent options.

There are two options for the replacement crossing—it could be located either upstream or downstream of the existing I-5 bridge. At the SR 14 interchange there are two basic configurations being considered. A traditional configuration would use ramps looping around both sides of the mainline to provide direct connection between I-5 and SR 14. A less traditional design could reduce right-of-way requirements by using a “left loop” that would stack both ramps on the west side of the I-5 mainline.

1.2.3 Full Alternatives

Full alternatives represent combinations of system-level and segment-level options. These alternatives have been assembled to represent the range of possibilities and total impacts at the project and regional level. Packaging different configurations of highway, transit, river crossing, tolling and other improvements into full alternatives allows project staff to evaluate comprehensive traffic and transit performance, environmental impacts and costs.

Exhibit 1 summarizes how the options discussed above have been packaged into representative full alternatives.

Exhibit 1. Full Alternatives

	Packaged Options				
Full Alternative	River Crossing Type	HCT Mode	Northern Transit Alignment	TDM/TSM Type	Tolling Method[a]
1	Existing	None	N/A	Existing	None
2	Replacement	BRT	I-5	Aggressive	Standard Rate
3	Replacement	LRT	I-5	Aggressive	Two options[b]
4	Supplemental	BRT	Vancouver	Very Aggressive	Higher rate
5	Supplemental	LRT	Vancouver	Very Aggressive	Higher rate

[a] In addition to different tolling rates, this report evaluates options that would toll only the I-5 river crossing and options that would toll both the I-5 and the I-205 crossings.

[b] Alternative 3 is evaluated with two different tolling scenarios, tolling and non-tolling.

Modeling software used to assess alternatives' performance does not distinguish between smaller details, such as most segment-level transit alignments. However, the geographic difference between the Vancouver and I-5 transit alignments is significant enough to warrant including this variable in the model. All alternatives include Transportation Demand Management (TDM) and Transportation System Management (TSM) measures designed to improve efficient use of the transportation network and encourage alternative transportation options to commuters such as carpools, flexible work hours, and telecommuting. Alternatives 4 and 5 assume higher funding levels for some of these measures.

Alternative 1: The National Environmental Policy Act (NEPA) requires the evaluation of a No-Build or "No Action" alternative for comparison with the build alternatives. The No-Build analysis includes the same 2030 population and employment projections and the same reasonably foreseeable projects assumed in the build alternatives. It does not include any of the I-5 CRC related improvements. It provides a baseline for comparing the build alternatives, and for understanding what will happen without construction of the I-5 CRC project.

Alternative 2: This alternative would replace the existing I-5 bridge with three new bridge structures downstream of the existing bridge. These new bridge structures would carry Interstate traffic, BRT, bicycles, and pedestrians. There would be three through-lanes and two auxiliary lanes for I-5 traffic in each direction. Transit would include a BRT system that would operate in an exclusive guideway from Kiggins Bowl in Vancouver to the Expo Center station in Portland. Express bus service and local and feeder bus service would increase to serve the added transit capacity. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line.

Alternative 3: This is similar to Alternative 2 except that LRT would be used instead of BRT. This alternative is analyzed both with a toll collected from vehicles crossing the Columbia River on the new I-5 bridge, and with no toll. LRT would use the same transit alignment and station locations. Transit operations, such as headways, would differ, and LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

Alternative 4: This alternative would retain the existing I-5 bridge structures for northbound Interstate traffic, bicycles, and pedestrians. A new crossing would carry southbound Interstate traffic and BRT. The existing I-5 bridges would be re-striped to provide two lanes on each structure and allow for an outside safety shoulder for disabled vehicles. A new, wider bicycle and pedestrian facility would be cantilevered from the eastern side of the existing northbound (eastern) bridge. A new downstream supplemental bridge would carry four southbound I-5 lanes (three through-lanes and one auxiliary lane) and BRT. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line. Compared to Alternative 2, increased transit service would provide more frequent service. Express bus service and local and feeder bus service would increase to serve the added transit capacity.

Alternative 5: This is similar to Alternative 4 except that LRT would be used instead of BRT. LRT would have the same alignment options, and similar station locations and requirements. LRT service would be more frequent (approximately 3.5 minute headways during the peak period) compared to 7.5 minutes with Alternative 3. LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

1.3 Long-Term Effects

A number of utilities would degrade with age regardless, eventually resulting in loss of service. Most, however, are local distribution or collection systems that would experience limited impacts in terms of service disruptions. There are major utilities in the vicinity of the CRC project including water mains, large diameter sewers, gas feed lines, high voltage electrical lines and main feeds, and communication cables. These major utilities tend to cross the freeway corridor, instead of staying parallel to and within the freeway right-of-way limits, minimizing the extent of physical impacts. The most significant exceptions are the existing bridges across North Portland Harbor and Columbia River; between the I-5/Marine Drive interchange and adjacent Expo Center, and downtown Vancouver. Here, the combination of the bridges and narrow width of Hayden Island has resulted in utility infrastructure being confined to a relatively narrow footprint.

A major water main, sanitary main, TV/data/fiber optic cables, and telephone trunk lines in the existing I-5 bridge across North Portland Harbor would need to be relocated if the existing structure is replaced. On the existing southbound I-5 Bridge across the Columbia River, TV/data/fiber optic cables would need to be relocated for all build alternatives. Even for the alternatives with the Supplemental Bridge, these communication cables would most likely be affected due to major potential structural and seismic upgrade of the existing bridges.

Although there would be no impact to utilities for the no-build alternative, the North Portland Harbor and Columbia River Bridges do not meet current seismic design standards. A failure or collapse in the unlikely event of a major earthquake could result in a number major utilities being severed. These utilities include a water main, main gas feed, main electrical feed and communications (telephone, cable, and fiber optics cables).

1.4 Temporary Effects

Temporary effects would be generally limited to temporary outages necessary when the relocated utilities are tied back into the existing system. Such outages are expected to be short in duration. The utility companies and agencies would work with the customers to minimize shutdown and/or work in windows that would avoid or minimize disruptions to their customers.

1.5 Mitigation

Mitigation measures would be implemented to eliminate or minimize utility relocations by designing the preferred alternative to minimize conflicts where cost-effective or by facilitating the relocation or protection of affected utilities. Mitigation measures would include relocating utilities in advance of construction and notifying communities of scheduled service disruptions. Advance utility relocation could also minimize and avoid potential construction delay to the highway and transit construction required for this project. Close and ongoing coordination with utility owners will maximize the likelihood of success for both long-term and temporary mitigation measures.

2. Methods

2.1 Introduction

The purpose of this discipline is to identify the impacts of alternatives included in the draft Environmental Impact Statement (DEIS) on publicly and privately owned utilities.

2.2 Study Area

In general, the impact of proposed alternatives on utilities will be limited to the primary Area of Potential Impact (API) shown on Exhibit 2. The primary API represents the zone of likely effects, which typically do not extend a significant distance beyond the area of direct construction activities.

2.3 Effects Guidelines

Effects were determined by whether a specific utility would need to be relocated or modified to facilitate either construction or the completed project. This includes both temporary and permanent impacts.

There are no specific statutes that pertain to the impact analysis for utilities. While the individual utility operators are required to operate under a number of laws and regulations, they relate to specific aspects relocating or modifying a utility such as safety, design, and construction requirements.

2.4 Data Collection Methods

Potential cumulative effects from this project are evaluated in the Cumulative Effects Technical Report. Please refer to this report for an evaluation of possible cumulative effects.

A “database” of mapping and engineering data was developed using MicroStation (a computer-aided drafting [CAD] software program). The base maps used to show the utility data included color aerial photography, existing highways and streets, transit facilities, surface utility features such as manholes and poles, and property boundaries.

Utilities identified within the primary API comprise:

- Water
- Sanitary sewers
- Power
- Natural gas
- Communications (telephone, cable television, fiber optic, etc.)
- Other (jet fuel, street and highway illumination, ramp meters, and signalization)

An initial list of potential utility owners was assembled though discussions with WSDOT and ODOT staff, permits and franchise agreements for utilities located within the I-5 right-of-way (see Appendix A), Columbia River crossing permits provided by the US Army Corps of Engineers, internet searches, data gathered as part of the proposed Delta Park project, and information provided by One-Call organizations in Washington and Oregon. The *Utilities: Existing Infrastructure* report dated May 2006 describes the data provided.

Utility owners were contacted as described in Section 3, and those with infrastructure in or near to the API provided as-built data in electronic and/or hard-copy forms. Meetings with utility owners provided an opportunity to confirm and expand the list of utilities. In most cases, the data provided included general plan locations of facilities or, in some cases, schematic information. While the latter was typical for communication providers, much of their infrastructure is co-located on power poles and it was possible to determine most routes with a reasonable degree of certainty.

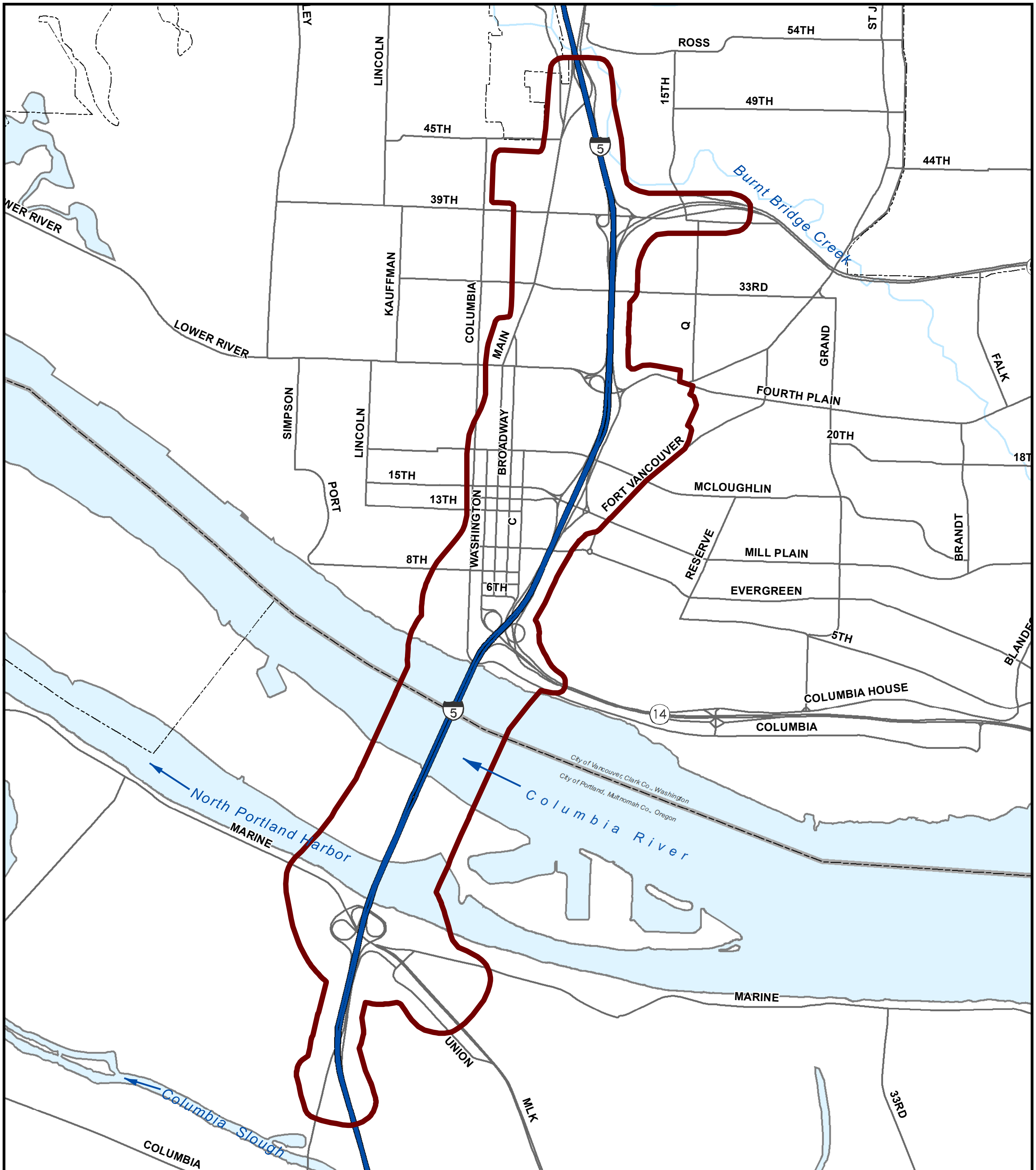
The data provided was accepted on an "as is" basis and adjustments were only made where required to fit the data to existing features (such as poles and manholes) on the base map. Field visits were performed on a limited basis to visually resolve apparent discrepancies. For quality control purposes, the utility data were compared with permits and franchise information provided by WSDOT and ODOT. In addition, base maps showing utility data were provided to owners for verification.

Composite utility drawings were prepared and do not include details such as traffic signals, power distribution to street lights, the content of vaults, individual power and communications ducts, and communications and power for the Interstate MAX line. The more detailed information will be included during subsequent phases of design development. Appendix B includes half-size drawings; for security reasons, they do not show ODOT's fiber-optic communication or Vancouver Area Smart Trek (VAST) networks.

2.5 Analysis Methods

Specific analytical techniques are not applicable to this topic. Individual utility owners were contacted as described in Section 3, and information regarding expected impacts was obtained through meetings. The key emphasis was to identify potential utility relocations that would require an extended period, long lead-time materials procurement and/or a long period for "tie-in" back to the existing system.

A project effect was defined as a need to physically relocate or modify utility infrastructure as a result of the project. Such effects are typically a direct result of construction activities. Utility infrastructure, for the purposes of this report, was deemed to comprise facilities required to convey water, sewage, power, gas, telecommunication, etc. Effects on support infrastructure such as administration and maintenance buildings, and publicly owned infrastructures such as street lighting, traffic signals, ramp metering signals, highway lighting, and highway traffic management systems are covered in the Public Services Technical Report. In addition, stormwater and drainage is not part of this effects analysis; they are covered in the Water Quality and Ecosystems Technical Reports.



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Primary Area of Potential Impact

Exhibit 2. Study Area

Columbia River CROSSING

Analysis by J. Koloszar; Analysis Date: 7/24/07; Plot Date: 7/24/07; File Name: Exhibit1_1_RK080.mxd

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3. Coordination

Each utility was initially contacted by phone to determine whether it had infrastructure in vicinity of the project; written confirmation was requested where this was not the case. Multiple meetings were also scheduled with utility owners that have infrastructure within or close to the primary API.

Exhibit 3 lists utilities that indicated they did have infrastructure in the primary API. When contacted, Level 3 Communications, MCI, Sprint, and Verizon confirmed that they would not be affected by the project.

Exhibit 3. Utilities with Infrastructure within the Primary API

Utility Owner	Type of Utility	Comments
AT&T	Communications	Local network services only.
Chevron	Fuel pipeline	Serves Portland International Airport. It will not be affected by the project.
Clark Public Utilities	Power	Serves the area north of the Columbia River.
Comcast	Communications	
Integra Telecom	Communications	Fiber-optic network formerly owned by Electric Lightwave.
NW Natural	Natural gas	Natural gas service provider for the area.
ODOT	Communications	
Pacific Power & Light	Power	Generally serves the area east of I-5 and south of Oregon Slough.
Portland, City of	Water, sewer and communications	
Portland General Electric	Power	Generally serves Hayden Island and the area west of I-5 and south of Oregon Slough.
Qwest	Communications	General telephone service provider for the area.
Sawtooth Technologies	Communications	Owns a fiber-optic line between the BPA Ross Complex and Vancouver VA Medical Center.
Time Warner Telecom	Communications	Fiber-optic network.
TriMet	Power & communications	Data provided showed changes made to existing utilities when the Interstate MAX Project light rail line was extended to the Expo Center.
Vancouver, City of	Water, sewer and communications	
WSDOT	Communications	

Initial meetings were held with all the utility owners listed in Exhibit 2 to determine what infrastructure that had within or close to the primary API, especially those considered important to their operations, and the most appropriate means of obtaining information on type and location.

Follow-up communications were sent and/or meetings were held on an as-required basis to obtain additional data considered necessary for this effects analysis and to resolve conflicting information. Additional meetings were held with individual utility owners to determine the impact of construction and completed project on their infrastructure and to ask the utility owners to confirm and verify the accuracy of the information shown on the project composite utility drawings.

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4. Affected Environment

4.1 Introduction

This section presents and describes existing utilities within the primary API with special emphasis on those that the project could affect. While there are a significant number of utilities that could be affected by the project (for example, overhead and underground lines and pipes located on Hayden Island and in Vancouver), the discussion focuses on major infrastructure considered to be important to utility operations.

In general, transportation agencies prefer that utilities not be located parallel to and under high-use corridors, such as a freeway or HCT guideway. Most utilities owners do not want their facilities located under such corridors either since it would be difficult and expensive to maintain, repair and replace.

4.2 Regional Conditions

Most of the utilities located within the primary API comprise local distribution or collection systems. With one notable exception, Hayden Island and the bridges across North Portland Harbor to the south and Columbia River to the north, utilities typically cross rather than run parallel to the highway alignment. Potential HCT alignments through Downtown Vancouver, Mill Plain District and North Vancouver generally follow existing streets, and utilities run both parallel to and across the guideway.

The presence of the bridge crossings across North Portland Harbor and Columbia River combined with the narrow 2200-foot width of Hayden island at this location have the effect of focusing several utilities along the narrow I-5 right-of-way. These utilities take advantage of the river crossings and include:

- a water transmission main across North Portland Harbor Bridge
- a main gas feed line across North Portland Harbor Bridge
- trunk communication cables (telephone, TV, data, and fiber optics) across North Portland Harbor Bridge and the Columbia River Bridge

Exhibit 4 presents the segments referenced in the following subsections while Exhibits 5 and 6 (at the end of this section) show the major utility infrastructure described in the following subsections. See Appendix B for more detailed composite utility plans.

4.3 Segment A Delta Park to Mill Plain District

4.3.1 Water and Sanitary Sewer

South of the Oregon-Washington state line, City of Portland (COP) provides water and sanitary sewer services within the primary API; water by the COP Bureau of Water

Works (BWW) and sanitary sewer by the COP Bureau of Environmental Services (BES). Sewage from this part of segment A is conveyed to the Columbia Boulevard Wastewater Treatment Plant, several miles west of I-5, south and west outside the API.

There are two water transmission mains and one major sewage forcemain between Victory Boulevard and North Portland Harbor. One water main crosses I-5 between Victory Boulevard and Marine Drive, runs north along the west side of Expo Road and then west along Marine Drive. The second water main crosses I-5 immediately south of North Portland Harbor and connects with the first main west of the Marine Drive Interchange. A branch from the second main crosses North Portland Harbor on the existing highway bridge, and is one of the two primary water supplies to Hayden Island. The sewage forcemain, which comprises two pipes under I-5, crosses the highway between Victory Boulevard and Marine Drive.

On Hayden Island, two water mains cross under I-5; one on Jantzen Drive and one on Hayden Island Drive. There is also a smaller diameter sewage forcemain located on Jantzen Drive.

A water supply well, which is currently abandoned, is located immediately north of Jantzen Drive and east of I-5. The well used to supply a water storage tank, also currently unused, located south of Jantzen Drive and west of I-5.

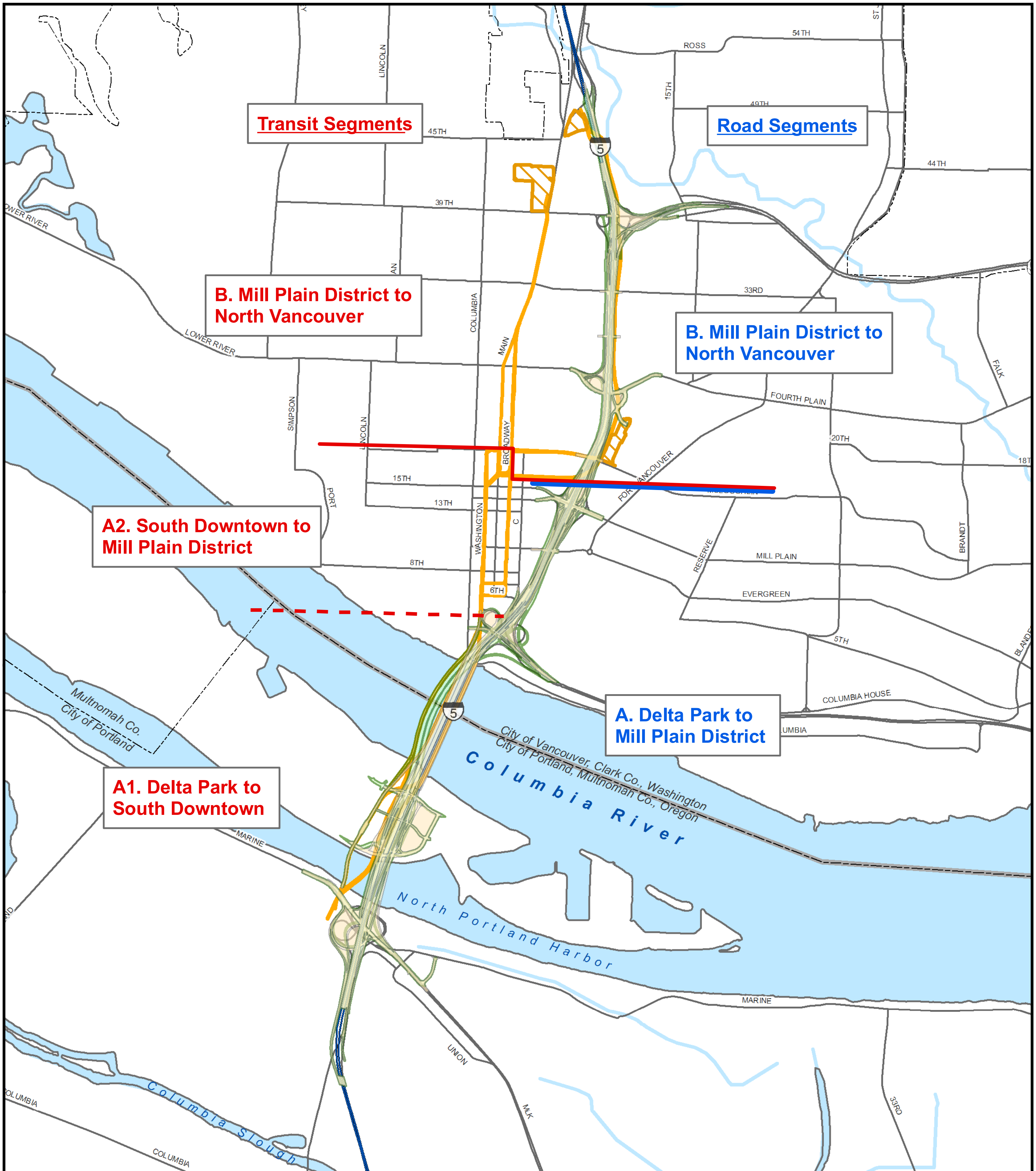
North of the Oregon-Washington state line, City of Vancouver provides water and sanitary sewer services within the primary API.

Within this part of Segment A, there is one major water transmission main and one major gravity sanitary sewage pipe. The water main and sewage pipe generally run in an east-west direction. The water main crosses under I-5 at Mill Plain Boulevard and the sewage pipe crosses I-5 between 5th and 6th Street.

Although there are a number of water and sanitary sewage pipes located under downtown Vancouver streets, they mostly comprise smaller diameter distribution and collection systems. One smaller diameter water main, which is located on Columbia Way, should be noted as it is the only source of potable water and fire flows to businesses adjacent to Columbia Way and immediately east of I-5.

4.3.2 Power and Natural Gas

South of the Oregon-Washington state line, Portland General Electric provides electricity to the area west of I-5 and south of North Portland Harbor, and to Hayden Island. Pacific Power & Light serves the area east of I-5 and south of North Portland Harbor.



Transit Segment Boundary
Transit Subsegment Boundary
Roadway Segment Boundary
Transit Lines
Park and Ride
Replacement Alignment
Supplemental Alignment

0 0.25 0.5
Miles

Exhibit 4. Road and Transit Segments

Columbia River CROSSING

Analysis by J. Koloszar; Analysis Date: Aug-2007; Plot Date: Aug-2007; File Name: JH_014_8x11.mxd

Electrical utilities within the API south of North Portland Harbor comprise overhead primary distribution systems with a voltage of 13 kV or less. An underwater power cable located immediately west of the I-5 bridge across North Portland Harbor connects Delta Park and Hayden Island distribution systems: this cable also has a voltage of 13 kV or less. The location of the underwater cable is such that several main feed lines and primary switches for Hayden Island are located adjacent to I-5. On Hayden Island, electrical services within the primary API are typically underground except for an overhead line located on the north bank of North Portland Harbor and west of the highway.

North of the Oregon-Washington state line, Clark Public Utilities provides electrical services. Some of Clark Public Utility's overhead power lines also carry fiber-optic cables owned by the utility. With the exception if a 69 kV transmission line, electrical utilities within this part of Segment A comprise overhead distribution systems with a voltage of 13 kV or less.

NW Natural provides natural gas service to the entire segment. Infrastructure within this part of the primary API generally comprises low- or medium-pressure distribution and feed pipes. Of note are two major feed pipes. One is located on the North Portland Harbor Bridge and supplies gas to Hayden Island. The second pipe is in Vancouver and is located mainly on Main Street—this pipe originates at a high pressure line (see below) at Columbia Street and Fourth Street. The a high-pressure pipe, which is located on Columbia Avenue and Columbia Street will likely not be affected by project construction.

4.3.3 Communications

There are five communication service providers with infrastructure within this part of the primary API: AT&T Local Network Services, Comcast, Integra, Qwest and Time Warner. Comcast provides television, telephone and Internet services, AT&T and Qwest provide telephone and Internet services, and Integra and Time Warner provide data and Internet services, primarily to larger clients. The customer base of AT&T, Comcast and Qwest extends through the entire area covered by Segment A. Within the API, Integra and Time Warner only have customers in Vancouver; Integra and Time Warner do serve the Metropolitan Portland area outside the API.

The infrastructure of all four providers is concentrated along the I-5 corridor from the Marine Drive interchange south of North Portland Harbor to the SR 14 interchange north of the Columbia River. All providers consider this infrastructure to be part of their major trunk systems. Cables for all four service providers are located on the North Portland Harbor Bridge and three are located on the Columbia River Bridge; one company crosses the Columbia River approximately 500 feet upstream of the existing bridges and most likely beyond the direct influence of construction activities. One provider also has additional underwater cables immediately west of the North Portland Harbor Bridge that provide services to Hayden Island. South of North Portland Harbor and north of the Columbia River, communications infrastructure is frequently co-located on power poles.

North of the Columbia River, three service providers are co-located on a loop that re-crosses the Columbia River at the I-205 Glen Jackson Bridge. Within this part of the primary API, major facilities are not located on streets proposed for HCT.

One service provider has two large controlled environmental vaults, which require power and ventilation, within this segment. One is located on Hayden Island and the other is located in downtown Vancouver. Relocating these vaults will be a major undertaking for utility owner in terms of both cost and duration.

In addition to the privately owned communication service providers described above, there are three publicly owned networks within this segment. They are the ODOT communications system in Oregon, the WSDOT communication system in Washington State, and the Vancouver Area Smart Trek (VAST) system in Washington State. The VAST program is a cooperative effort by public transportation agencies in Clark County and the system is used, among other things, for transportation management, and transit operation and management. Exhibits and composite plans do not show these networks for security reasons.

4.4 Segment B Mill Plain District to North Vancouver

4.4.1 Water and Sanitary Sewer

City of Vancouver provides water and sanitary sewer services and within this part of the primary API, there are two major water transmission mains both of which run east-west. One crosses under I-5 at McLoughlin Boulevard. West of I-5, this pipe is located in 16th Street. The other main crosses SR 500 between N and M Streets, east of the I-5/SR 500 interchange.

The remaining water and sanitary sewage infrastructure in this segment comprises smaller diameter pipes.

4.4.2 Power and Natural Gas

Clark Public Utilities provide electrical services. With the exception if a 69 kV transmission line that crosses I-5 at 33rd Street, electrical utilities within this segment that might be affected by project construction comprise overhead distribution systems with a voltage of 13 kV or less.

NW Natural provides natural gas service to the entire segment. Infrastructure within this part of the primary API generally comprises low- or medium-pressure distribution and feed pipes. Of note is a major feed pipe located along Main Street. This line runs from McLoughlin Boulevard to 46th Street, and then along Hazel Dell Avenue. This pipe serves areas east and west of Main Street.

4.4.3 Communications

Similar to Segment A, there are five communication service providers with infrastructure within this part of the primary API; AT&T Local Network Services, Comcast, Integra, Qwest and Time Warner. Communications infrastructure within this segment is frequently co-located on Clark Public Utility power poles.

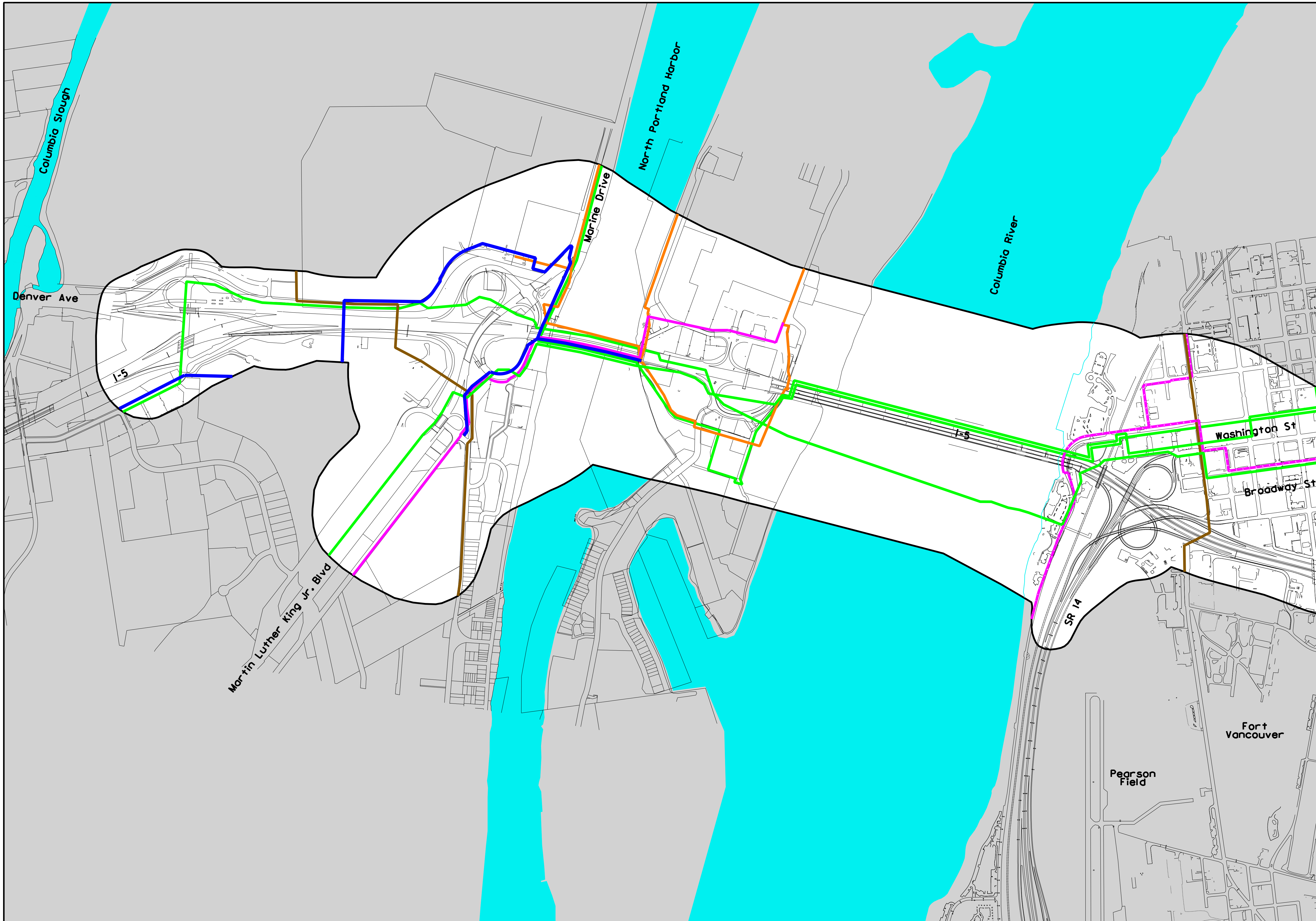
Three providers are co-located on the loop described in Section 4.3.3. Again, major facilities are not located on streets proposed for HCT.

Within Segment B, One service provider has an underground trunk line located on Main Street south of Fourth Plain Boulevard, and on Washington Street north of the Boulevard. This company also has a trunk line running east-west that crosses I-5 at the Fourth Plain interchange and a major office within this segment. The office will likely not be affected by the project.

As described in Section 4.3.3, there are also three publicly-owned networks within this segment. Again, exhibits and composite plans do not show these networks for security reasons.

Exhibit 5. Major Utilities (Sheet 1 of 2)

Columbia River CROSSING



LEGEND
- Power
- Water Main
- Gas
- Sanitary Sewer
- Communications

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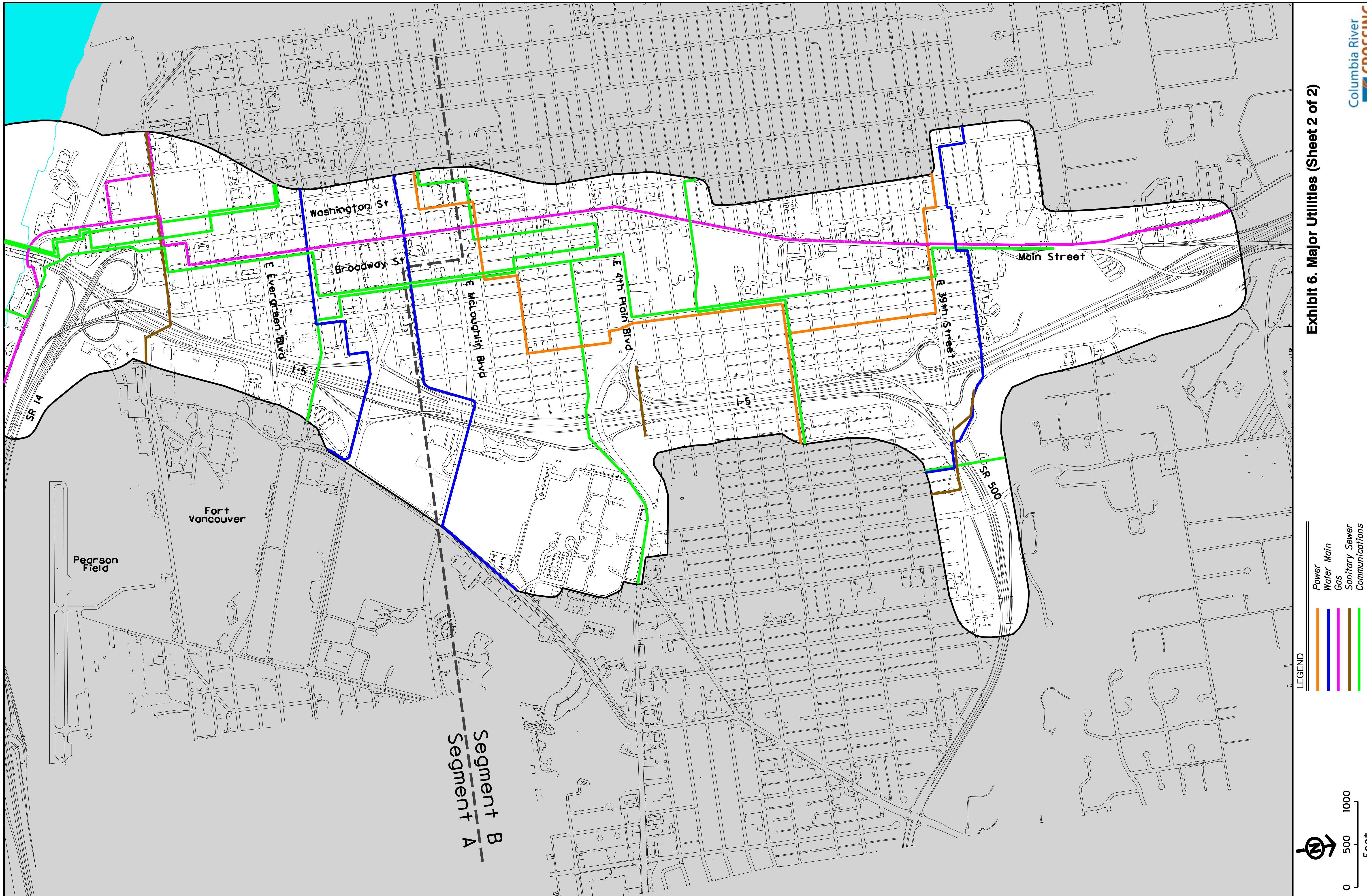
Exhibit 6. Major Utilities (Sheet 2 of 2)

Columbia River CROSSING



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5. Long-Term Effects

Long-term effects on utilities could include elements of the as-constructed project impairing access for maintenance and reductions in the level of service.

Note that BRT does not always require the relocation of utilities. Unlike LRT, buses can be temporarily re-routed onto adjacent streets should access be required along the guideway to maintain, upgrade or replace utility infrastructure. The transit agencies and utility owners would jointly determine whether utilities under the BRT or LRT guideway would be relocated. Key considerations would be the permanency of the guideway, the need for uninterrupted HCT service, and who would be responsible for the cost of relocation.

5.1 How is this section organized?

This chapter describes the long-term impacts that would be expected from the I-5 CRC alternatives and options. We first describe impacts from the five full build alternatives and no-build alternative. These are the five comprehensive alternatives that include specific highway, transit, bicycle, pedestrian and other elements. This discussion focuses on how these alternatives would affect corridor and regional impacts and performance. We then focus in on impacts that would occur with various design options at the segment level, for example, comparing the impacts of each alignment option in each segment. Finally, we provide a more comparative and synthesized summary of the impacts associated with the system-level choices. This three-part approach provides a comprehensive description and comparison of (1) the combination of system-level and segment level choices expressed as five specific alternatives (2) discrete system-level choices, and (3) discrete segment-level choices.

Although there are numerous utilities within the API, most of them are part of local distribution systems and are not considered significant enough to warrant separate discussions. Therefore, the effects presented focus on those that would have a major impact on a utility's operation or level of service, or on public safety.

5.2 Impacts from Full Alternatives

This section describes the impacts from five build alternatives and no-build alternative. These are combinations of highway, river crossing, transit and pedestrian/bicycle alternatives and options covering all of the CRC segments. They represent the range of system-level choices that most affect overall performance, impacts and costs. The full alternatives are most useful for understanding the regional impacts, performance and total costs associated with the CRC project.

There are a number of utilities within the primary API that could be affected by the project as shown on Exhibits 5 and 6 (see Section 4). The presence of these utilities will be confirmed during final design and their locations determined with a greater level of accuracy. While there could be impacts, affected utilities would either be relocated or protected to maintain existing levels of service. Either the project or the utility owner would perform and/or pay for such work.

Exhibits 7 through 10 present the major utilities and proposed project footprints. Exhibits 7 and 8 are for the replacement Columbia River Bridge alternative, and Exhibits 9 and 10 are for the supplemental Columbia River Bridge. Exhibits 8 and 10 also show the Vancouver transit alignment. This segment level choice (see Section 1.2.2.1) has a footprint that is sufficiently different to warrant including in the exhibits.

5.2.1 No-Build Alternative

Under this scenario, there would be no impact on utilities or the levels of service provided. It should be noted, however, that the North Portland Harbor and Columbia River Bridges are not designed to current seismic standards, and could fail and possibly collapse in the unlikely event of a catastrophic earthquake.

Failure of the North Portland Harbor Bridge could result in a loss of natural gas supplies to and fire flows on Hayden Island, and the underwater electrical cable serving the island could also be severed. In addition, communications cables could be cut if the North Portland Harbor and southbound Columbia River Bridge failed, resulting in a loss of land-based communications on Hayden Island and elsewhere within the API.

5.2.2 Replacement Crossing with BRT

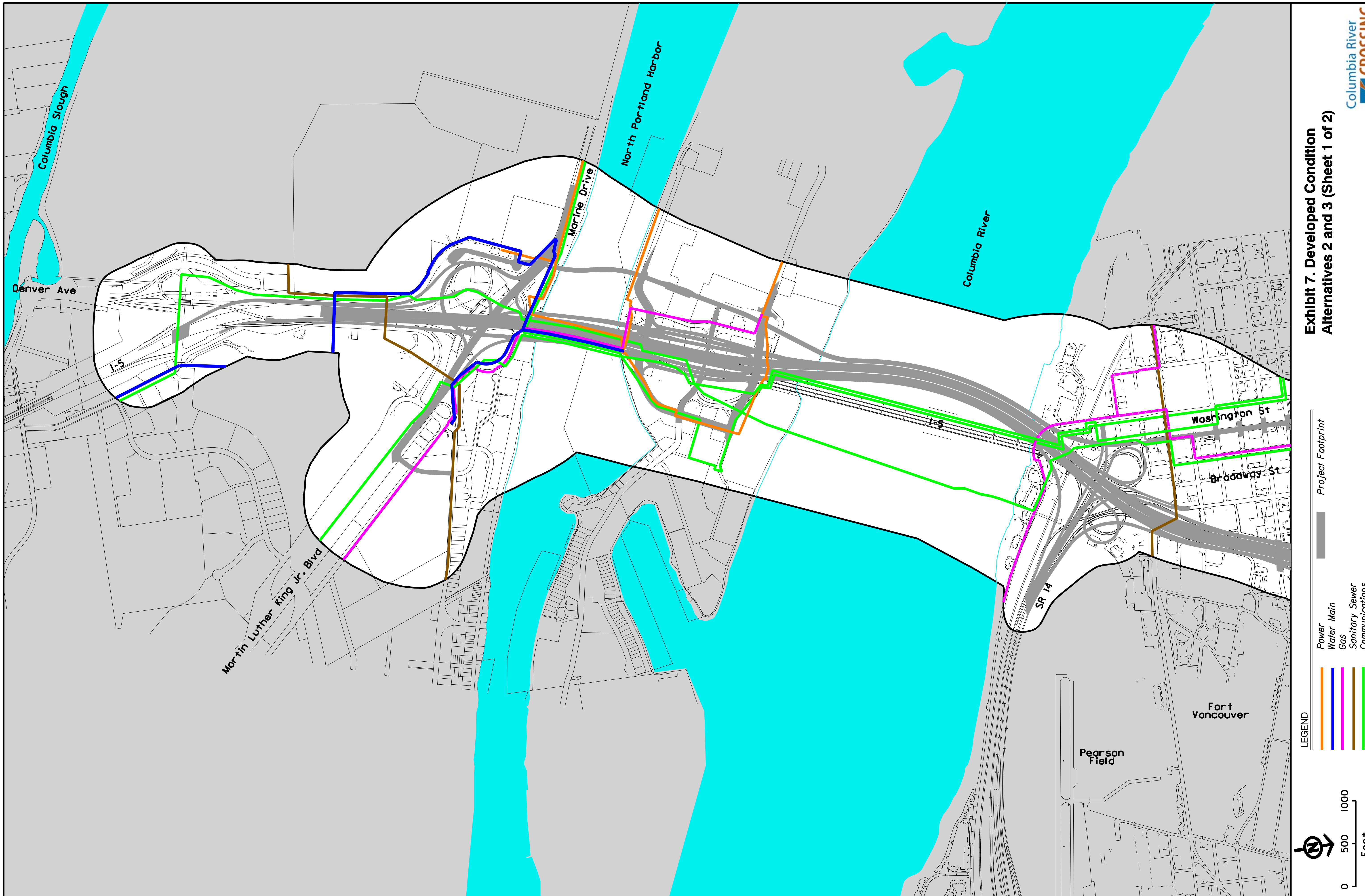
The primary elements of this alternative are:

- Replacement bridges, 10 to 12 lanes
- Bus Rapid Transit (I-5 alignment)
- Full-length (between Delta Park and Main Street interchanges)

There are a number of utilities within the project footprint that may be affected, the more significant of which are:

- Water supply main on the I-5 North Portland Harbor Bridge. This main, which is vital for maintaining fire flows on Hayden Island, would be affected by bridge demolition.
- Natural gas feed main on I-5 North Portland Bridge that provides supplies to Hayden Island. It would also be affected by bridge demolition.
- Communication cables across the I-5 North Portland Harbor Bridge, Hayden Island and southbound I-5 Columbia River Bridge. Several of these are trunk lines and would be affected by bridge demolition and reconstruction of the Hayden Island interchange.
- Underwater communication and power cables downstream of the North Portland Harbor Bridge.

Exhibit 7. Developed Condition Alternatives 2 and 3 (Sheet 1 of 2)



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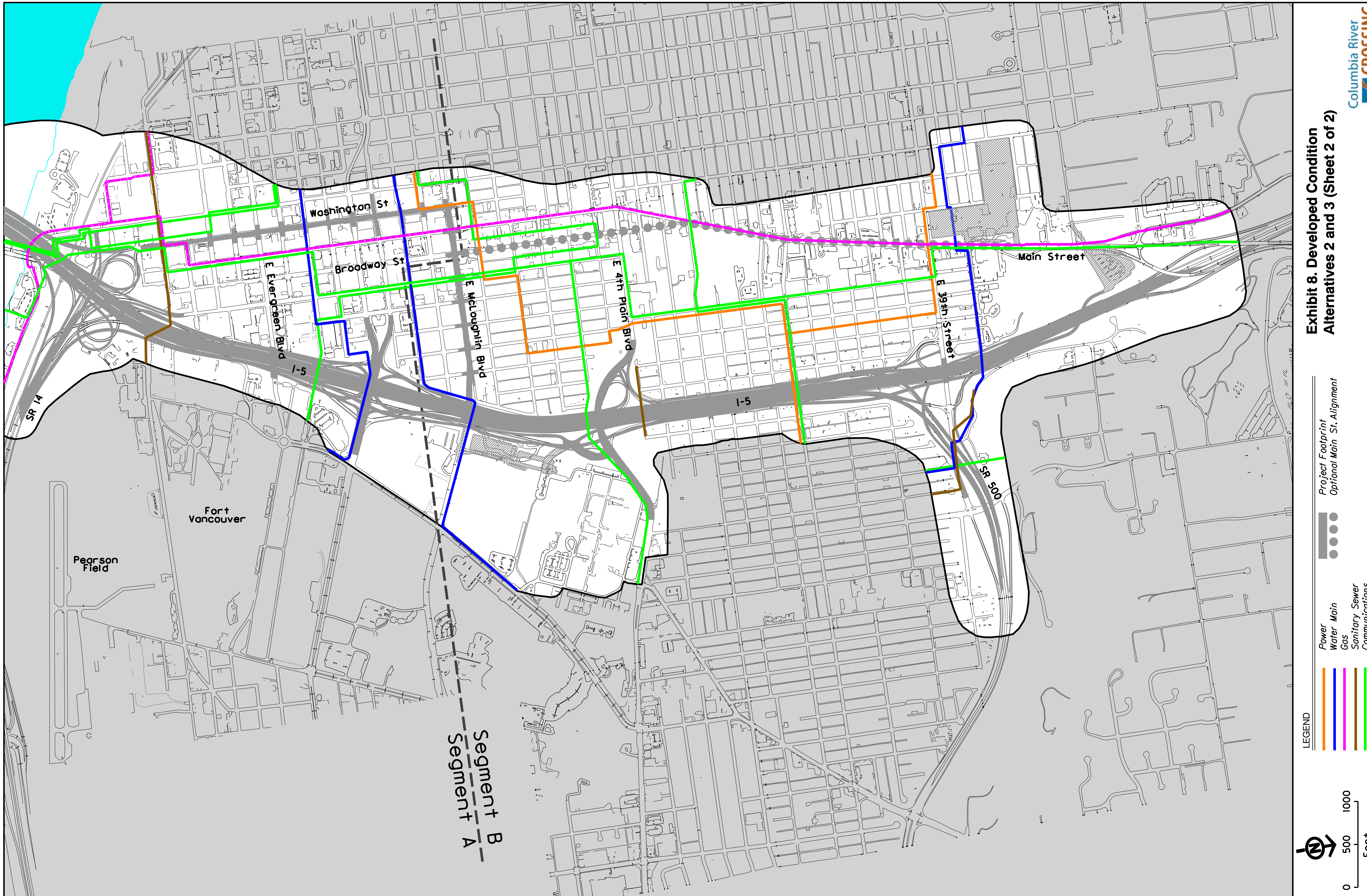

Exhibit 8. Developed Condition Alternatives 2 and 3 (Sheet 2 of 2)

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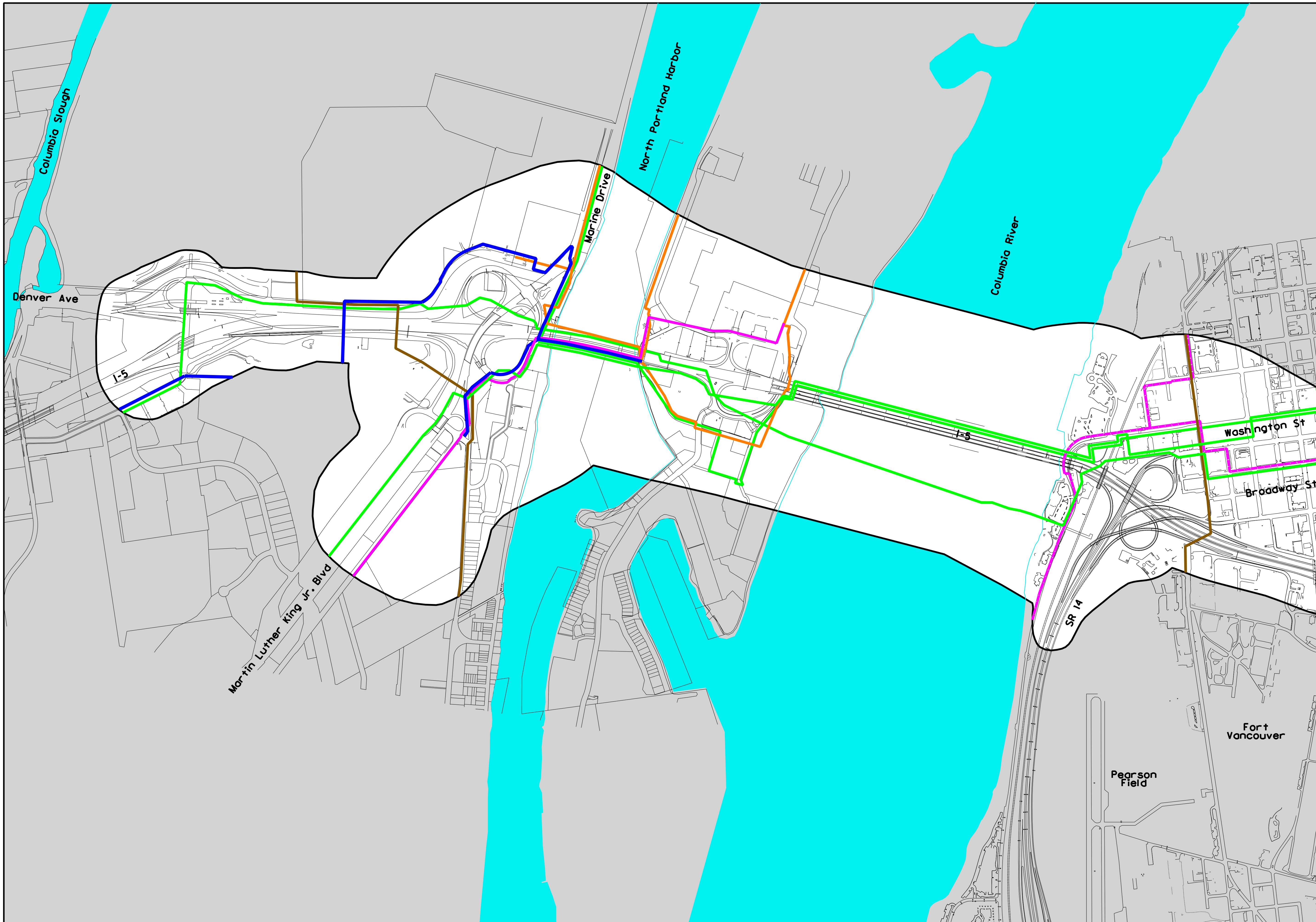

Exhibit 9. Developed Condition Alternatives 4 and 5 (Sheet 1 of 2)

Columbia River CROSSING

LEGEND

- Power
- Water Main
- Gas
- Sanitary Sewer
- Communications
- Project Footprint

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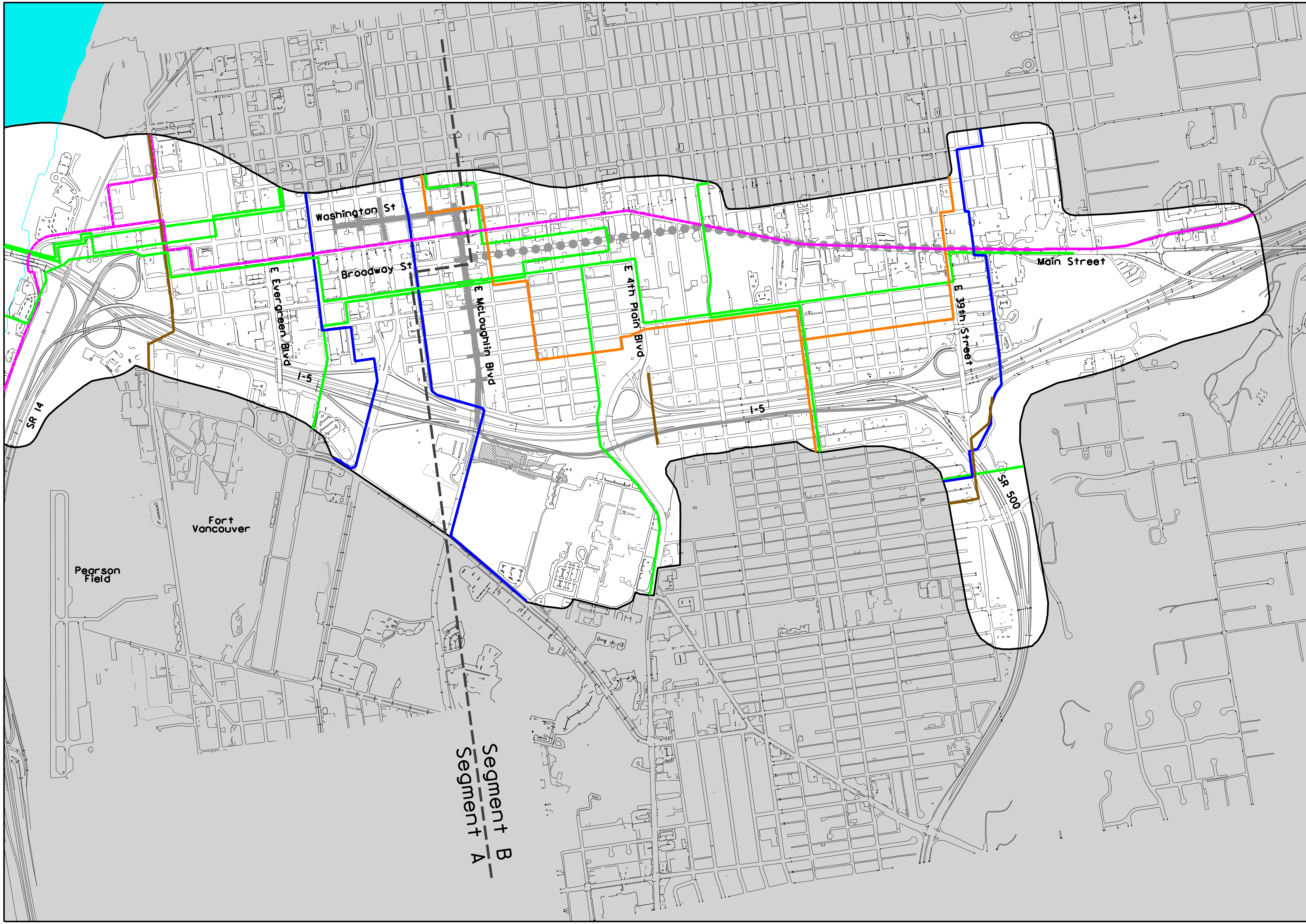

Columbia River CROSSING

Exhibit 10. Developed Condition Alternatives 4 and 5 (Sheet 2 of 2)

LEGEND

- Power
- Water Main
- Gas
- Sanitary Sewer
- Communications
- Project Footprint
- Optional Main St. Alignment

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- Main electrical feeds and switches adjacent to I-5 on Hayden Island that would be affected by reconstruction of the Hayden Island interchange. A main feed switch located adjacent to the Hayden Island Supercenter could be affected by construction of the elevated BRT guideway.

The above-mentioned utilities are the only links to Hayden Island. To maintain services, either temporary utilities relocation and/or staging/sequencing provision in the construction of new structures and demolition of the existing structures would need to be negotiated and mutually agreed to prior to start of the project construction.

Other utilities include:

- Large diameter gravity sanitary sewer crossing I-5 around 5th and 6th Street, Vancouver, could be affected by construction of a new ramp at the SR 14 interchange. Depending on ramp grades, pumping may be required to maintain sanitary sewer flows.
- Water supply main crossing I-5 at Mill Plain Boulevard may be affected when the vertical profile of the boulevard is lowered to provide a design vertical clearance for the widened highway. Loss of the main could affect water supplies and fire flows.
- Water supply main crossing I-5 at McLoughlin Boulevard may be affected when the vertical profile of the boulevard is lowered to provide a design vertical clearance for the widened highway. Loss of the main could affect water supplies and fire flows.
- Communications cable crossing I-5 at Fourth Plain that could be affected by the construction of additional lanes.
- High voltage electrical transmission line crossing I-5 at 33rd Street that could be affected by over-crossing reconstruction.
- Water supply main crossing I-5 at 40th Street, Vancouver. This could be affected by construction of a new ramp at the SR 500 interchange. Loss of the main could affect water supplies and fire flows.
- Large diameter gravity sewer located under 39th Street east of I-5 may be affected by street reconstruction.

5.2.3 Replacement Crossing with LRT

The primary elements of this alternative are:

- Replacement bridges, 10 to 12 lanes
- Light Rail Transit (I-5 alignment)
- Full-length (between Delta Park and Main Street interchanges)

The more significant utilities within the project footprint that may be affected are the same as those listed in Section 5.2.2.

5.2.4 Supplemental Crossing with BRT

The primary elements of this alternative are:

- Supplemental bridges, 8 lanes
- Bus Rapid Transit (Vancouver alignment) with Enhanced Transit Operations
- Full-length (between Delta Park and Main Street interchanges)

The more significant utilities within the project footprint that may be affected are the same as those listed in Section 5.2.2.

5.2.5 Supplemental Crossing with LRT

The primary elements of this alternative are:

- Supplemental bridges, 8 lanes
- Light Rail Transit (Vancouver alignment) with Enhanced Transit Operations
- Full-length length (between Delta Park and Main Street interchanges)

The more significant utilities within the project footprint that may be affected are the same as those listed in Section 5.2.2.

5.3 Impacts from Segment-level Options

This section describes and compares the impacts associated with specific highway alignment and interchange options and specific transit alignments and options. They are organized by Segment, including:

- Segment A: Delta Park to Mill Plain District
- Segment B: Mill Plain District to North Vancouver

For transit options, Segment A is divided into two sub-segments, each with a discrete set of transit choices:

- Sub-segment A1: Delta Park to South Vancouver
- Sub-segment A2: South Vancouver to Mill Plain District

Impacts from highway options are described separately from impacts from transit options. The purpose of this organization is to present the information according to the choices to be made. Where the traffic and transit choices would have a substantial effect on each other, this is considered.

5.3.1 Segment A: Delta Park to Mill Plain District - Highway Alternatives

Segment A is the part of the primary API where most utility impacts occur, most of which would be on Hayden Island. As stated previously, utilities are concentrated in a relatively narrow corridor between the Marine Drive and SR 14 interchanges.

5.3.1.1 No-Build

The I-5 bridges across North Portland Harbor and Columbia River are not designed to current seismic standards, and could fail and possibly collapse in the unlikely event of a catastrophic earthquake.

Failure of the North Portland Harbor Bridge could result in a loss of natural gas supplies to and fire flows on Hayden Island and the underwater electrical cable serving the island could also be severed. In addition, communication cables could be cut if the North Portland Harbor and southbound Columbia River Bridge failed, resulting in a loss of land-based communications on Hayden Island.

5.3.1.2 Replacement Crossing

The water main and sewage forcemain that crosses I-5 half way between Delta Park and Marine Drive interchanges are not likely to be affected by the project. The vertical profile of the highway will not be significantly altered and construction will be kept within the existing right-of-way. The Marine Drive interchange design options would not substantially influence impacts to utilities identified in this report.

Across the North Portland Harbor, the water main and gas feed line on the bridge would be affected by bridge demolition and electrical cable immediately upstream would be affected by new bridge construction.

At the Hayden Island interchange, main electrical feeds and switches for Hayden Island are within the new footprint and would be affected. The extent of the impact depends on whether existing streets would be vacated where they are realigned or abandoned. While not identified, note that there are a number of utilities located under Jantzen Drive and Hayden Island Drive; these two streets provide the only through connection under I-5 between developments on the island to the east and west of the highway.

Major underground communication trunk lines that run through the Marine Drive interchange and across the North Portland Harbor Bridge and Hayden Island, would be affected by the bridge demolition and reconstruction of the Marine Drive and Hayden Island interchanges. There are also underwater telephone cables across North Portland Harbor, immediately downstream of the existing I-5 bridge, that would be affected by new bridge construction. In addition, the communication cables across the southbound Columbia River Bridge would be affected by bridge demolition.

At the SR 14 interchange, the only major utility that might be affected is a large diameter gravity sanitary sewer crossing I-5 around 5th and 6th Street. Based on information provided by the City of Vancouver, it would be affected by ramp construction.

There is a water main located on Mill Plain Boulevard where it crosses under I-5, and would likely be affected by the potential lowering of the boulevard to accommodate a wider freeway lanes while maintaining vertical clearances.

5.3.1.3 Supplemental Crossing

The extent of effects is the same as those described in Section 5.3.1.3 with exception of the water main and sanitary sewer at the SR 14 interchange—the proposed interchange configuration is such that neither would likely be permanently affected. Although the existing Columbia River Bridges would be retained, proposed improvements and seismic retrofit would impact communication cables on the southbound structure.

5.3.2 Segment B: Mill Plain District to North Vancouver - Highway Alternatives

The reconstructed I-5 would generally follow its existing corridor and, as such, any impact on utilities would be limited. Most of the effects listed below are a result of ramp construction rather than improvements to the mainline.

5.3.2.1 No-build

There are no highway-related effects within this segment for this alternative.

5.3.2.2 I-5 Western Alignment

For this option, the centerline alignment of I-5 would be moved to the west to accommodate a HCT guideway adjacent to the highway (known as the I-5 transit alignment).

There is a water main under McLoughlin Boulevard where is passes under I-5. The main may be affected when the vertical profile of the boulevard is lowered to provide a design vertical clearance for the widened highway. Based on data provided by the City of Vancouver, impacts are expected to be confined to the west side of I-5 where the pipe crosses McLoughlin.

A telephone trunk line that crosses I-5 immediately south of the Fourth Plain interchange would be affected by this segment level option. Based on information provided by the utility owner, construction of the southbound (west) retaining wall would conflict with the duct bank.

At the 33rd Street bridge over I-5, a high voltage electrical transmission line could be affected. One or both poles at either end of the existing bridge may conflict with construction of a longer new bridge.

There is a water main that crosses I-5 at 40th Street, north of the SR 500 interchange. This, however, would only likely be affected if the ramp from southbound I-5 to eastbound SR 500 is a tunnel. If this ramp is a bridge, there would probably be no impact. Note that a tunnel would be required for the I-5 Transit Alignment; the ramp could be either a tunnel or a bridge for the Vancouver Transit Alignment.

5.3.2.3 I-5 Current Alignment

For this option, the existing centerline alignment of I-5 would be generally retained. This highway option would be paired with the Vancouver transit alignment. North of the Mill

Plain interchange, there is no significant difference in between the replacement and supplemental bridge alignments.

Except for the communications crossing at Fourth Plain Boulevard, the effects from this option would be as described in Section 5.3.2.2. Based on available information, this particular utility would probably not be affected by the project.

5.3.3 Segment A1: Delta Park to South Vancouver - Transit Alternatives

As described in the following subsections, major utility impacts associated with transit components are limited within this segment.

5.3.3.1 No-Build

There are no transit-related effects within this segment for the no-build alternative.

5.3.3.2 Hayden Island I-5 Adjacent Alignment

The guideway is elevated across Hayden Island and there are no additional impacts to major utilities.

5.3.3.3 Hayden Island Offset Alignment

The guideway is elevated across Hayden Island and the only impacts anticipated would be a result of pier location. Those impacts would be limited to the main electrical feed to and switches for the Hayden Island Supercenter.

5.3.4 Segment A2: South Vancouver to Mill Plain District - Transit Alternatives

5.3.4.1 Two-Way on Washington Street

Communications trunk lines belonging to two service providers are located along Washington Street south of 8th Street, and could be affected by the project. Impacts south of 5th Street would be a result of bridge construction and potential impacts between 5th and 8th Street would be due to guideway construction.

5.3.4.2 Couplet on Broadway/Washington

Impacts would be the same as those described in Section 5.3.3.4 except that they would be limited to trunk lines on Washington Street that are south of 6th Street. Additional guideway-related impacts for this option could include a water main on 16th Street between Main and Broadway Street and, for the replacement Columbia River Bridge, a communications trunk line located on 6th Street between Washington and Main Street.

5.3.5 Segment B: Mill Plain District to North Vancouver - Transit Alternatives

There are a number of utilities located on streets proposed for guideway alignments. Most, however, are not being considered to be major or critical infrastructure and are not listed separately.

5.3.5.1 No-build

There are no transit-related effects within this segment for the no-build alternative.

5.3.5.2 Vancouver Transit Alignments

5.3.5.2.1 Broadway Two-Way

A gas feed line running along Main Street north of 29th Street and a communications trunk line located along Main Street north of 39th Street and could be affected by guideway construction. In addition, there is a water main located along the south side of the WSDOT maintenance facility and a communications tower in the southeast corner of the same facility. Construction of the Lincoln Park and Ride would affect both utilities.

5.3.5.2.2 Main/Broadway Couplet

Potential impacts would be the same as those described in Section 5.3.5.2.1.

5.3.5.2.3 Main Street Two-Way (North of Fourth Plain Blvd)

Potential impacts would be the same as those described in Section 5.3.5.2.1. In addition, the gas feed pipe on Main Street south of 29th Street could be affected by guideway construction.

5.3.5.3 North I-5 Transit Alignments

5.3.5.3.1 McLoughlin I-5 Alignment

The only major utilities associated with this alignment that could be affected are a water main on McLoughlin Boulevard and a telephone trunk line that crosses the guideway immediately south of Fourth Plain Boulevard.

Impacts to the water main would be a result of the need to further lower McLoughlin to meet the additional clearance required for the LRT catenary system; this clearance is greater than that required for vehicular traffic. The impacts are expected to extend beyond what is presented in Section 5.3.2.2. The communications line at Fourth Plain crosses the proposed guideway between two cut and cover tunnels, where it is in a retained cut. Again, the impact would be greater than that resulting from highway construction alone.

5.3.5.3.2 16th/I-5 Alignment

The anticipated major utility impacts include the communications trunk line described in Section 5.3.4.3.1 in addition to a water main on 16th Street. The latter would be affected east of E Street where the guideway is below the existing street grade to accommodate a tunnel under I-5; west of E Street, the water main would only be affected by LRT.

5.4 Impacts from Other Project Elements

5.4.1 Minimum Operable Segment

A Minimum Operable Segment (MOS) for transit is being considered in which the BRT or LRT line for the I-5 Transit Alignments could stop at the Clark College Station. For this option, the only major utility that would not be affected is the communications trunk line running east-west immediately south of Fourth Plain Boulevard (see Section 5.3.5.3.1).

Another MOS being considered would stop transit at the Mill Plain district. This shorter length alignment would not be expected to introduce any new impacts to utilities, and could avoid some of the impacts discussed in Segment B above.

5.4.2 Transit Maintenance Base Options

Construction of the proposed maintenance bases (either expansion of the C-TRAN bus maintenance facility in eastern Vancouver for BRT, or expansion of the TriMet Ruby Junction light rail maintenance facility in Gresham for LRT) would only involve development of existing maintenance facilities or contiguous property. As such, utility impacts would be limited to infrastructure serving those bases and located on the property being developed.

5.5 Impacts from System-Level Choices

5.5.1 River Crossing Type and Capacity: How does the Supplemental 8-lane crossing compare to the Replacement 10-lane or 12-lane crossing?

There is no appreciable difference in impacts to major utilities for the supplemental versus replacement Columbia River bridge options.

5.5.2 Transit Mode: How does BRT compare to LRT?

In general, utility impacts associated with BRT could be significantly less than those for LRT. The primary reason for this is that utilities may not need to be relocated to accommodate the BRT guideway unless it decided that it should be constructed to be “LRT-ready.”

Most utility owners would prefer that their infrastructure not be located under the LRT guideway where those utilities are under or close to the guideway. Relocation would be desirable for future access for maintenance and repair. It would also be desirable to minimize the likelihood for induced and/or stray electrical currents in pipes and ducts constructed from electrically-conductive material such as steel.

Impacts would be common to both BRT and LRT where the guideway is elevated or where is would be excavated below existing grade. Examples include main electrical feeds on Hayden Island, and communications trunk lines on Washington Street and the water main under 16th Street, both in Vancouver.

5.5.3 Major Transit Alignment: How does the Vancouver alignment compare to the I-5 alignment?

There would be a greater number of major utilities potentially affected by the Vancouver alignment versus the I-5 alignment. A water main, gas feed line and communication trunk line could be affected by Vancouver alignment compared with a water main and communications trunk line for the I-5 alignment.

5.5.4 Transit Project Length: How do the full-length alternatives compare to the shorter length option?

As described in Section 5.4.1, there are not significant differences in major utility impacts between the full length and MOS options. For the I-5 Alignment, the shorter length would only eliminate one impact—to a communications trunk line located south of Fourth Plain Boulevard. For the Vancouver Alignment, the shorter length would eliminate impacts to the gas feed pipe on Main Street north of the Mill District Station and communications trunk line on Main Street north of 39th Street.

6. Temporary Effects

Temporary effects are generally limited to those caused by construction activities, and temporary outages that may be necessary when relocating utilities. Such impacts would be similar regardless of the highway or transit option.

Both underground and overhead utilities could be affected by construction activities such as excavation, foundation construction and earth moving. Tying in relocated utilities could result in a temporary loss of services—these are expected to have a short duration. However, for some utilities such as communications, tying into the existing trunk lines from the new relocated lines could take an extended period for splicing and connecting multiple cables.

Depending on the construction sequence, temporary relocations may be necessary before a utility is in its final location. This is more likely to occur with utilities crossing the existing Portland Harbor Bridge; at least part of the existing bridge would need to be demolished to accommodate construction of the new highway crossing. Since most of these existing utilities are the only links to Hayden Island, temporary relocation may be required prior to the start of highway and transit construction. Otherwise, the highway and transit construction contract will need to have provision to protect and maintain such utilities, to provide duct bank, conduit, and attachment for the relocated utilities in the new crossing, and to have construction window to allow utilities to pull cables and tying in relocated utilities as necessary.

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7. Mitigation for Long-Term Effects

Proposed mitigation for long term effects would be the same for both highway and transit elements regardless of alignment and option. They are intended to eliminate or minimize long-term impacts from the project and ensure that such impacts do not impair existing overall levels of service, and include:

- Close and ongoing coordination with utility owners during design.
- Determining the exact location and depth of utilities using techniques such as potholing and locating using electronic instruments, and confirming those locations with individual utility owners.
- Evaluating the effect on proposed utility relocation on other nearby utility infrastructure.
- Where practical and cost effective, design the locally preferred alternative to avoid or minimize conflicts, service disruptions and access restrictions, especially for major utilities. Design would also consider the effect of relocating utilities on other nearby utility infrastructure.
- Develop detailed Composite Utility Plans that show existing utilities, and proposed temporary and permanent utility locations. These plans would be reviewed with utility owners prior to construction.
- Develop agreement(s) with affected utility owners for utilities to be relocated, where feasible, prior to start of the project. Advance utility relocation is a key to minimizing project schedule delays. An alternative approach would be to include utility relocation, particularly public facilities, in the construction contracts.

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8. Mitigation for Temporary Effects

Similar to long-term effects, proposed mitigation for temporary effects would be the same for both highway and transit elements regardless of alignment and option. They are intended to minimize service disruptions during construction and include:

- Close and ongoing coordination with utility owners during design and construction.
- Relocating utilities in advance of construction where feasible.
- Identify schedule-related constraints with utility owners. For example, long lead procurement times for materials and equipment required for utility relocation, and the time that critical utilities such as water mains can be out of service.
- Incorporate temporary and permanent utility relocations and duration of expected service disruptions in the construction schedules. The schedule and sequence for utility relocation work would be reviewed with owners prior to construction.
- Notify neighborhoods of potential disruptions in service
- Tailor construction contract(s) to include protecting and maintaining utilities, to provide duct banks, conduit, and attachments for the relocated utilities, and to have defined construction windows for utilities to pull cables and tie in relocated utilities.

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9. References

No references are cited in this report.

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10. Permits and Approvals

Use and occupancy agreements (permits and franchises) would be required from ODOT and WSDOT for utilities located within their rights-of-way. The utility owners, however, would obtain these. The utility owner or contractor performing relocation work would also obtain any other permits and approvals specifically required for that work by state or local government agencies.

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APPENDIX A

ODOT and WSDOT Permits and Franchises

Permits Issued by ODOT for I-5 Right-of-Way

Permit No.	Year Issued	Utility Type	Applicant	Comments
4734	1955	Communications	Pacific Telephone & Telegraph Company	MP 6.24 (prior Mile Post system). Telephone cable crossing.
6142	1962	Communications	Pacific Northwest Bell	MP 307.45. U/G telephone cable.
5225	1964	Communications	Pacific Northwest Bell	MP 6.63 - 6.77 (prior Mile Post system). Telephone cable. Modified later.
11761	1967	Water	Hayden Island, Inc.	MP 308.02. 6" steel. Not shown on City of Portland data - could be abandoned.
11973	1967	Electricity	Portland General Electric	MP 307.69. U/G 11 kV crossing. Amended in Salem Permit Office.
12240	1968	Sewer	Hayden Island, Inc	MP 6.28 (prior Mile Post system). 8" welded steel pipe.
12259	1971	Communications	Pacific Northwest Bell	Location on attached map is not clear: it is likely at intersection of Hayden Island Drive and Center Avenue.
13509	1970	Water	Hayden Island, Inc.	MP 7.69 (prior Mile Post system). 12" pipe. Replaced - see Permit #30861.
13681	1970	Electricity	Portland General Electric	MP 6.59 - 6.60 (prior Mile Post system). 17 kV buried cable and switch/transformer house. Current configuration not as shown on the permit.
14228	1971	Gas	Northwest Natural Gas Company	MP 307.69 - 307.99. 2" and 4" pipe.
15306	1972	Water	City of Portland	MP 307.06. 24" casing for 16" steel main.
15572	1972	Water	City of Portland	MP 307.05. 16" DIP crossing.
16216	1973	Communications	City of Portland	MP 307.48 - 307.70. Fire alarm cable suspended under Oregon Slough Bridge. Not shown for security reasons.
17675	1976	Communications	Pacific Northwest Bell	MP 308.14 - 308.16. Concrete parking area.
18599	1977	Sewer	City of Portland	MP 306.64 - 306.83. 6" DIP forcemain.
19107	1977	Gas	Northwest Natural Gas Company	MP 308.15 - 308.17. 2" steel.
20738	1979	Communications	Pacific Northwest Bell	MP 368.25. U/G cable. Mile Post is incorrect.
25437	1985	Communications	Pacific Northwest Bell	MP 307.45. U/G telephone cable and cable suspended under North Portland Harbor Bridge deck.
27148	1987	Communications	Roger's Cable Systems	MP 307.47 - 307.70. U/G TV cable and suspended cable under North Portland Harbor Bridge deck.
30693	1990	Water	City of Portland	MP 307.33 - 307.51. 16" DIP.
30861	1990	Water	City of Portland	MP 308.06 - 308.16. 12" DIP.
2BM35007	1990	Gas	Northwest Natural Gas Company	MP 307.32 - 307.47. 8" steel line.
2BM35178	1992	Sewer	City of Portland	MP 307.70. 10" PVC forcemain crossing.
2BM35338	1993	Communications	Red Lion Inn	MP 308.00. Record existing telephone cable.
2BM35356	1994	Communications	Columbia Cable of Washington	MP 307.99 - 308.38. 2" conduit with fiber-optic cable across Columbia River Bridge. Extends onto Washington side. Shown as a submarine crossing at lift span.
2BM35638	1996	Sewer	City of Portland	MP 307.16. 20" and 30" forcemain.

Permit No.	Year Issued	Utility Type	Applicant	Comments
2BM35797	1997	Communications	TCI	MP 307.99 - 308.38. Temporary permit for installing fiber-optic cable on Columbia River Bridge. Extends onto Washington side.
2BM35800	1997	Communications	All Phase Communications	MP 307.80 - 307.99. U/G fiber-optic cable.
2BM35801	1997	Communications	All Phase Communications	MP307.99 - 308.38. PVC conduits on Columbia River Bridge for fiber-optic cable. Extends onto Washington side, and includes vault and pull boxes.
2BM35831	1997	Communications	All Phase Communications	MP 307.46 - 307.70. Fiber-optic cable suspended under Oregon Slough Bridge.
2BM35873	1997	Communications	GST Telecom	MP 307.30. U/G fiber-optic cable. Mile Post is incorrect – cable located on Pier 99 Street.
2BM36005	1998	Water	City of Portland	MP 307.45. 8" DIP.
2BM36010	1998	Communications	Electric Lightwave	MP 307.48. O/H fiber-optic line on PP&L poles.
2BM36073	1999	Communications	Paragon Cable	MP 307.46 - 307.47. U/G fiber-optic & TV cable.
2BM36236	2000	Electricity	Portland General Electric	MP 308.00. U/G mainline backbone feeder.
2BM36242	2000	Electricity	Portland General Electric	MP 308.00. 4" & 6" U/G power conduit.
2BM36281	2000	Communications	Hayden Corner	MP 308.00. Replace traffic loop detector - loops not shown on drawings.
2BM36614	2002	Water	Doubletree Hotel	MP 308.00. Connection to ODOT water line. Insufficient information to verify location. Private connections not shown on the drawings.
2BM36829	2003	Communications	Qwest	MP 307.71. U/G 2" service conduit. Service connections not shown on drawings.
2BM37005	2005	Communications	Qwest	MP 307.71. U/G telephone cable.

Franchises and Permits Issued by WSDOT for I-5 Right-of-Way

Permit No.	Year Issued	Utility Type	Applicant	Comments
FRANCHISES				
	1994	Communications	Columbia Cable of Washington	MP 0.00 - 0.17. See ODOT Permit # 2BM35356.
	1997	Communications	All Phase Communications	See ODOT Permit # 2BM35801.
	1997	Communications	TCI	MP 0.00 - 0.23. See ODOT Permit # 2BM35797.
6423	1980	Electricity	Clark County PUD	MP 0.27. Existing 12.5 kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark County PUD	MP O.53. Existing guy wire and neutral wire O/H crossing. Franchise Agreement (expires 2005). No longer there.
6423	1980	Electricity	Clark County PUD	MP 0.65. Existing 12.5 kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark County PUD	MP 0.93. Existing 12.5 kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark County PUD	MP 1.23. Existing 2 - 6" conduits without cable. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark County PUD	MP 1.82. Existing 12.5 kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark County PUD	MP 2.02. Existing 69 kV O/H crossing. Franchise Agreement (expires 2005).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.54. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing no longer exists.
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.84. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing is on bridge.
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.55. U/G telephone cable crossing encased in a 30" steel pipe. Franchise Agreement (expires 2009.
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.56. U/G telephone cable crossing. Franchise Agreement (expires 2009).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.98. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing is actually at 33rd (MP 2.02).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.29 - 0.32. U/G telephone cable crossing. Franchise Agreement (expires 2009).
6644	1991	Communications	Pacific Northwest Bell Telephone Co.	MP 1.55 - 1.62. U/G telephone cable crossing: within an existing duct. Franchise Agreement (expires 2009).
6644	1991	Communications	Pacific Northwest Bell Telephone Co.	MP 1.56 - 1.62. U/G telephone cable crossing: within existing ducts. Franchise Agreement (expires 2009).
40006	1985	Gas	Northwest Natural Gas Company	MP 0.25. 6" steel. Franchise Agreement (expires 2010).
40006	1985	Gas	Northwest Natural Gas Company	MP 1.28 - 1.29. 4" steel. Franchise Agreement (expires 2010).
40025	1987	Water	City of Vancouver	MP 0.25. 6" DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 0.54 - 0.56. 12" DIP. Franchise Agreement (expires 2012).

Permit No.	Year Issued	Utility Type	Applicant	Comments
40025	1987	Water	City of Vancouver	MP 0.58 - 0.60. 12" DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.00 - 1.04. 12" DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.03 - 1.08. 8" pipe. Franchise Agreement (expires 2012). Partly abandoned.
40025	1987	Water	City of Vancouver	MP 1.03 - 1.04. 6" pipe. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 2.33 - 2.37. 8" DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 2.36 - 2.38. 8" DIP with a 2" galvanized pipe. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.30. 20" DIP crossing not previously described. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.68. 6" pipe crossing in 36" culvert not previously described. Franchise Agreement (expires 2012). Abandoned.
40025	1987	Water	City of Vancouver	MP 1.83. 12" DIP crossing in 42" culvert not previously described. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.97. 10" DIP crossing in 42" culvert not previously described. Franchise Agreement (expires 2012).
40058	1988	Sewer	City of Vancouver	MP 0.26. Existing 8" CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.43 - 0.44. Existing 8" CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.44 - 0.45. Existing 8" CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.56 - 0.58. Existing 33" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.03. Existing 8" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.08. Existing 8" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.19 - 1.26. Existing 10" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.30 - 1.37. Existing 8" pipe. Franchise Agreement (expires 2013). Abandoned.
40058	1988	Sewer	City of Vancouver	MP 1.68. Existing 14" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.68. Existing 12" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.25 - 2.29. Existing 8" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.29 - 2.34. Existing 8" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.34 - 2.35. Existing 27" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.31 - 2.37. Existing 8" pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.41 - 2.44. Existing 12" pipe. Franchise Agreement (expires 2013).

Permit No.	Year Issued	Utility Type	Applicant	Comments
40118	1994	Communications	Columbia Cable of Washington	MP 0.00 - 0.26. 2" duct with fiber-optic cable on Columbia River Bridge. Franchise Agreement (expires 2019).
40118	1998	Communications	TCI	MP 0.00 - 0.26. 2" duct with fiber-optic cable. High level crossing of bridge lift span. Franchise Agreement (expires 2019).
40118	1998	Communications	TCI	MP 2.02. O/H fiber-optic cable crossing. Franchise Agreement (expires 2019).
40151	1997	Communications	Electric Lightwave	MP 0.26 - 0.27. O/H fiber-optic cable crossing. Franchise Agreement (expires 2022).
40151	1997	Communications	Electric Lightwave	MP 2.02. O/H fiber-optic cable crossing. Franchise Agreement (expires 2022).
40161	1998	Communications	GTE	MP 1.82. O/H fiber-optic cable crossing. Franchise Agreement (expires 2023).
PERMITS				
8828	1983	Communications	Cox Cable	MP 0.94. O/H CATV cable crossing. See #11072.
8842	1984	Communications	Cox Cable	MP 1.84. Two CATV cables within 29th Street structure.
8868	1983	Electricity	Clark County PUD	MP 0.66 - 0.69. 4" PVC duct with 12.5 kV cable.
9749	1984	Communications	City of Vancouver	MP 1.03 - 1.05. U/G cable in PVC duct.
9278	1985	Communications	Cox Cable	MP 0.79 - 0.84. U/G CATV cable parallel to I-5 in 2" PVC duct.
11013	1994	Communications	Clark Public Utilities	MP 0.94 - 0.95. O/H fiber-optics cable lashed to neutral wire authorized under Franchise #6423.
11072	1995	Communications	Columbia Cable of Washington	MP 0.94. O/H CATV cable crossing.
11466	1996	Communications	TCI	MP 1.27 - 1.28. 2 - 2" PVC ducts. One is empty and one has a CATV cable.
U1196	2001	Communications	City of Vancouver	MP 1.03 - 1.05. U/G 3" duct with fiber-optic cable.
U1271	2002	Communications	Clark County Dept. of Information Technology	MP 0.85. 3 - 1.25" fiber-optic cable ducts.
U1315	2002	Communications	Clark Public Utilities	MP 0.26 - 0.28. O/H fiber-optic cable crossing.
U1444	2004	Communications	City of Vancouver	MP 1.58. Fiber-optic cables.

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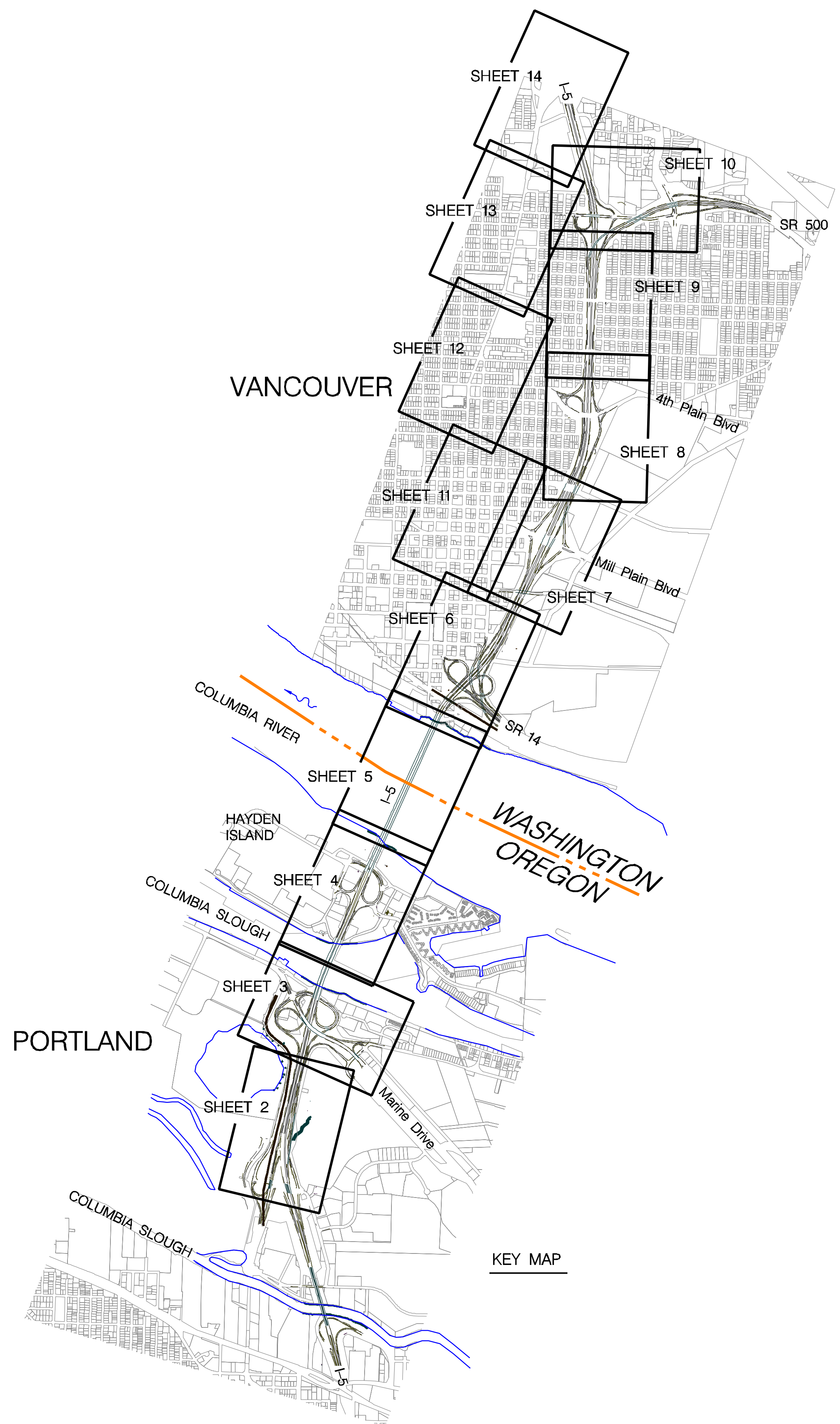
APPENDIX B

Composite Utility Plans



NOTES:

1. *Utilities Presented On These Drawings Are Based On Information Provided By Various Agencies And Utility Sources. Poles For Overhead Utilities Were Adjusted Where Appropriate To Match Pole Locations Shown Within The Limits Of The Detailed Base Map.*

2. *The Utilities Shown Have Not Been Field Located. There Is No Guarantee That The Utilities Shown Comprise All Utilities In The Area, Either Abandoned Or In Service, Or That The Location Of The Utilities Shown Is Accurate.*

3. *The Ortho-Photo Base Map, Which Was Provided By The Oregon Department Of Transportation, Is Based On Aerial Photography Flown In April 2005.*

LEGEND

U TV	*Underground Cable Television*
A TV	*Above Ground Cable Television*
G	*Northwest Natural Gas Line*
U E	*Underground Electric*
A E	*Above Ground Electric*
U T F O	*Underground Fiber Optic*
A T F O	*Above Ground Fiber Optic*
U T	*Underground Communication*
A T	*Above Ground Communication*
U W	*Underground Water Line*
	Sanitary Sewer Line

Composite Utility Plans (Sheet 1 of 14)

Key Map, Notes and Legend

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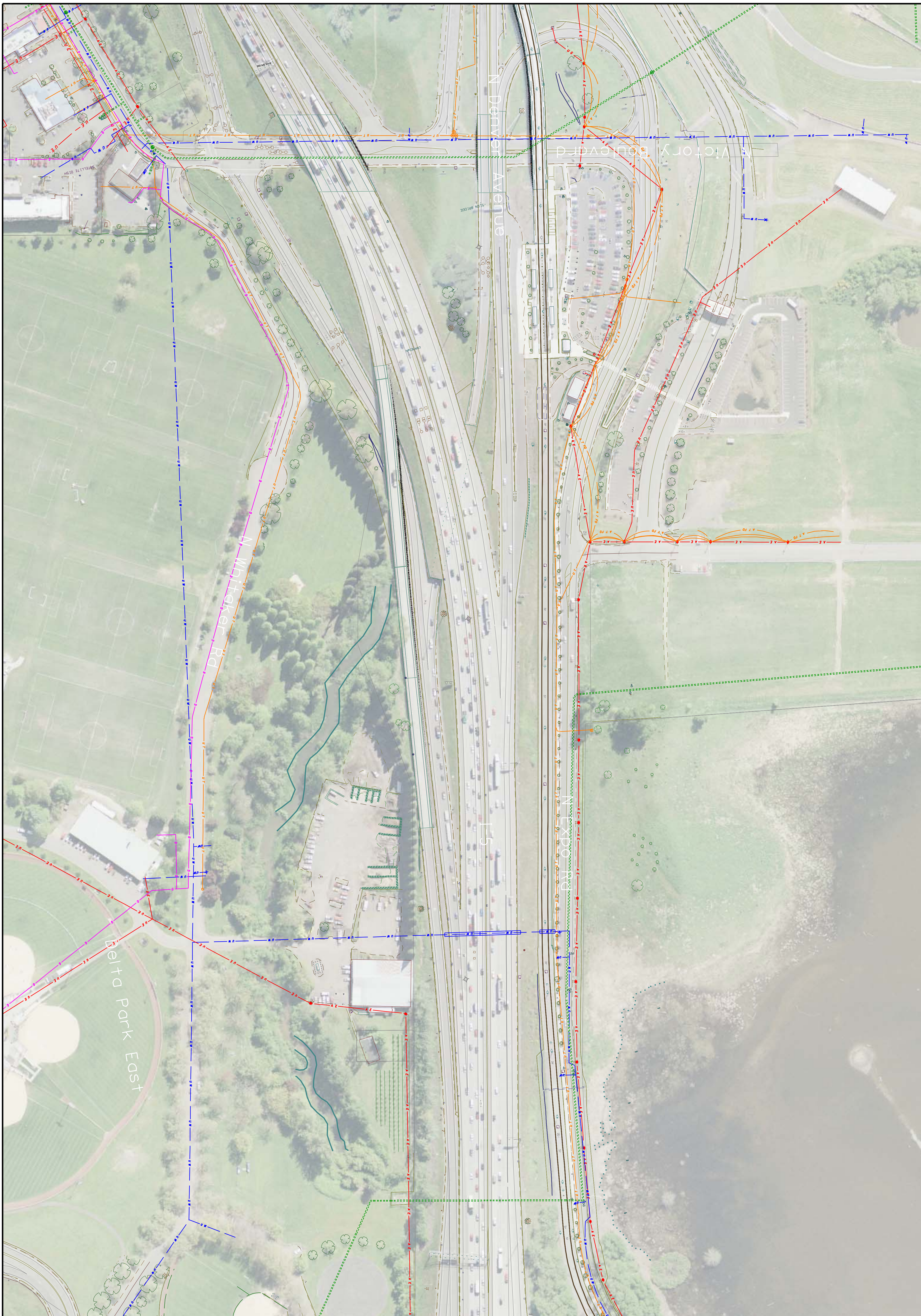

Composite Utility Plans (Sheet 2 of 14)

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Note:
See sheet 1 for Key Map, Notes and Legend

Columbia River CROSSING

Composite Utility Plans (Sheet 3 of 14)

Note:
See sheet 1 for Key Map, Notes and Legend

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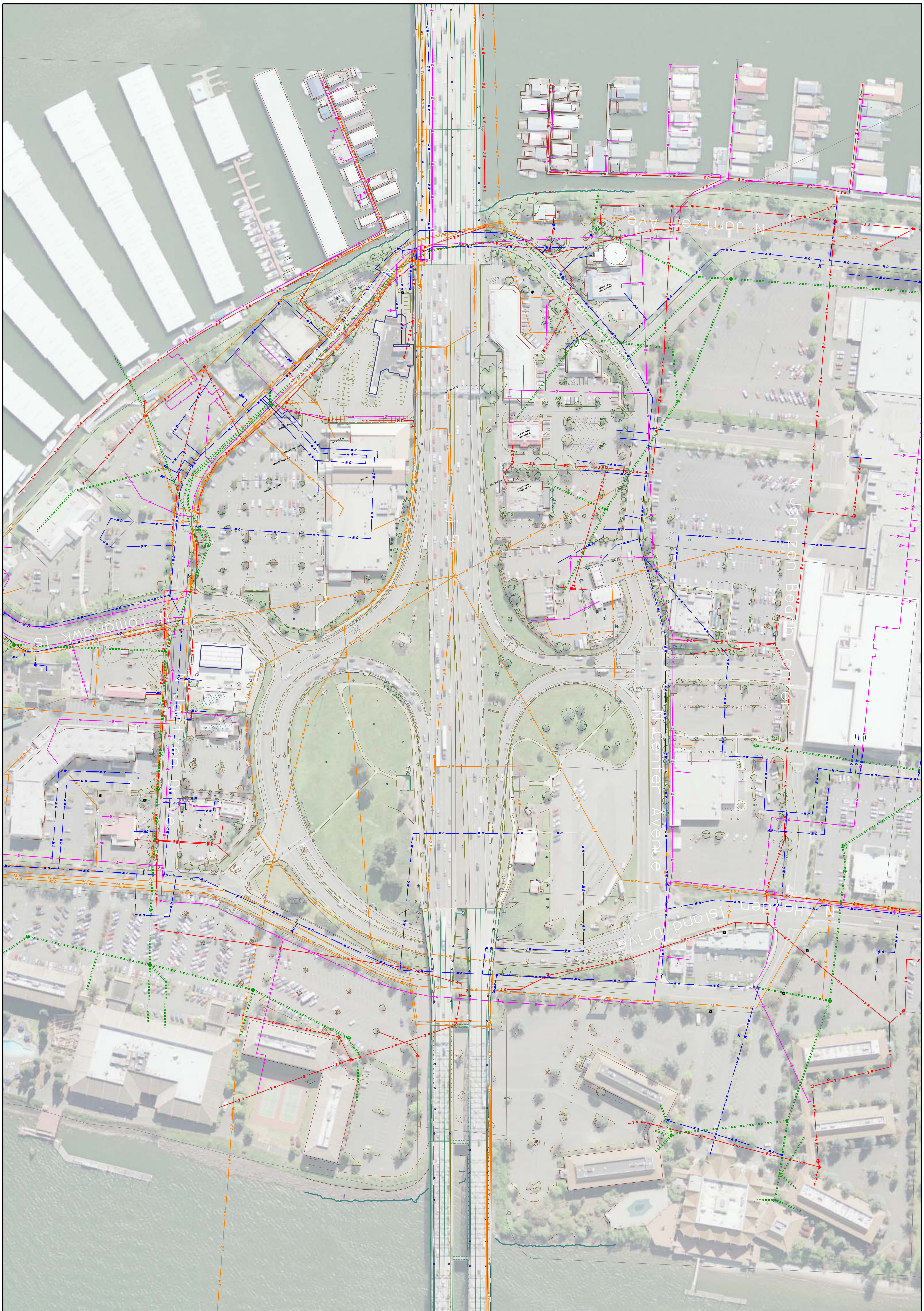

Composite Utility Plans (Sheet 4 of 14)

Note:
See sheet 1 for Key Map, Notes and Legend

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Composite Utility Plans (Sheet 5 of 14)

Note:
See sheet 1 for Key Map, Notes and Legend

Columbia River
CROSSING

Composite Utility Plans (Sheet 6 of 14)

Note:
See sheet 1 for Key Map, Notes and Legend

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Note:
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Composite Utility Plans (Sheet 8 of 14)

Note:
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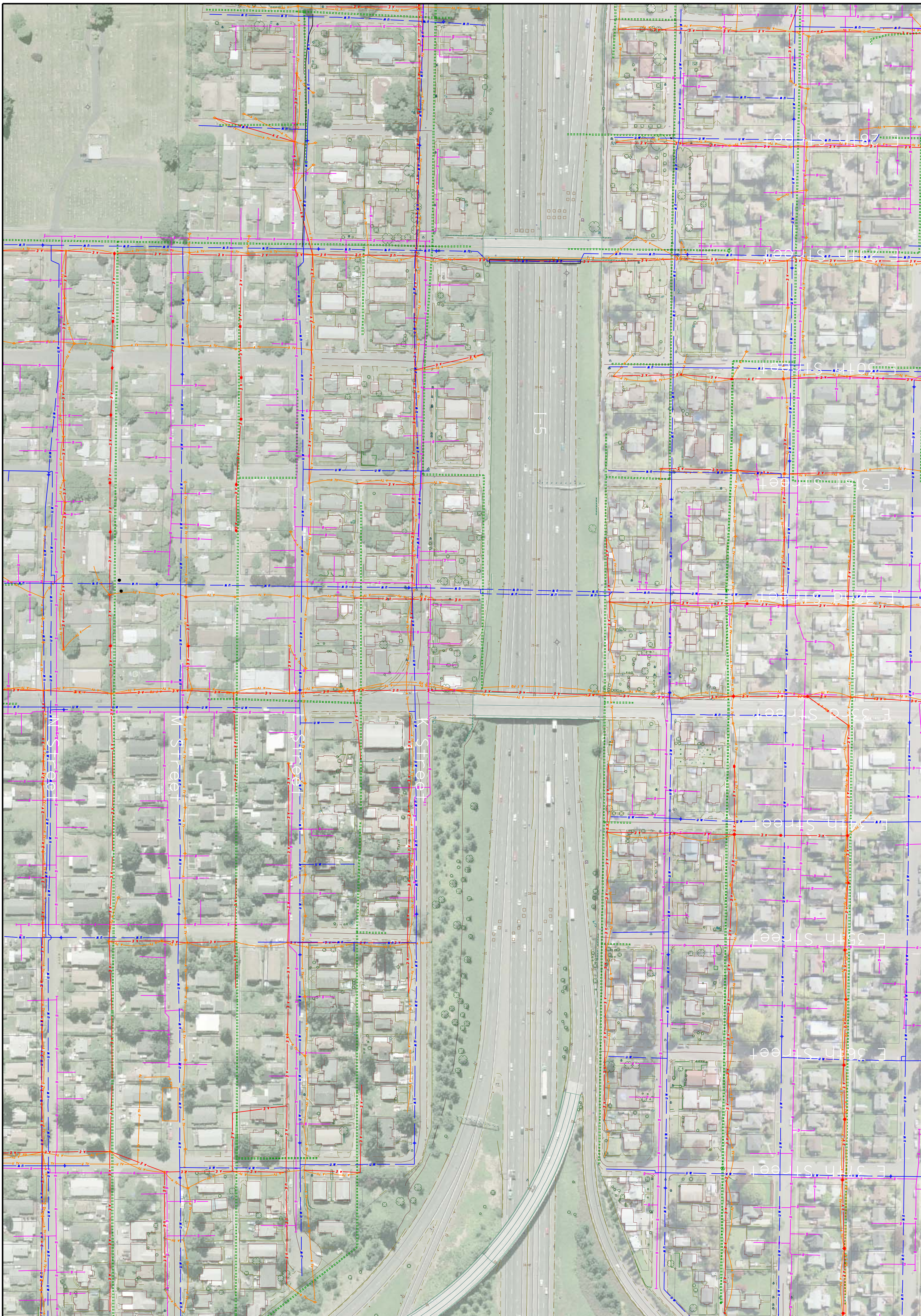

Composite Utility Plans (Sheet 9 of 14)

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Note:
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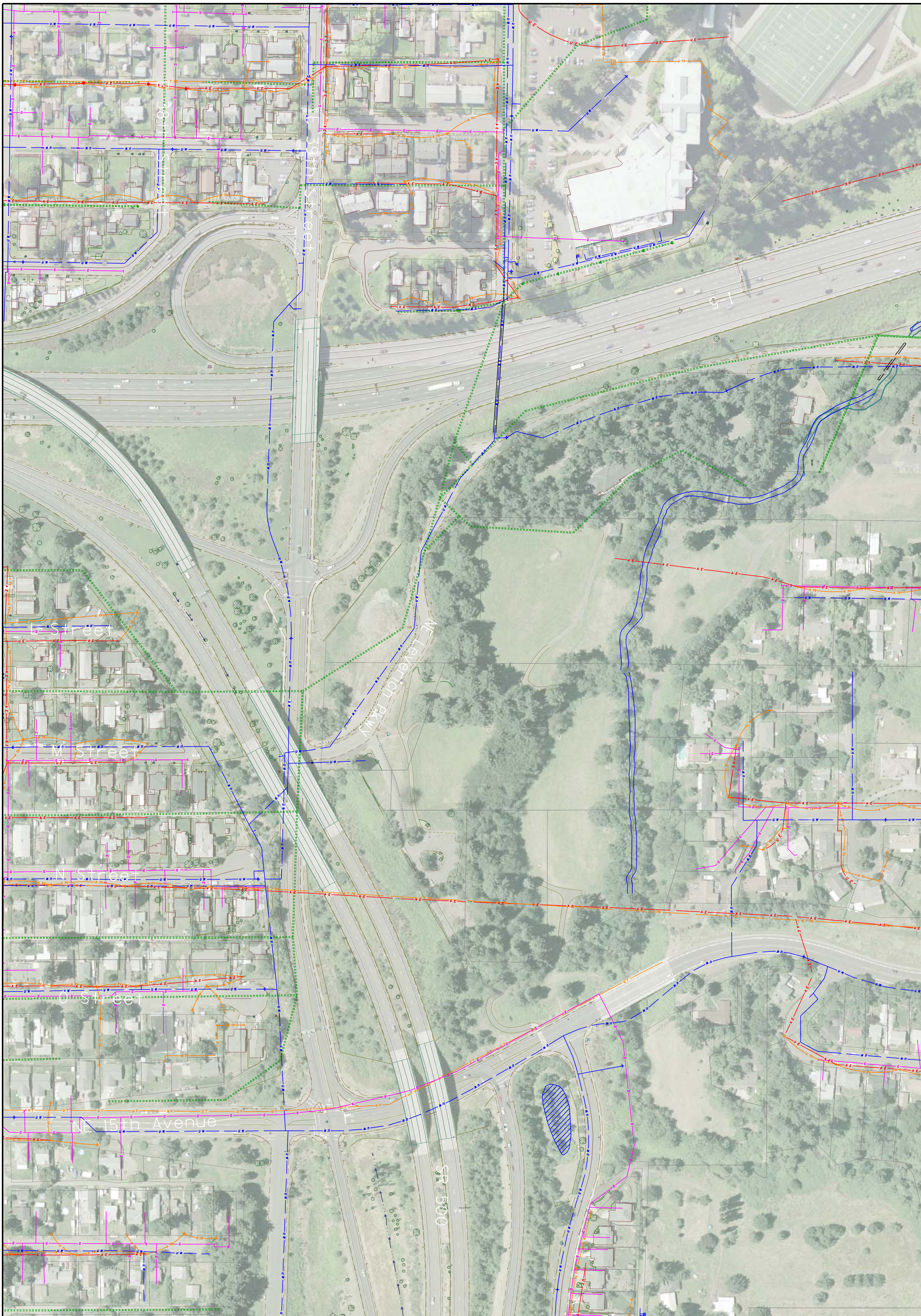

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Composite Utility Plans (Sheet 10 of 14)

Note:
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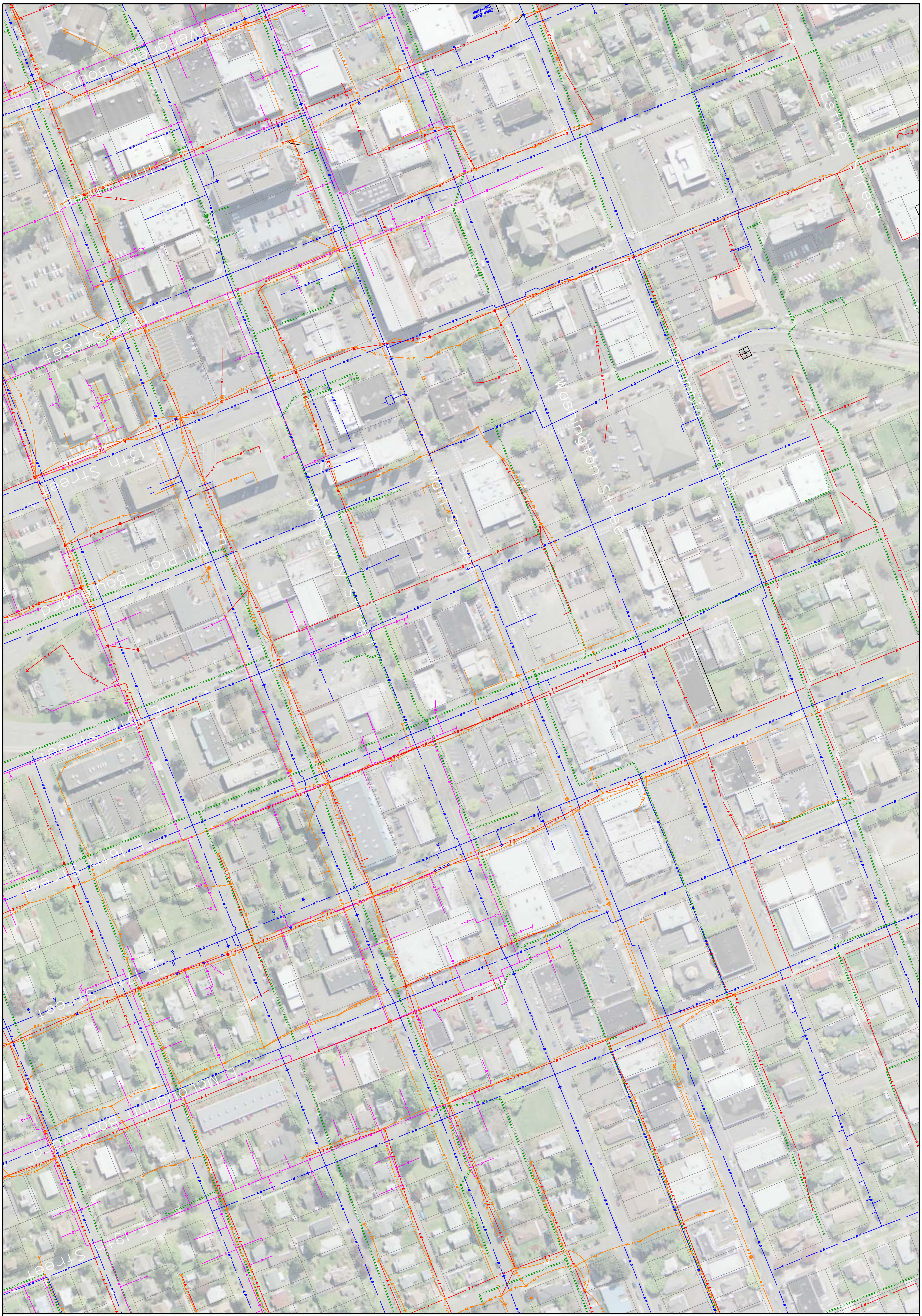

Composite Utility Plans (Sheet 11 of 14)

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Note:
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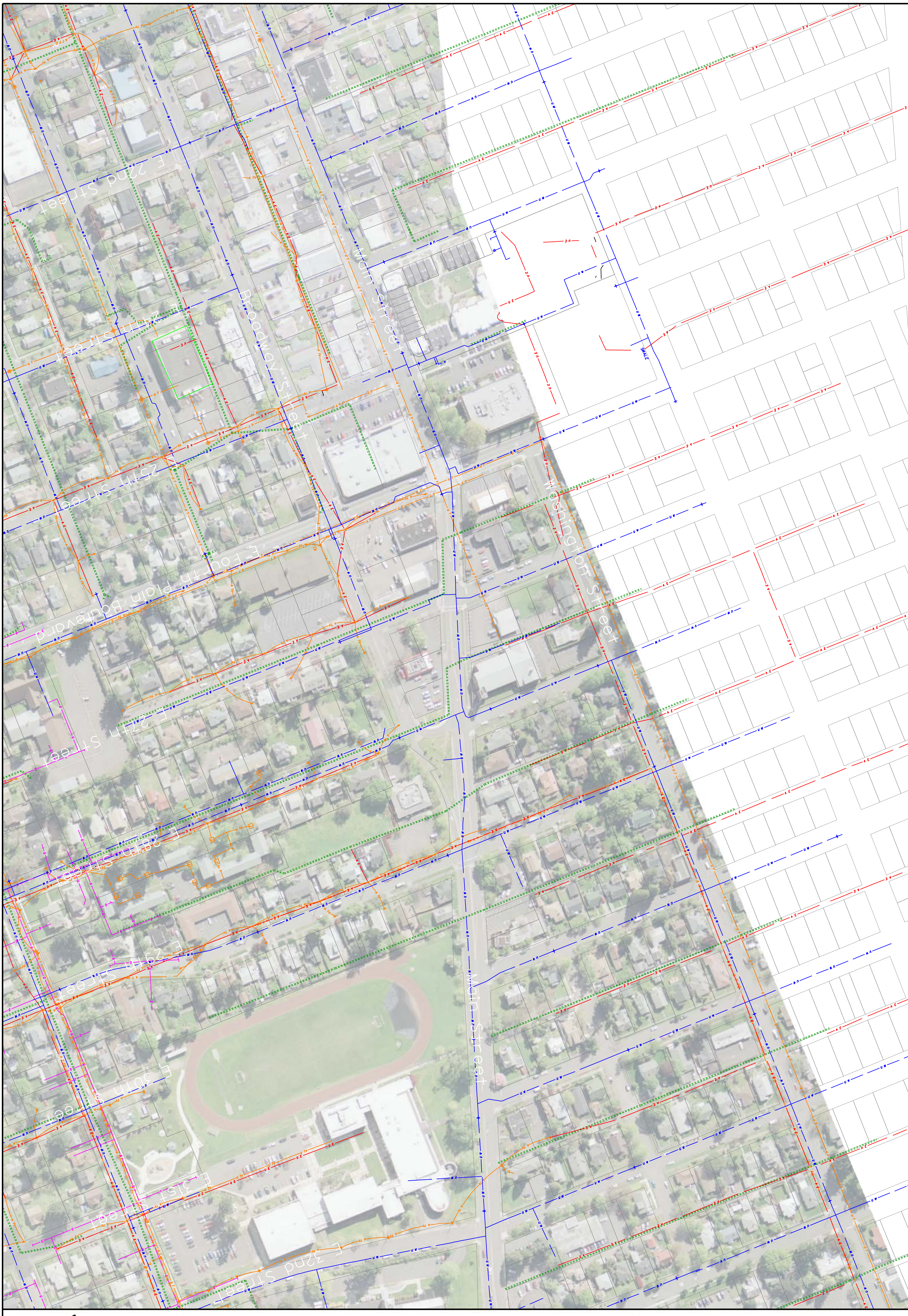
Columbia River CROSSING



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Composite Utility Plans (Sheet 12 of 14)

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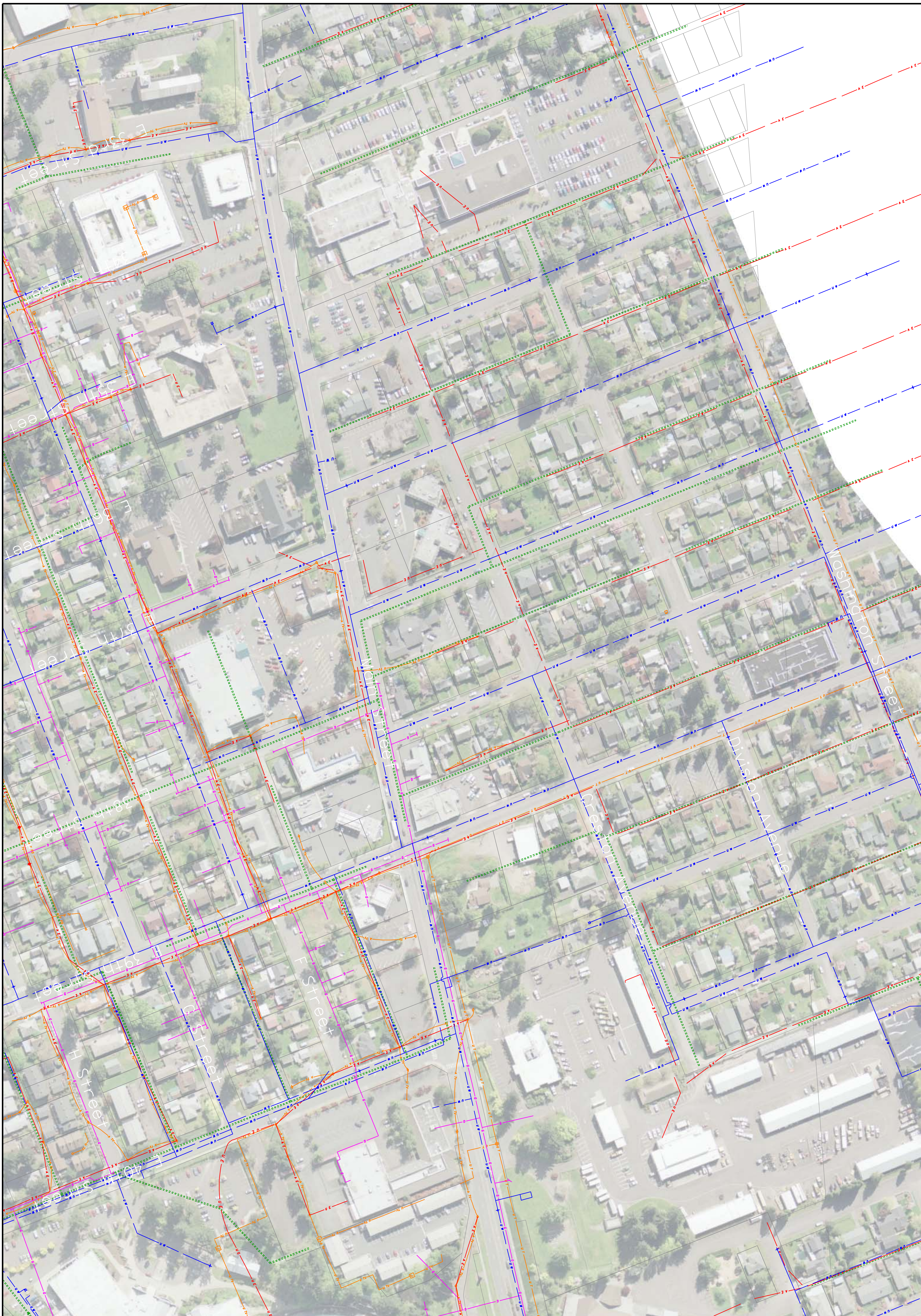

Composite Utility Plans (Sheet 13 of 14)

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Feet

Note:
See sheet 1 for Key Map, Notes and Legend

Columbia River CROSSING

Composite Utility Plans (Sheet 14 of 14)

Note:
See sheet 1 for Key Map, Notes and Legend

Columbia River CROSSING

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