

FINAL



Utilities Technical Report

I-5 Rose Quarter Improvement Project

Oregon Department of Transportation

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I-5 ROSE QUARTER
IMPROVEMENT PROJECT



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¹ Appendix E includes written descriptions of all figures referenced in this Technical Report. If needed, additional figure interpretation is available from the ODOT Senior Environmental Project Manager at (503) 731-4804.

Acronyms and Abbreviations

API	Area of Potential Impact
BES	City of Portland Bureau of Environmental Services
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflow
EB	eastbound
GIS	geographic information system
GPS	global positioning system
I-5	Interstate 5
I-84	Interstate 84
I-405	Interstate 405
kV	kilovolt
MCI	Verizon National Fiber Security
mvmt	million vehicle miles traveled
NB	northbound
NEPA	National Environmental Policy Act
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
PBOT	City of Portland Bureau of Transportation
PGE	Portland General Electric
Project	I-5 Rose Quarter Improvement Project
PVC	polyvinyl chloride
PWB	City of Portland Water Bureau
ROW	right of way
SAC	Stakeholder Advisory Committee
SB	southbound
SPIS	Safety Priority Index System
UPRR	Union Pacific Railroad Company
WB	westbound
Zayo	Zayo Group

Executive Summary

The Build and No-Build Alternatives have been reviewed for effects on existing utility facilities within the Area of Potential Impact (API). Both aerial and underground facilities occur within the API. Service providers notified by the Oregon Utility Notification Center within the API include the following:

- AT&T Corporation
- CenturyLink Local
- CenturyLink National
- Comcast Cable
- Level 3 Communications
- NW Natural
- Oregon Department of Transportation Electrical
- PacifiCorp (Pacific Power)
- Portland General Electric
- Portland Bureau of Environmental Services (BES)
- Portland Bureau of Transportation
- Portland Parks and Recreation
- Portland Water Bureau
- TriMet
- Verizon National Fiber Security (MCI)
- XO Communications
- Zayo Group

Utilities occur in existing Oregon Department of Transportation (ODOT) or City of Portland right of way (ROW) and are allowed by permit. Modifications, adjustment, or relocation of the permitted utilities within ODOT's ROW as a result of the Project are not compensable. Modifications, adjustment, or relocation of permitted non-municipal utilities within City of Portland's ROW as a result of the Project are not compensable.

Prior Rights may exist for utilities within the Union Pacific Railroad ROW and utilities on private property in easements. Prior Rights do exist for the City of Portland's utilities within the City of Portland's ROW and qualifying easements. Modifications, adjustment, or relocation of utilities with Prior Rights must be compensated by the Project for their design and relocation.

Table ES-1 provides a summary of environmental consequences of the No-Build and Build Alternatives. Both above-ground and underground impacts could occur for utilities within the API. Impacts are assumed until design is sufficiently detailed to show where avoidance or protection is feasible. Utility relocation prior to and during construction may result in interruptions of service. Potential disruptions are expected to be minimal for most of the utilities, with utility providers scheduling outages when they are required. Temporary connections would likely be established before relocating the minor utility conveyances. Proper coordination and the use of standard construction procedures and techniques would minimize disturbance to system users and avoid damage or impacts to existing facilities that are deemed, during final design, to not require relocation or upgrades.

Table ES-1. Summary of Environmental Consequences

Type of Impact	No-Build Alternative	Build Alternative
Direct Impacts	<p>Direct impacts are expected where relocation of major and minor utility infrastructure is required on NE Broadway and N Williams Street associated with the improvements assumed under the No-Build Alternative. Disruptions in service may be required during relocations.</p> <p>The following utility providers could be impacted¹:</p> <ul style="list-style-type: none"> • AT&T Corporation • CenturyLink Local • Comcast Cable • Level 3 • NW Natural • PacifiCorp (Pacific Power) • Portland General Electric • Portland Bureau of Environmental Services • Portland Water Bureau • XO Communications • Zayo Group 	<p>Direct impacts would be avoided and minimized to the maximum extent practicable. Unavoidable direct impacts would be mitigated through identified Project- and utility-specific mitigation measures. Direct impacts are expected where relocation of major and minor utility infrastructure is required. Functional replacements are required for segments of utility infrastructure. Disruptions in service may be required during relocations.</p> <p>The following utility providers could be impacted¹:</p> <ul style="list-style-type: none"> • AT&T Corporation • CenturyLink Local • CenturyLink National • Comcast Cable • Level 3 Communications • NW Natural • PacifiCorp (Pacific Power) • Portland General Electric • Portland Bureau of Environmental Services • Portland Water Bureau • Verizon National Fiber Security (MCI) • XO Communications • Zayo Group



Type of Impact	No-Build Alternative	Build Alternative
Indirect Impacts	None anticipated.	Indirect impacts could include expansion of utility infrastructure; relocation for additional development; and additional expense to avoid or restore newly constructed infrastructure. The Project could indirectly impact the alignment selection of Verizon National Fiber Security's planned expansion in the Project Area.
Cumulative Effects	None anticipated.	Similar direct impacts are expected to utilities from reasonably foreseeable future actions; however, impacts to major utilities are not anticipated. The incremental cumulative impact of the Build Alternative on existing utilities and other utilities likely to be installed within the API prior to Project construction could be extensive compared to the impacts on these utilities from the actions of others during the life of the Project. The contribution of the Project to cumulative impacts would be minimized through Project- and utility-specific mitigation measures.
Estimated Costs ²	Compensable Facilities: \$0 Non-Compensable Facilities: \$2,506,500	Compensable Facilities: \$27,542,850 ³ Non-Compensable Facilities: \$15,347,300

Notes: API = Area of Potential Impact

¹The affected environment and environmental consequences for Oregon Department of Transportation Electrical, Portland Bureau of Transportation, Portland Parks and Recreation, and TriMet are not addressed in this technical report.

²Engineering and contingencies are not included and would increase the estimated costs shown.

³Includes \$18,000,000 for a 264-inch combined sanitary pipe indicated to have an easement and \$1,097,600 for a combined sanitary pump station and associated piping installed prior to highway construction. However, these utilities are not viable to relocate without direct impact.

Potential disruptions for major utility infrastructure would be more disruptive and temporary connections more difficult and costly to establish due to the conveyance volumes involved. If service disruptions were to occur to major utilities, large areas could be affected, thus mitigation measures should be implemented to avoid or minimize impacts to these facilities. In particular, the Project should avoid impacts to the City of Portland BES combined sewer overflow system, sanitary pump station, and pump station piping, all of which, according to BES, would be infeasible to relocate or allow disruptions in service.

The Estimated Costs shown in Table ES-1 represent an approximated cost for relocating and adjusting utility facilities as a direct impact. The costs use assumed relocation unit costs and do not include engineering or contingencies. Although a cost has been included for direct impacts to the facilities, relocation may not always be a viable option. The estimated costs therefore represent a preliminary budgetary

amount for additional measures that may be required for the Project to avoid direct impacts and protect existing utilities.

In summary, without mitigation the Build Alternative would likely result in direct impacts to existing utilities. However, by incorporating design and engineering controls, including Project- and utility-specific avoidance, minimization, and mitigation measures, the geographic extent and duration of impacts would be reduced and significant impacts on utilities would be avoided.

1 Introduction

1.1 Project Location

The I-5 Rose Quarter Improvement Project (Project) is located in Portland, Oregon, along the 1.7-mile segment of Interstate 5 (I-5) between Interstate 405 (I-405) to the north (milepost 303.2) and Interstate 84 (I-84) to the south (milepost 301.5). The Project also includes the interchange of I-5 and N Broadway and NE Weidler Street (Broadway/Weidler interchange) and the surrounding transportation network, from approximately N/NE Hancock Street to the north, N Benton Avenue to the west, N/NE Multnomah Street to the south, and NE 2nd Avenue to the east.

Figure 1 illustrates the Project Area in which the proposed improvements are located. The Project Area represents the estimated area within which improvements are proposed, including where permanent modifications to adjacent parcels may occur and where potential temporary impacts from construction activities could result.

1.2 Project Purpose

The purpose of the Project is to improve the safety and operations on I-5 between I-405 and I-84, of the Broadway/Weidler interchange, and on adjacent surface streets in the vicinity of the Broadway/Weidler interchange and to enhance multimodal facilities in the Project Area.

In achieving the purpose, the Project would also support improved local connectivity and multimodal access in the vicinity of the Broadway/Weidler interchange and improve multimodal connections between neighborhoods located east and west of I-5.

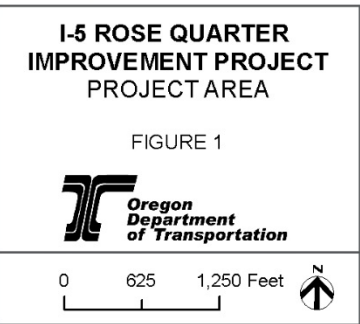
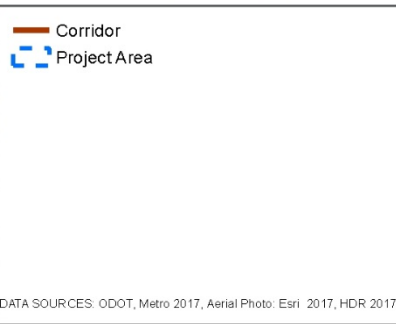
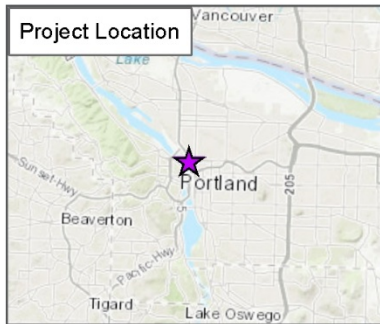
1.3 Project Need

The Project would address the following primary needs:

- **I-5 Safety:** I-5 between I-405 and I-84 has the highest crash rate on urban interstates in Oregon. Crash data from 2011 to 2015 indicate that I-5 between I-84 and the merge point from the N Broadway ramp on to I-5 had a crash rate (for all types of crashes²) that was approximately 3.5 times higher than the statewide average for comparable urban interstate facilities (ODOT 2015a).

² Motor vehicle crashes are reported and classified by whether they involve property damage, injury, or death.

Figure 1. Project Area



- Seventy-five percent of crashes occurred on southbound (SB) I-5, and 79 percent of all the crashes were rear-end collisions. Crashes during this 5-year period included one fatality, which was a pedestrian fatality. A total of seven crashes resulted in serious injury.
- The Safety Priority Index System (SPIS) is the systematic scoring method used by the Oregon Department of Transportation (ODOT) for identifying potential safety problems on state highways based on the frequency, rate, and severity of crashes (ODOT 2015b). The 2015 SPIS shows two SB sites in the top 5 percent and two northbound (NB) sites in the top 10 percent of the SPIS list.
- The 2015 crash rate on the I-5 segment between I-84 and the Broadway ramp on to I-5 is 2.70 crashes per million vehicle miles. The statewide average for comparable urban highway facilities is 0.77 crashes per million vehicle miles travelled (mvmt).
- The existing short weaving distances and lack of shoulders for accident/incident recovery in this segment of I-5 are physical factors that may contribute to the high number of crashes and safety problems.
- **I-5 Operations:** The Project Area is at the crossroads of three regionally significant freight and commuter routes: I-5, I-84, and I-405. As a result, I-5 in the vicinity of the Broadway/Weidler interchange experiences some of the highest traffic volumes in the State of Oregon, carrying approximately 121,400 vehicles each day (ODOT 2017), and experiences 12 hours of congestion each day (ODOT 2012a). The following factors affect I-5 operations:
 - Close spacing of multiple interchange ramps results in short weaving segments where traffic merging on and off I-5 has limited space to complete movements, thus becoming congested. There are five on-ramps (two NB and three SB) and six off-ramps (three NB and three SB) in this short stretch of highway. Weaving segments on I-5 NB between the I-84 westbound (WB) on-ramp and the NE Weidler off-ramp, and on I-5 SB between the N Wheeler Avenue on-ramp and I-84 eastbound (EB) off-ramp, currently perform at a failing level-of-service during the morning and afternoon peak periods.
 - The high crash rate within the Project Area can periodically contribute to congestion on this segment of the highway. As noted with respect to safety, the absence of shoulders on I-5 contributes to congestion because vehicles involved in crashes cannot get out of the travel lanes.
 - Future (2045) traffic estimates indicate that the I-5 SB section between the N Wheeler on-ramp and EB I-84 off-ramp is projected to have the most critical congestion in the Project Area, with capacity and geometric constraints that result in severe queuing.
- **Broadway/Weidler Interchange Operations:** The complexity and congestion at the I-5 Broadway/Weidler interchange configuration is difficult to navigate for vehicles (including transit vehicles), bicyclists, and pedestrians, which impacts

access to and from I-5 as well as to and from local streets. The high volumes of traffic on I-5 and Broadway/Weidler in this area contribute to congestion and safety issues (for all modes) at the interchange ramps, the Broadway and Weidler overcrossings of I-5, and on local streets in the vicinity of the interchange.

- The Broadway/Weidler couplet provides east-west connectivity for multiple modes throughout the Project Area, including automobiles, freight, people walking and biking, and Portland Streetcar and TriMet buses. The highest volumes of vehicle traffic on the local street network in the Project Area occur on NE Broadway and NE Weidler in the vicinity of I-5. The N Vancouver Avenue/N Williams couplet, which forms a critical north-south link and is a Major City Bikeway within the Project Area with over 5,000 bicycle users during the peak season, crosses Broadway/Weidler in the immediate vicinity of the I-5 interchange.
- The entire length of N/NE Broadway is included in the Portland High Crash Network—streets designated by the City of Portland for the high number of deadly crashes involving pedestrians, bicyclists, and vehicles.³
- The SB on-ramp from N Wheeler and SB off-ramp to N Broadway experienced a relatively high number of crashes per mile (50-70 crashes per mile) compared to other ramps in the Project Area during years 2011-2015. Most collisions on these ramps were rear-end collisions.
- Of all I-5 highway segments in the corridor, those that included weaving maneuvers to/from the Broadway/Weidler ramps tend to experience the highest crash rates:
 - SB I-5 between the on-ramp from N Wheeler and the off-ramp to I-84 (SB-S5) has the highest crash rate (15.71 crashes/mvmt).
 - NB I-5 between the I-84 on-ramp and off-ramp to NE Weidler (NB-S5) has the second highest crash rate (5.66 crashes/mvmt).
 - SB I-5 between the on-ramp from I-405 and the off-ramp to NE Broadway (SB-S3) has the third highest crash rate (4.94 crashes/mvmt).
- **Travel Reliability on the Transportation Network:** Travel reliability on the transportation network decreases as congestion increases and safety issues expand. The most unreliable travel times tend to occur at the end of congested areas and on the shoulders of the peak periods. Due to these problems, reliability has decreased on I-5 between I-84 and I-405 for most of the day. Periods of congested conditions on I-5 in the Project Area have grown over time from morning and afternoon peak periods to longer periods throughout the day.

³ Information on the City of Portland's High Crash Network is available at <https://www.portlandoregon.gov/transportation/54892>.

1.4 Project Goals and Objectives

In addition to the purpose and need, which focus on the state's transportation system, the Project includes related goals and objectives developed through the joint ODOT and City of Portland N/NE Quadrant and I-5 Broadway/Weidler Interchange Plan process, which included extensive coordination with other public agencies and citizen outreach. The following goals and objectives may be carried forward beyond the National Environmental Policy Act (NEPA) process to help guide final design and construction of the Project:

- Enhance pedestrian and bicycle safety and mobility in the vicinity of the Broadway/Weidler interchange.
- Address congestion and improve safety for all modes on the transportation network connected to the Broadway/Weidler interchange and I-5 crossings.
- Support and integrate the land use and urban design elements of the Adopted N/NE Quadrant Plan (City of Portland et al. 2012) related to I-5 and the Broadway/Weidler interchange, which include the following:
 - Diverse mix of commercial, cultural, entertainment, industrial, recreational, and residential uses, including affordable housing
 - Infrastructure that supports economic development
 - Infrastructure for healthy, safe, and vibrant communities that respects and complements adjacent neighborhoods
 - A multimodal transportation system that addresses present and future needs, both locally and on the highway system
 - An improved local circulation system for safe access for all modes
 - Equitable access to community amenities and economic opportunities
 - Protected and enhanced cultural heritage of the area
 - Improved urban design conditions
- Improve freight reliability.
- Provide multimodal transportation facilities to support planned development in the Rose Quarter, Lower Albina, and Lloyd.
- Improve connectivity across I-5 for all modes.

2 Project Alternatives

This technical report describes the potential effects of no action (No-Build Alternative) and the proposed action (Build Alternative).

2.1 No-Build Alternative

NEPA regulations require an evaluation of the No-Build Alternative to provide a baseline for comparison with the potential impacts of the proposed action. The No-Build Alternative consists of existing conditions and any planned actions with committed funding in the Project Area.

I-5 is the primary north-south highway serving the West Coast of the United States from Mexico to Canada. At the northern portion of the Project Area, I-5 connects with I-405 and the Fremont Bridge; I-405 provides the downtown highway loop on the western edge of downtown Portland. At the southern end of the Project Area, I-5 connects with the western terminus of I-84, which is the east-west highway for the State of Oregon. Because the Project Area includes the crossroads of three regionally significant freight and commuter routes, the highway interchanges within the Project Area experience some of the highest traffic volumes found in the state (approximately 121,400 average annual daily trips). The existing lane configurations consist primarily of two through lanes (NB and SB), with one auxiliary lane between interchanges. I-5 SB between I-405 and Broadway includes two auxiliary lanes.

I-5 is part of the National Truck Network, which designates highways (including most of the Interstate Highway System) for use by large trucks. In the Portland-Vancouver area, I-5 is the most critical component of this national network because it provides access to the transcontinental rail system, deep-water shipping and barge traffic on the Columbia River, and connections to the ports of Vancouver and Portland, as well as to most of the area's freight consolidation facilities and distribution terminals. Congestion on I-5 throughout the Project Area delays the movement of freight both within the Portland metropolitan area and on the I-5 corridor. I-5 through the Rose Quarter is ranked as one of the 50 worst freight bottlenecks in the United States (ATRI 2017).

Within the approximately 1.5 miles that I-5 runs through the Project Area, I-5 NB connects with five on- and off-ramps, and I-5 SB connects with six on- and off-ramps. Drivers entering and exiting I-5 at these closely spaced intervals, coupled with high traffic volumes, slow traffic and increase the potential for crashes. Table 1 presents the I-5 on- and off-ramps in the Project Area. Table 2 shows distances of the weaving areas between the on- and off-ramps on I-5 in the Project Area. Each of the distances noted for these weave transitions is less than adequate per current highway design standards (ODOT 2012b). In the shortest weave section, only 1,075 feet is available for drivers to merge onto I-5 from NE Broadway NB in the same area where drivers are exiting from I-5 onto I-405 and the Fremont Bridge.



Table 1. I-5 Ramps in the Project Area

I-5 Travel Direction	On-Ramps From	Off-Ramps To
Northbound	<ul style="list-style-type: none"> I-84 N Broadway/N Williams Avenue 	<ul style="list-style-type: none"> NE Weidler Street/NE Victoria Avenue I-405 N Greeley Avenue
Southbound	<ul style="list-style-type: none"> N Greeley Avenue I-405 N Wheeler Avenue/N Ramsay Way 	<ul style="list-style-type: none"> N Broadway/N Vancouver Avenue I-84 Morrison Bridge/Highway 99E

Notes: I = Interstate

Table 2. Weave Distances within the Project Area

I-5 Travel Direction	Weave Section	Weave Distance
Northbound	I-84 to NE Weidler Street/NE Victoria Avenue	1,360 feet
Northbound	N Broadway/N Williams Avenue to I-405	1,075 feet
Southbound	I-405 to N Broadway	2,060 feet
Southbound	N Wheeler Avenue/N Ramsay Way to I-84	1,300 feet

Notes: I = Interstate

As described in Section 1.3, the high volumes, closely spaced interchanges, and weaving movements result in operational and safety issues, which are compounded by the lack of standard highway shoulders on I-5 throughout much of the Project Area.

Under the No-Build Alternative, I-5 and the Broadway/Weidler interchange and most of the local transportation network in the Project Area would remain in its current configuration, with the exception of those actions included in the Metro 2014 *Regional Transportation Plan* financially constrained project list (Metro 2014).⁴ One of these actions includes improvements to the local street network on the Broadway/Weidler corridor within the Project Area. The proposed improvements include changes to N/NE Broadway and N/NE Weidler from the Broadway Bridge to NE 7th Avenue. The current design concept would remove and reallocate one travel lane on both N/NE Broadway and N/NE Weidler to establish protected bike lanes and reduce pedestrian crossing distances. Proposed improvements also include

⁴ Metro Regional Transportation Plan ID 11646. Available at: https://www.oregonmetro.gov/sites/default/files/Appendix%201.1%20Final%202014%20RTP%20%20Project%20List%208.5x11%20for%20webpage_1.xls

changes to turn lanes and transitions to minimize pedestrian exposure and improve safety. The improvements are expected to enhance safety for people walking, bicycling, and driving through the Project Area. Implementation is expected in 2018-2027.

2.2 Build Alternative

The Project alternatives development process was completed during the ODOT and City of Portland 2010-2012 N/NE Quadrant and I-5 Broadway/Weidler Interchange planning process. A series of concept alternatives were considered following the definition of Project purpose and need and consideration of a range of transportation-related problems and issues that the Project is intended to address.

In conjunction with the Stakeholder Advisory Committee (SAC) and the public during this multi-year process, ODOT and the City of Portland studied more than 70 design concepts, including the Build Alternative, via public design workshops and extensive agency and stakeholder input. Existing conditions, issues, opportunities, and constraints were reviewed for the highway and the local transportation network. A total of 19 full SAC meetings and 13 subcommittee meetings were held; each was open to the public and provided opportunity for public comment. Another 10 public events were held, with over 100 attendees at the Project open houses providing input on the design process. Of the 70 design concepts, 13 concepts advanced for further study based on SAC, agency, and public input, with six concepts passing into final consideration.

One recommended design concept, the Build Alternative, was selected for development as a result of the final screening and evaluation process. The final I-5 Broadway/Weidler Facility Plan (ODOT 2012a) and recommended design concept, herein referred to as the Build Alternative, were supported by the SAC and unanimously adopted in 2012 by the Oregon Transportation Commission and the Portland City Council.⁵ The features of the Build Alternative are described below.

The Build Alternative includes I-5 mainline improvements and multimodal improvements to the surface street network in the vicinity of the Broadway/Weidler interchange. The proposed I-5 mainline improvements include the construction of auxiliary lanes (also referred to as ramp-to-ramp lanes) and full shoulders between I-84 to the south and I-405 to the north, in both the NB and SB directions. See Section 2.2.1 for more detail.

Construction of the I-5 mainline improvements would require the rebuilding of the N/NE Weidler, N/NE Broadway, N Williams, and N Vancouver structures over I-5.

⁵ Resolution No. 36972, adopted by City Council October 25, 2012. Available at: <https://www.portlandoregon.gov/citycode/article/422365>

With the Build Alternative, the existing N/NE Weidler, N/NE Broadway, and N Williams overcrossings would be removed and rebuilt as a single highway cover structure over I-5 (see Section 2.2.2). The existing N Vancouver structure would be removed and rebuilt as a second highway cover, including a new roadway crossing connection N/NE Hancock and N Dixon Streets. The existing N Flint Avenue structure over I-5 would be removed. The I-5 SB on-ramp at N Wheeler would also be relocated to N/NE Weidler at N Williams, via the new Weidler/Broadway/Williams highway cover. A new bicycle and pedestrian bridge over I-5 would be constructed at NE Clackamas Street, connecting Lloyd with the Rose Quarter (see Section 2.2.4.3).

Surface street improvements are also proposed, including upgrades to existing bicycle and pedestrian facilities and a new center-median bicycle and pedestrian path on N Williams between N/NE Weidler and N/NE Broadway (see Section 2.2.4.4).

2.2.1 I-5 Mainline Improvements

The Build Alternative would modify I-5 between I-84 and I-405 by adding safety and operational improvements. The Build Alternative would extend the existing auxiliary lanes approximately 4,300 feet in both NB and SB directions and add 12-foot shoulders (both inside and outside) in both directions in the areas where the auxiliary lane would be extended. Figure 2 illustrates the location of the proposed auxiliary lanes. Figure 3 illustrates the auxiliary lane configuration, showing the proposed improvements in relation to the existing conditions. Figure 4 provides a cross section comparison of existing and proposed conditions, including the location of through lanes, auxiliary lanes, and highway shoulders.

A new NB auxiliary lane would be added to connect the I-84 WB on-ramp to the N Greeley off-ramp. The existing auxiliary lane on I-5 NB from the I-84 WB on-ramp to the NE Weidler off-ramp and from the N Broadway on-ramp to the I-405 off-ramp would remain.

The new SB auxiliary lane would extend the existing auxiliary lane that enters I-5 SB from the N Greeley on-ramp. The existing SB auxiliary lane currently ends just south of the N Broadway off-ramp, in the vicinity of the Broadway overcrossing structure.

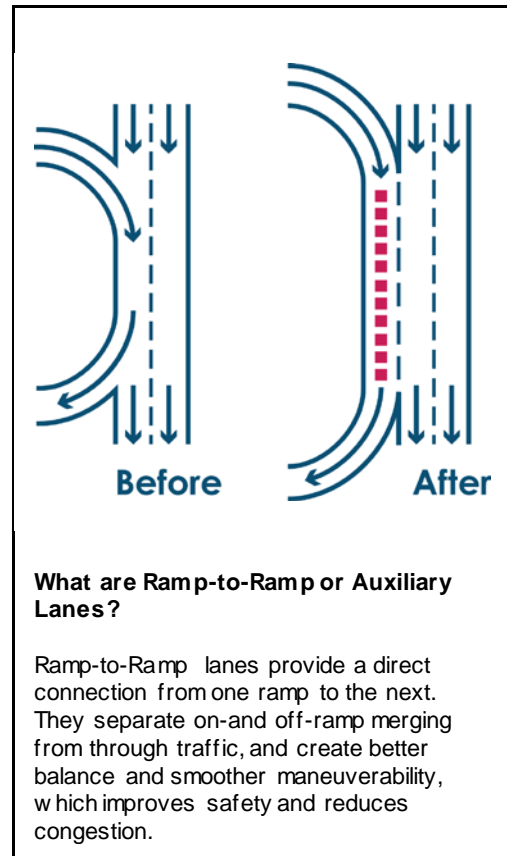


Figure 2. Auxiliary Lane/Shoulder Improvements

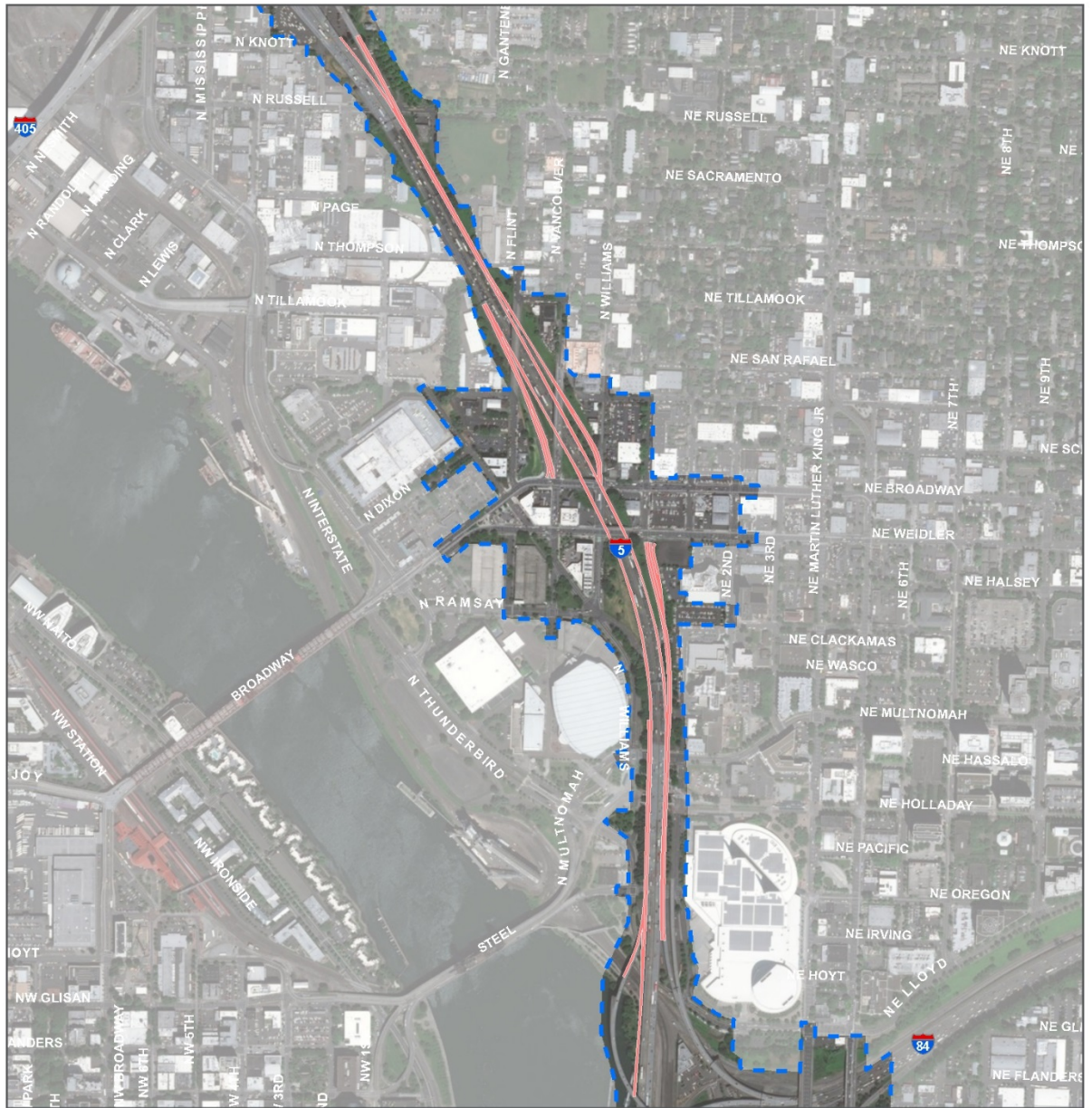


Figure 3. I-5 Auxiliary (Ramp-to-Ramp) Lanes – Existing Conditions and Proposed Improvements

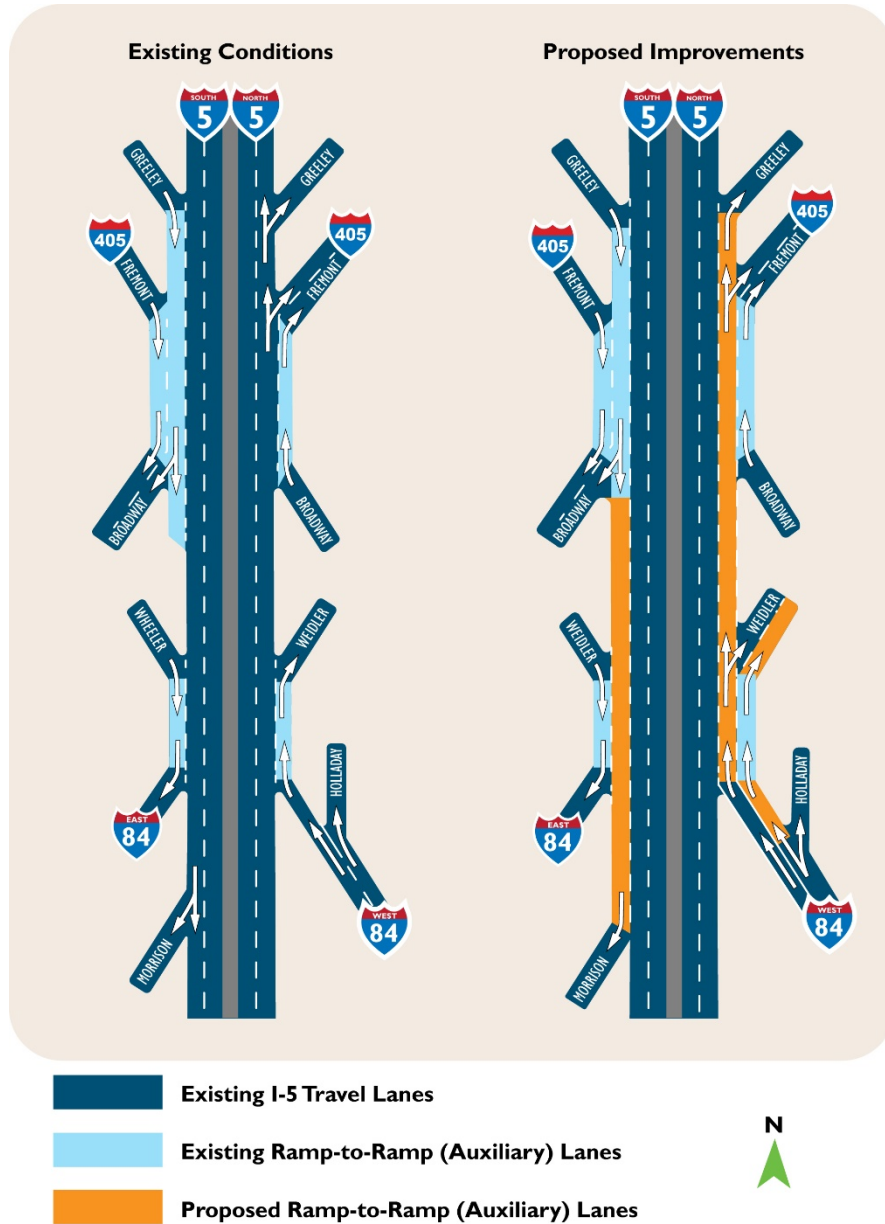
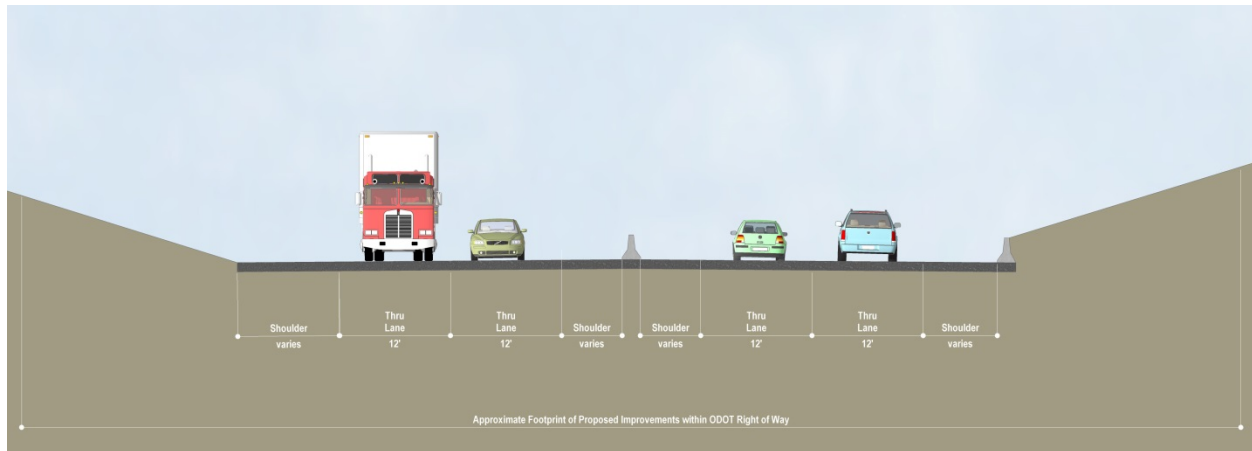
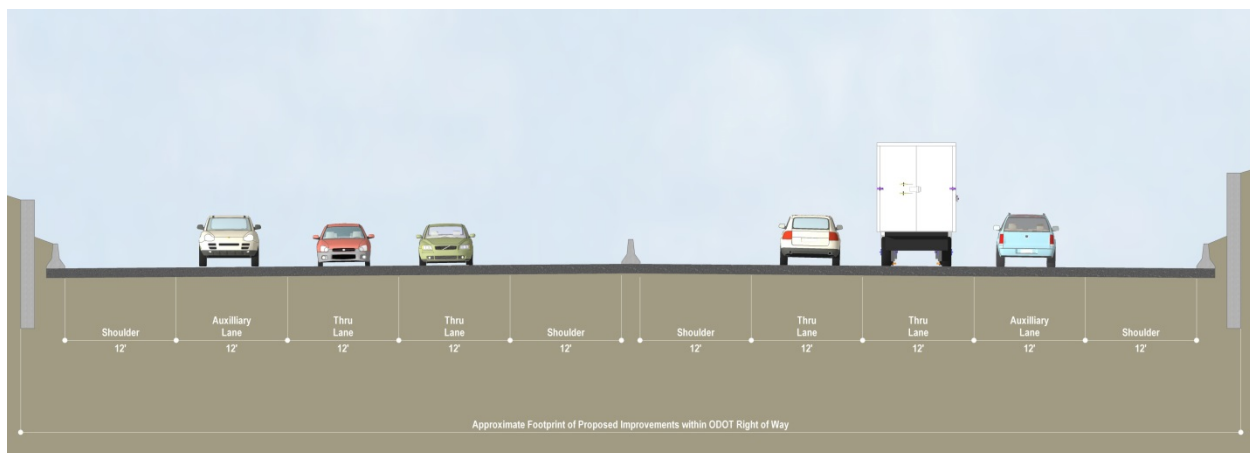


Figure 4. I-5 Cross Section (N/NE Weidler Overcrossing) – Existing Conditions and Proposed Improvements



Existing Lane Configuration



Proposed Lane Configuration

Under the Build Alternative, the SB auxiliary lane would be extended as a continuous auxiliary lane from N Greeley to the Morrison Bridge and the SE Portland/Oregon Museum of Science and Industry off-ramp. Figure 4 presents a representative cross section of I-5 (south of the N/NE Weidler overcrossing within the Broadway/Weidler interchange area), with the proposed auxiliary lanes and shoulder, to provide a comparison with the existing cross section.

The addition of 12-foot shoulders (both inside and outside) in both directions in the areas where the auxiliary lanes would be extended would provide more space to allow vehicles that are stalled or involved in a crash to move out of the travel lanes. New shoulders would also provide space for emergency response vehicles to use to access an incident within or beyond the Project Area.

No new through lanes would be added to I-5 as part of the Build Alternative; I-5 would maintain the existing two through lanes in both the NB and SB directions.

2.2.2 Highway Covers

2.2.2.1 Broadway/Weidler/Williams Highway Cover

To complete the proposed I-5 mainline improvements, the existing structures crossing over I-5 must be removed, including the roads and the columns that support the structures. The Build Alternative would remove the existing N/NE Broadway, N/NE Weidler, and N Williams structures over I-5 to accommodate the auxiliary lane extension and new shoulders described in Section 2.2.1.

The structure replacement would be in the form of the Broadway/Weidler/Williams highway cover (Figure 5). The highway cover would be a wide bridge that spans east-west across I-5, extending from immediately south of N/NE Weidler to immediately north of N/NE Broadway to accommodate passage of the Broadway/Weidler couplet. The highway cover would include design upgrades to make the structure more resilient in the event of an earthquake.

Figure 5. Broadway/Weidler/Williams and Vancouver/Hancock Highway Covers



The highway cover would connect both sides of I-5, reducing the physical barrier of I-5 between neighborhoods to the east and west of the highway while providing additional surface area above I-5. The added surface space would provide an opportunity for new and modern bicycle and pedestrian facilities and public spaces when construction is complete, making the area more connected, walkable, and bike friendly.

2.2.2.2 N Vancouver/N Hancock Highway Cover

The Build Alternative would remove and rebuild the existing N Vancouver structure over I-5 as a highway cover (Figure 5). The Vancouver/Hancock highway cover would be a concrete or steel platform that spans east-west across I-5 and to the north and south of N/NE Hancock. Like the Broadway/Weidler/Williams highway cover, this highway cover would provide additional surface area above I-5. The highway cover would provide an opportunity for public space and a new connection across I-5 for all modes of travel. A new roadway connecting neighborhoods to the east with the Lower Albina area and connecting N/NE Hancock to N Dixon would be added to the Vancouver/Hancock highway cover (see element “A” in Figure 6).

2.2.3 Broadway/Weidler Interchange Improvements

Improvements to the Broadway/Weidler interchange to address connections between I-5, the interchange, and the local street network are described in the following subsections and illustrated in Figure 6.

2.2.3.1 Relocate I-5 Southbound On-Ramp

The I-5 SB on-ramp is currently one block south of N Weidler near where N Wheeler, N Williams, and N Ramsay come together at the north end of the Moda Center. The Build Alternative would remove the N Wheeler on-ramp and relocate the I-5 SB on-ramp north to N Weidler. Figure 6 element “B” illustrates the on-ramp relocation.

2.2.3.2 Modify N Williams between Ramsay and Weidler

The Build Alternative would modify the travel circulation on N Williams between N Ramsay and N Weidler. This one-block segment of N Williams would be closed to through-travel for private motor vehicles and would only be permitted for pedestrians, bicycles, and public transit (buses) (Figures 6 and 7). Private motor vehicle and loading access to the facilities at Madrona Studios would be maintained.

2.2.3.3 Revise Traffic Flow on N Williams between Weidler and Broadway

The Build Alternative would revise the traffic flow on N Williams between N/NE Weidler and N/NE Broadway. For this one-block segment, N Williams would be converted from its current configuration as a two-lane, one-way street in the NB direction with a center NB bike lane to a reverse traffic flow two-way street with a 36-foot-wide median multi-use path for bicycles and pedestrians. These improvements are illustrated in Figures 6 and 7.

Figure 6. Broadway/Weidler Interchange Area Improvements

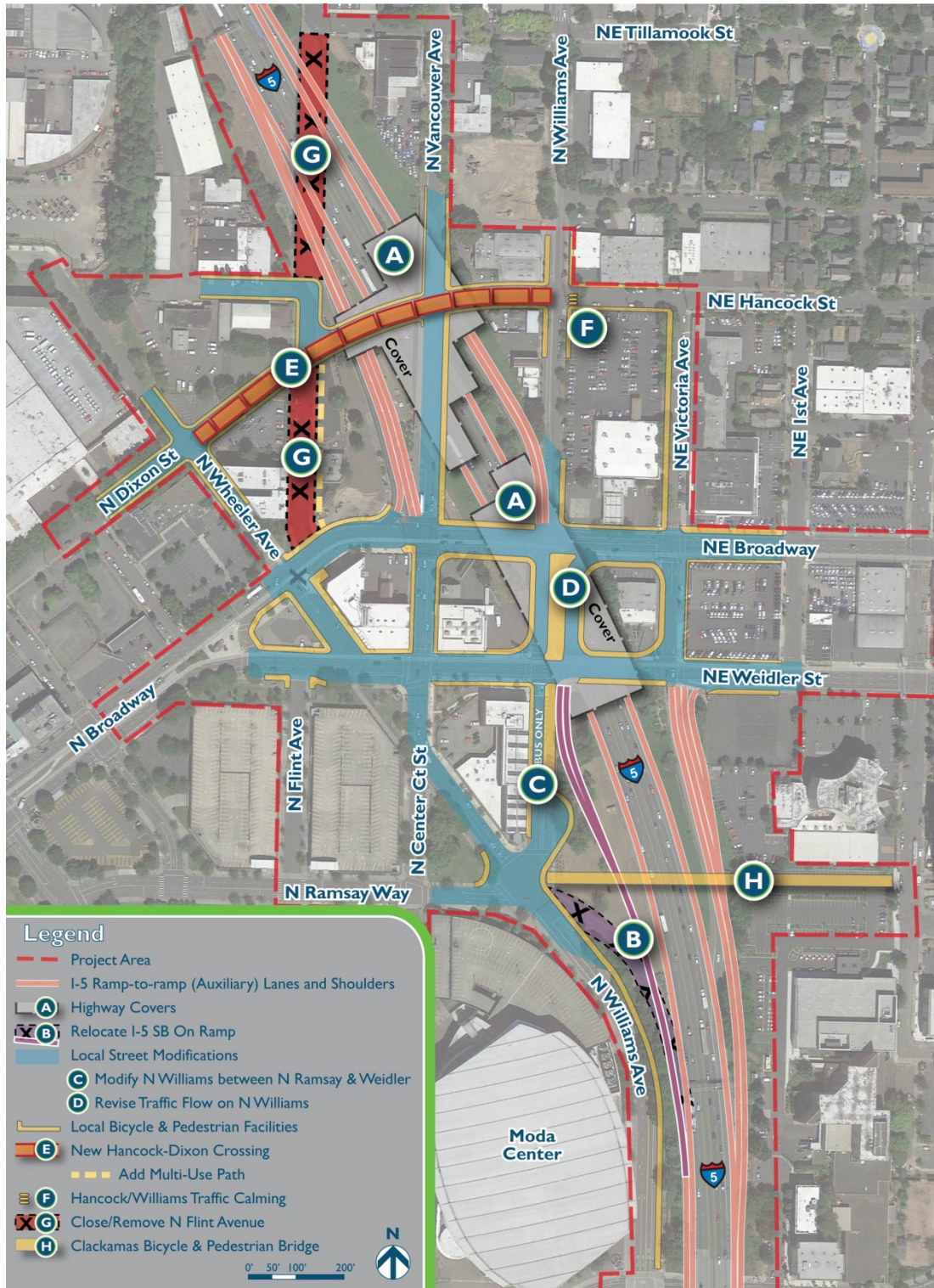


Figure 7. Conceptual Illustration of Proposed N Williams Multi-Use Path and Revised Traffic Flow



The revised N Williams configuration would be designed as follows:

- Two NB travel lanes along the western side of N Williams to provide access to the I-5 NB on-ramp, through movements NB on N Williams, and left-turn movements onto N Broadway.
- A 36-foot-wide center median with a multi-use path permitted only for bicycles and pedestrians. The median multi-use path would also include landscaping on both the east and west sides of the path.
- Two SB lanes along the eastern side of N Williams to provide access to the I-5 SB on-ramp or left-turn movements onto NE Weidler.

2.2.4 Related Local System Multimodal Improvements

2.2.4.1 New Hancock-Dixon Crossing

A new roadway crossing would be constructed to extend N/NE Hancock west across and over I-5, connecting it to N Dixon (see Figure 6, element “E”). The new crossing would be constructed on the Vancouver/Hancock highway cover and would provide a new east-west crossing over I-5. Traffic calming measures would be incorporated east of the intersection of N/NE Hancock and N Williams to discourage use of NE Hancock by through motor vehicle traffic. Bicycle and pedestrian through travel would be permitted (see Figure 6, element “F”).

2.2.4.2 Removal of N Flint South of N Tillamook and Addition of New Multi-Use Path

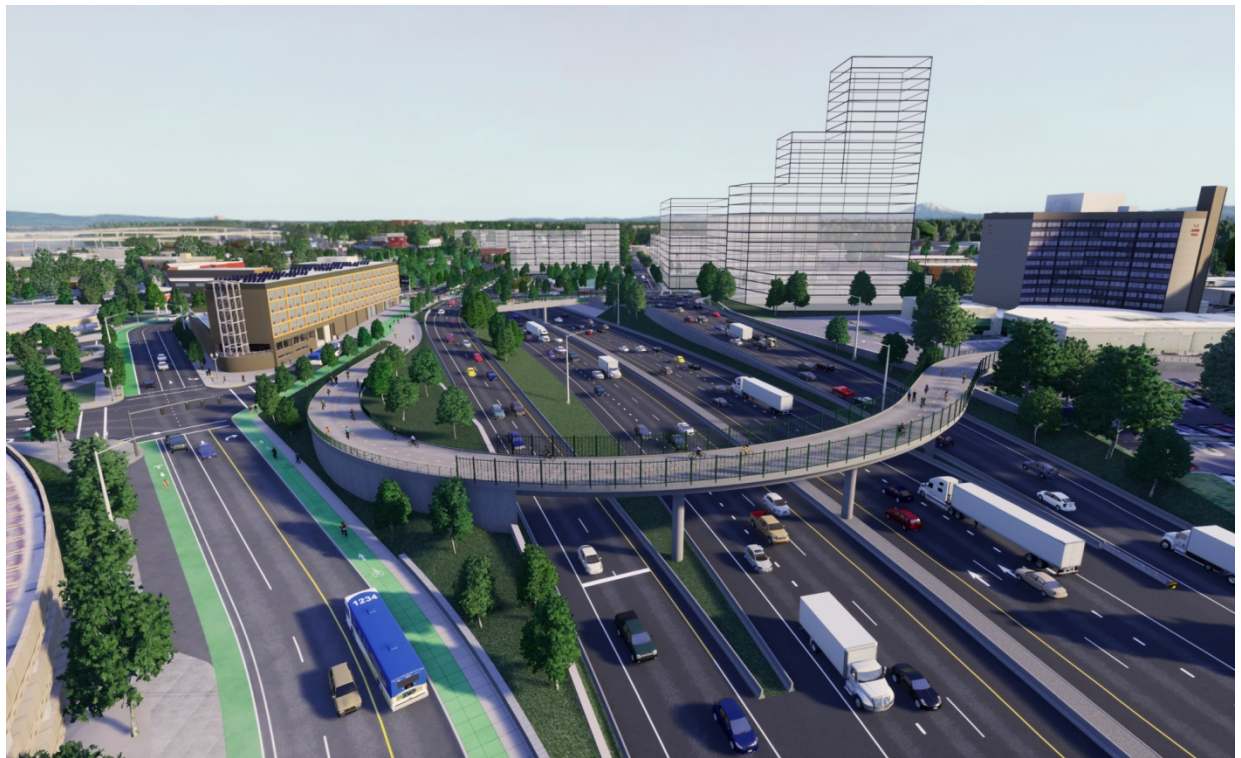
The existing N Flint structure over I-5 would be removed, and N Flint south of N Russell Street would terminate at and connect directly to N Tillamook (see Figure 6, element “G”). The portion of Flint between the existing I-5 overcrossing and Broadway would be closed as a through street for motor vehicles. Driveway access would be maintained on this portion of N Flint to maintain local access.

A new multi-use path would be added between the new Hancock-Dixon crossing and Broadway at a grade of 5 percent or less to provide an additional travel route option for people walking and biking. The new multi-use path would follow existing N Flint alignment between N Hancock and N Broadway (see Figure 6, element “G”).

2.2.4.3 Clackamas Bicycle and Pedestrian Bridge

South of N/NE Weidler, a new pedestrian- and bicycle-only bridge over I-5 would be constructed to connect NE Clackamas Street near NE 2nd Avenue to the N Williams/ N Ramsay area (see Figure 6, element “H,” and Figure 8). The Clackamas bicycle and pedestrian bridge would offer a new connection over I-5 and would provide an alternative route for people walking or riding a bike through the Broadway/Weidler interchange.

Figure 8. Clackamas Bicycle and Pedestrian Crossing



2.2.4.4 Other Local Street, Bicycle, and Pedestrian Improvements

The Build Alternative would include new widened and well-lit sidewalks, Americans with Disabilities Act-accessible ramps, high visibility and marked crosswalks, widened and improved bicycle facilities, and stormwater management on the streets connected to the Broadway/Weidler interchange.⁶

A new two-way cycle track would be implemented on N Williams between N/NE Hancock and N/NE Broadway. A two-way cycle track would allow bicycle movement in both directions and would be physically separated from motor vehicle travel lanes and sidewalks. This two-way cycle track would connect to the median multi-use path on N Williams between N/NE Broadway and N/NE Weidler.

The bicycle lane on N Vancouver would also be upgraded between N Hancock and N Broadway, including a new bicycle jug-handle at the N Vancouver and N Broadway intersection to facilitate right-turn movements for bicycles from N Vancouver to N Broadway.

Existing bicycle facilities on N/NE Broadway and N/NE Weidler within the Project Area would also be upgraded, including replacing the existing bike lanes with wider, separated bicycle lanes. New bicycle and pedestrian connections would also be made between the N Flint/N Tillamook intersection and the new Hancock-Dixon connection.

These improvements would be in addition to the new Clackamas bicycle and pedestrian bridge, upgrades to bicycle and pedestrian facilities on the new Broadway/Weidler/Williams and Vancouver/Hancock highway covers, and new median multi-use path on N Williams between N/NE Broadway and N/NE Weidler described above and illustrated in Figure 6.

⁶ Additional details on which streets are included are available at <http://i5rosequarter.org/local-street-bicycle-and-pedestrian-facilities/>

3 Regulatory Framework

Statutes, rules, and regulations set policy and procedures that govern the way ODOT's Utility Relocation Program operates. Utility facilities can be found to occupy federal, state, and local roads and streets rights of way (ROWs) throughout the State of Oregon. Location of utility facilities within the ROW is controlled by the ROW owner to protect and maintain the use and safety of the roadways.

ODOT's utility facility relocation and reimbursement policy and procedures originate with the Oregon Constitution and Oregon Revised Statute (ORS) 35.510. The ORS stipulates that the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, codified as 49 Code of Federal Regulations (CFR) 24, guides state policy and procedures. 49 CFR 24 further refers to 23 CFR 645A, which is the federal policy and procedure for relocation and reimbursement of utility facilities.

The location, access for maintenance, and relocation of utility facilities for highway improvements are regulated by federal, state, and/or local laws. The applicable laws are listed and described in Chapter 10 of Appendix A of the *ODOT Right of Way Manual* (ODOT 2016).

4 Methodology and Data Sources

4.1 Area of Potential Impact

The geographic area within which impacts to utilities were considered is referred to as the Area of Potential Impact (API). The API includes the improvement footprint and anticipated areas of construction staging for the Project's Build Alternative. The API also includes the adjacent roadways where utility relocation is likely to occur beyond the Project Area. Since temporary traffic control measures do not impact utilities, the portions of the Project Area that are not permanently improved or used for construction staging for the Build Alternative are not included in the API. Figure 9 shows the API for Utilities.

4.2 Resource Identification and Evaluation

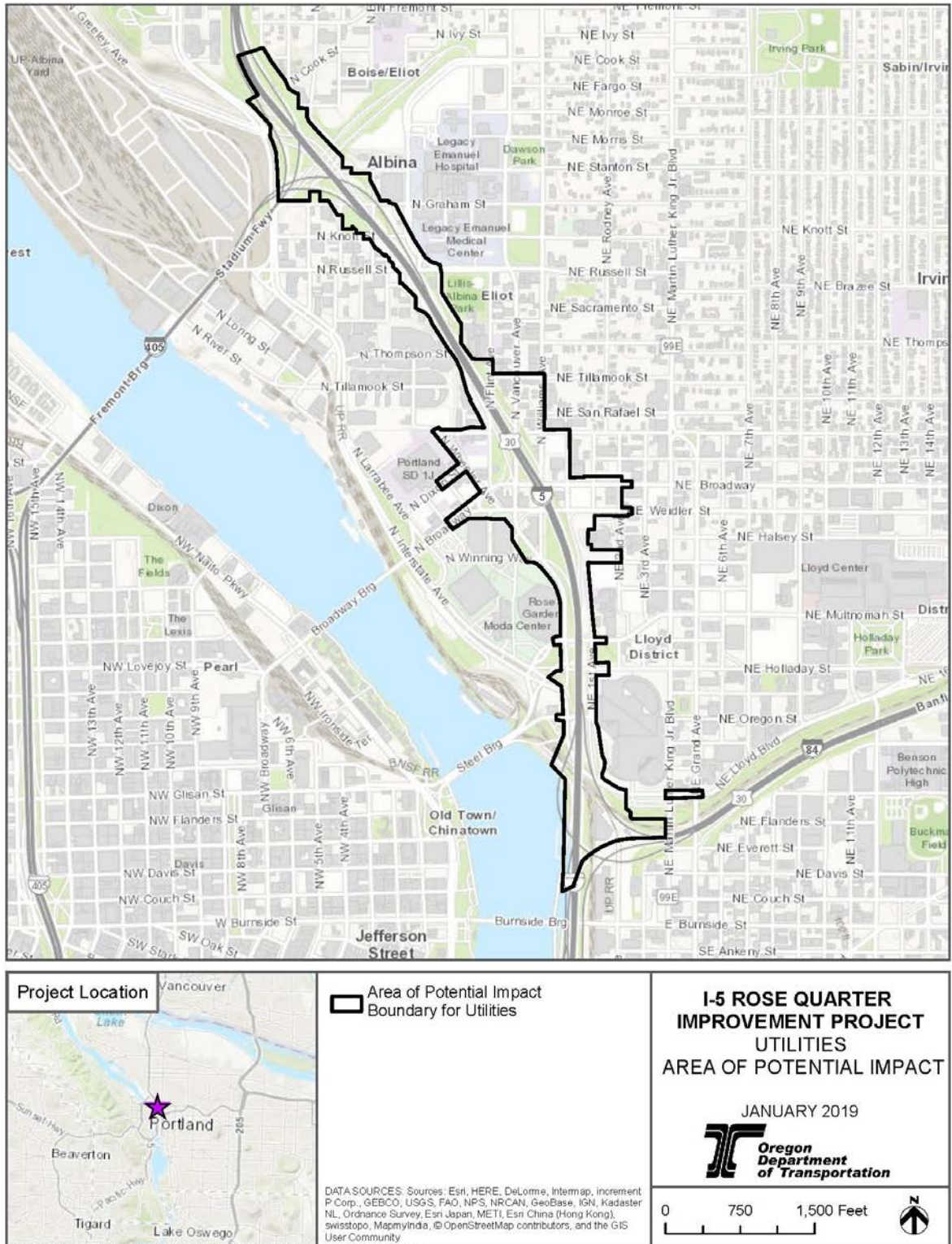
4.2.1 Data Collection

The utilities impact analysis was completed using existing information and limited field study. No subsurface investigations were conducted. Utility information was obtained through the following means:

- Contacting the Oregon Utility Notification Center (One-call, 811, 800-332-3244) and submitting a pre-design survey, "mapping-only," ticket request for the Project Area through the online ITIC program at:
<http://callbeforeyoudig.org/oregon/index.asp>.⁷
- Contacting local agencies, including the City of Portland Bureau of Environmental Services (BES) and Portland Water Bureau (PWB) to obtain existing utility information geographic information system (GIS) data.
- Contacting utility and local agency representative personnel to request information on the following:
 - Operational constraints, including staging and phasing limitations
 - Maintenance and/or maintenance access constraints
 - Maximum amount of grade change that can be accommodated
 - Whether they might request bridge attachment

⁷ Ticket 17203786 dated August 7, 2017, (Oregon Utility Notification Center 2017) and Ticket 18100320 dated April 23, 2018 (Oregon Utility Notification Center 2018)

Figure 9. Utilities Area of Potential Impact



- The ease of moving utilities
 - Required protection measures if impacts are trying to be avoided
 - Approximate durations for planning and budgeting relocations
 - Approximate duration for relocation design
 - Utility segments with prior property rights that would qualify for compensable relocation
 - Planned expansion or improvements within the Project Area, independent of the Project.
- Contacting ODOT's Region 1 District 2B Permits Specialist to obtain a list of utility "X" permits issued by ODOT for facilities with Prior Rights within the ROW. Note that X-permits are issued for utility facilities that originally occupied a portion of ODOT's ROW and where the owner had a compensable interest or a Prior Right to occupy that ROW.
 - Reviewing jurisdictional limits of roadway ROW within the Project Area for ODOT, City of Portland, and private roadways.

Data were collected through agency website access, when possible, or direct contact with utility and agency personnel. Utilities were mapped using GIS and are included in Appendix A as Utilities Figures 1-1 through 1-8.

4.2.2 Reimbursable Rights

In most cases, utilities within an existing ODOT or City of Portland ROW do not have a compensable Prior Right, and those utilities on properties proposed for acquisition could have a compensable right. For this report, a full Prior Right assessment was not completed. This report indicates whether a facility appears to be within an existing ROW and whether a utility has an existing permit from ODOT to occupy ODOT ROW. Utilities outside the ROW and those within the Union Pacific Railroad Company (UPRR) ROW are assumed to have a Prior Right for the purposes of this report.

Utility facilities that originally occupied a portion of ODOT's ROW in which the owner had a compensable interest or a Prior Right to occupy said ROW are issued a permit titled "X" Permit. No "X" Permits have been issued by ODOT within the Project Area. A summary of ODOT-issued permits included in this review is provided in Appendix B.

When a state highway is routed over city streets, relocation of city utilities is compensable. For the purposes of this report, it was assumed that City of Portland utilities located within ODOT's ROW were previously relocated by the initial highway construction, and the compensable relocation occurred at that time. Unless mapping indicated a City of Portland easement within ODOT's ROW, it was assumed that relocation would not be compensable a second time. Since this Project is not a new



state highway, a full prior rights assessment would be required to determine compensability of city utilities within ODOT's ROW.

Table 3 summarizes compensable utility reimbursement rights (Prior Rights) for ODOT projects.

Table 3. Summary of Utility Reimbursement Rights for ODOT Projects

Utility Type	City/State ROW Ownership	Compensable
NON-MUNICIPAL AND MUNICIPAL UTILITY		
With permit (OAR 734-55-045) with exception to below **	State	No
Without permit installed after highway (ORS 366.321) with exception to below **	State	No
With "X" Permit ¹ (OAR 734-55-110)	State	Yes
Without permit, prior to state highway (ORS 366.321)	State	Yes
Outside the ROW, in "Public Utility Easement" (23 CFR 645.107)	N/A	No
Outside the ROW, in utility-named easement or documentation to show a compensable property right ² (23 CFR 645.107)	N/A	Yes
Outside the ROW, not within an easement (23 CFR 645.107)	N/A	No
CITY UTILITY		
**State highway routed over City street (ORS 373.020)	State/City	Yes
City utility on City street (ORS 366.321)	City	Yes

Notes: CFR = Code of Federal Regulation; City = City of Portland; N/A = not applicable; OAR = Oregon Administrative Rules; ODOT = Oregon Department of Transportation; ORS = Oregon Revised Statute; ROW = right of way

¹The "X" Permit is a special permit issued by ODOT to utility facilities with a compensable interest or a prior right to occupy state ROW.

²Acceptable evidence is the physical document showing easements, fee title, service agreements, or Court finding of prescription or estoppels (ODOT 2016, Certification of Reimbursement Eligibility).

4.3 Assessment of Impacts

Potential impacts to the ROWs, properties, utilities, and private easements were assessed using collected data and information about the Project alternatives and construction methods. Specifically, impacts of the Project were assessed based on the following:

- Potential impacts to utility facilities requiring functional replacements
- Potential impacts to utility facilities due to required relocation, including:

- Identification of utilities with prior property rights that qualify for compensable relocation; and
- Cost estimates to relocate utilities, including estimates for relocation that is the responsibility of ODOT (compensable) and relocation that is the responsibility of the utility provider (non-compensable).
- Potential impacts to utility facilities due to maintenance access and maintenance depth constraints
- Impacts to city water and sewer facilities and major utility distribution/trunk lines
- The ease of moving or mitigating impacts to utilities

4.4 Cumulative Impacts

The cumulative impacts analysis considered the Project's impacts combined with other past, present, and reasonably foreseeable future actions that would have environmental impacts in the Project Area. A list of reasonably foreseeable future actions was developed through consultation with City of Portland and Metro staff. This list included any permitted public and private projects within the Project Area and projects that are in the permit application process. The cumulative impact assessment qualitatively assessed the magnitude of impacts expected from reasonably foreseeable future actions in combination with anticipated Project impacts. This assessment also identified the contribution of the Project to overall cumulative impacts.

5 Affected Environment

5.1 Existing Infrastructure

Existing infrastructure data were collected through agency website access, when possible, or from direct contact with assigned utility representatives, when available. No subsurface investigations were conducted. Data below include (when available) the type of utility, size, and general roadway limits of the utility's infrastructure within the vicinity of the Project Area. Data also include information that the utility's representative felt was important for the Project to consider. Utilities were mapped using GIS and are included in Appendix A as Utilities Figures 1-1 through 1-8.

Utilities are not obligated to respond during a planning phase. Some utilities wait for a project to have topographic base mapping performed before responding to requests for information, particularly in those cases where a utility owner cannot release its facility maps. The *ODOT Right of Way Manual* (ODOT 2016) requires verification of utility facility mapping to be performed during design. The manual further requires that in those cases where a utility has not released its facility maps prior to performing field survey, a copy of the topographic base map must be provided to the utility owner. The utility owner returns the base map with corrections corresponding to their facilities at that time.

5.1.1 AT&T Corporation

AT&T Corporation is identified on the Oregon Utility Notification Center ticket. AT&T Corporation's specific infrastructure and location within the Project Area is not known because, as of this writing, the company has not yet provided any mapping information.⁸ Facilities commonly include communication infrastructure.

5.1.2 CenturyLink Local

CenturyLink Local has underground and aerial communication facilities within the Project Area and one cell tower site. The cell tower site is located at the corner of NE 2nd and NE Everett, between the I-5 and I-84 interchange ramps, outside the construction limits of the Build Alternative. Listed from south to north and west to east, the CenturyLink Local facilities include the following:

- **NE Multnomah, N Hassalo Street to NE 2nd:** 4 - 4-inch polyvinyl chloride (PVC) underground ductbank
- **Broadway System:**
 - 8 - 4-inch PVC underground ductbank with communication manholes, typical
 - 12 - 4-inch steel underground ductbank under I-5, not attached to bridge

⁸ Communications were attempted in July 2017, August 2017, and November 2017. A representative is expected to be assigned during the design phase and mapping determined at that time.

- Above-ground cabinets at the intersection of N Flint and N Broadway
- N Ross Avenue: Underground facilities, size not specified, north of N Broadway
- N Wheeler: Underground facilities, size not specified, north of N Broadway to the first property on the eastern side of N Wheeler
- N Flint: Underground facilities, size not specified, north of N Broadway, terminating before N Hancock
- N Vancouver, N Broadway to N Weidler: Underground facilities, size not specified, to the first property south of N Weidler on the eastern side of N Vancouver
- NE Victoria Avenue:
 - South of NE Broadway: Underground facilities, size not specified, with riser to aerial service crossing, to the third property on the western side of NE Victoria
 - North of NE Broadway: Underground facilities, size not specified, to the third property on the western side of NE Victoria
- **Hancock System, East of I-5:**
 - Aerial facilities beginning at a property on the eastern side of N Vancouver at the northeastern quadrant of the existing N Vancouver overcrossing, continuing south along the eastern side of I-5 through private property on PacifiCorp poles, then continuing east on NE Hancock
 - N Williams, south of NE Hancock: Underground facilities, size not specified, terminating before NE Broadway
- **N Vancouver, North of I-5:** Aerial facilities, size not specified, beginning at the property on the northwestern quadrant of the existing N Vancouver bridge overcrossing and continuing north
- **N Tillamook, East of I-5:** Aerial facilities, beginning at the properties on the eastern side of N Flint and continuing east along N/NE Tillamook
- **N Flint, North of I-5:** Aerial facilities, size not specified, beginning at the property on the northwestern quadrant of the existing N Flint bridge overcrossing and continuing north
- **N Thompson Street, West of I-5:** Aerial facilities, size not specified, from west of N Kerby Avenue to the easternmost property on N Thompson on the northern side of the road
- **N Russell:** 6 - 4-inch PVC underground ductbank with communication manholes
- **N Knott Street:** Aerial facilities, size not specified, from N Albina Avenue through the N Borthwick Avenue intersection

- **I-5/I-405 Interchange:**
 - 12 - 4-inch concrete encased underground ductbank, with dimensions of 22 inches wide x 16 inches high
 - Extends north from N Albina at N Graham Street, through the gated maintenance facility under I-5, until N Stanton Street
 - Turns west, crossing I-5, following the former N Stanton alignment, and also connects east to N Stanton's 15-inch x 15-inch vitrified clay duct system
 - Turns north, crossing I-5 a third time, following the former N Mississippi Avenue alignment

5.1.3 CenturyLink National

CenturyLink National has a single-path communication route, typically attached to the joint-use utility poles owned by PacifiCorp. Its route within the API and in the vicinity of the Project Area, beginning on the west, is as follows:

1. Along the Steel Bridge and NE Oregon Street, west of N Interstate Avenue
2. Turns north at N Interstate and continues along the western side of I-5 between NE Oregon and NE Multnomah on an alignment using N Interstate and N Williams (formerly NE Wheeler)
3. Turns east at NE Multnomah, crossing I-5
4. Continues along NE Multnomah to NE Martin Luther King Jr. Boulevard
5. Turns south at NE Martin Luther King Jr. Boulevard and continues to NE Lloyd
6. Turns east at NE Lloyd, crossing through the NE Grand intersection
7. Turns southeast, crossing I-84
8. Turns south, continuing along NE 6th away from the API

CenturyLink National could be underground on NE Multnomah at its highway crossing (pers. comm., Michael Lopez [CenturyLink], August 15, 2017).

5.1.4 Comcast Cable

Comcast Cable provides service throughout the Project Area. Facilities include overhead lines, underground lines, joint poles, and pedestals. Facilities commonly include communication infrastructure along the same roadways as the local telephone provider; for this Project, it would be CenturyLink Local. Listed from south to north and west to east, Comcast facilities include the following:

- **NE Lloyd:** Underground conduit, size not specified, beginning from pedestal located between NE Martin Luther King Jr. Boulevard and NE Grand Avenue, service heading east to joint pole east of NE Grand

- **N Multnomah:** Underground conduit, size not specified, entering the Project Area from the west to a pedestal at the N Williams (formerly NE Wheeler) intersection, continuing east to a pedestal west of I-5, and crossing I-5 to a pedestal outside of the Project Area
- **N Williams, N Wheeler to N Hancock, West of I-5:** Underground system of conduits and pedestals routed as follows:
 - Begins at a pedestal north of the N Williams and N Wheeler intersection
 - Heads north to N Weidler
 - Turns west to pedestal on N Weidler
 - Continues west to N Wheeler
 - Turns northwest on to N Wheeler until N Broadway
 - Splits into two routes, one heading northeast on N Broadway before turning northwest onto N Flint, the other heading southwest before turning northwest onto N Ross
- **N Weidler:** A system of aerial and underground facilities routed as follows:
 - Aerial facilities begin at joint pole west of I-5 and head east, crossing I-5
 - Transitions from aerial to underground between NE Victoria and NE 1st and continues east past NE 2nd and beyond the Project Area
 - Additional aerial facilities on N Weidler begin at joint pole between NE 1st and NE 2nd and head east beyond the Project Area
- **N Flint, West of I-5:** Aerial facilities begin near N Broadway, continue north and end before reaching N Hancock
- **NE Victoria and NE Hancock:** Aerial facilities routed as follows:
 - Begins at joint pole on NE Victoria, north of NE Broadway intersection
 - Continues north and turns west at NE Hancock
 - Continues west to joint pole west of the N Williams intersection
- **N Williams, NE Tillamook, East of I-5:** Aerial facilities routed as follows:
 - Begins at joint pole on N Williams, north of I-5
 - Continues north to NE Tillamook, beyond the Project Area and turns west, into the Project Area, to a joint pole east of the N Flint intersection
- **N Vancouver, East of I-5:** Aerial facilities being at joint pole north of I-5, continuing north beyond the Project Area to N Page Street
- **N Flint, East of I-5:** Aerial facilities routed as follows:
 - Begins at joint pole on east side of N Flint
 - Continues across N Flint and turns north

- Continues beyond the Project Area to N Page
- **N Russell, west of I-5:** Aerial facilities begin at joint pole, between N Ross and I-5, and continue west beyond the Project Area
- **N Knott to N Kerby:** System of aerial and underground facilities are routed as follows:
 - Aerial facilities on N Knott enter the Project Area from the west to a joint pole between N Borthwick and I-5
 - Facilities then transition underground, crossing I-5 to a joint pole between I-5 and N Kerby
 - Continues north and east beyond the Project Area
- **N Albina:** Aerial facilities begin at joint pole south of the I-5 SB on-ramp and continues south beyond the Project Area
- **N Mississippi:** Aerial facilities begin at joint pole south of the I-5 SB on-ramp and continue south beyond the Project Area

5.1.5 Level 3 Communications

Level 3 Communications provides communications services to enterprise, government, and carrier customers with a fiber network. Level 3 Communications was very recently acquired by CenturyLink (National), but for the purposes of this report has been documented separately. This is because the utility is identified as Level 3 Communications through the Oregon Utility Notification Center, and communications with the utility occurred prior to its acquisition by CenturyLink (National).

Level 3 Communication's infrastructure in the Project Area is not part of its long-haul route between states, but instead is part of its regional and local network. It does have some customers and would need to schedule cut-overs and relocation down time (pers. comm., Tim Boykin [Level 3 Communications], August 11, 2017). Its cable within the railroad ROW may qualify for Prior Rights.

Listed from south to north and west to east, the Level 3 Communications fiber, sizes unspecified, include the following:

- **I-5/I-84 Interchange:** Underground facilities are situated between the I-84 EB ramps, from NE 2nd to NE 3rd; turns south toward NE Davis Street as an aerial facility. Underground facilities within railroad ROW are routed as follows:
 - Western side of the UPRR tracks, from the Burnside Bridge north through the I-5 SB overpass
 - Crosses the UPRR tracks in the highway gore between the I-5 SB overpass and the I-5 SB to I-84 EB overpass, with vaults on both sides of the track crossing

- Continues northward on the eastern side of the UPRR tracks, continuing outside the API
- **NE Lloyd - NE Multnomah Loop:** Loop of underground facilities within the roadway ROW are routed as follows:
 1. Along the Steel Bridge and NE Oregon, west of N Interstate
 2. Turns north at N Interstate and continues along the western side of I-5 between NE Oregon and NE Multnomah on an alignment using N Interstate and N Williams (formerly NE Wheeler)
 3. Turns east at NE Multnomah, crossing under I-5
 4. Continues along NE Multnomah to NE 7th
 5. Turns south at NE 7th and continues to NE Lloyd
 6. Turns west at NE Lloyd Boulevard, continuing back to NE Oregon
- **N Wheeler - NE Weidler System:** A system of underground and aerial facilities within the roadway ROW is routed as follows:
 1. Aerial facilities along N Wheeler Place, continuing on N Wheeler to the northern side of N Broadway; segment includes an aerial spur at the northern end to N Hancock and N Gantenbein Avenue
 2. Transitions from aerial to underground at the northern side of N Broadway and continues underground southeast along N Wheeler
 3. Turns east at N Weidler and continues underground through the N Vancouver intersection
 4. Transitions from underground to aerial on N Weidler west of N Williams, crosses I-5 aerially, and continues through the NE Victoria intersection; segment includes an aerial spur that crosses N Williams diagonally from northwest to southeast
 5. Transitions from aerial to underground on N Weidler, west of NE 1st, and continues underground to NE 2nd
 6. Turns north on NE 2nd and continues underground through the NE Broadway intersection and onto NE Schuyler Street
- **N Kerby:** North-south aerial facilities on N Kerby are routed adjacent to the I-5 NB to I-405 WB interchange ramp, from the vacated N Knott to the north; facilities also continue east through the vacated N Knott.

5.1.6 NW Natural

NW Natural is the gas service provider within the vicinity of the Project Area. Facilities include gas mains ranging in size from 1 to 12-3/4 inch within the Project Area. Gas infrastructure is primarily within the roadway ROW of City of Portland, with a few crossings of ODOT's ROW. None of the facilities are high pressure or transmission facilities (pers. comm., Jodi Wright [NW Natural], August 14, 2017).

However, mains sized 6-5/8 inch and larger are more critical to NW Natural's system than the smaller mains.

NW Natural's mains sized 12-3/4 inch within the Project Area are at the following locations:

- **NE Grand:** Steel main between NE Everett to NE Hoyt; attached to the NE Grand overcrossing bridge of I-84. Steel main continues on NE Everett. This is a major feeder and would be very difficult to relocate (pers. comm., Jodi Wright [NW Natural], August 14, 2017).
- **NE Multnomah:** Steel main between NE 1st and NE Martin Luther King Jr. Boulevard.
- **NE 1st:** Steel main beginning at NE Multnomah and continuing in an easement north through the vacated ROW toward NE Weidler.

NW Natural's mains sized 6-5/8 inch within the Project Area are at the following locations:

- **N Williams (formerly NE Wheeler):** Steel main between NE Holladay and N/NE Multnomah.
- **N/NE Multnomah:** Steel main between N Interstate and NE Martin Luther King Jr. Boulevard, parallel to the main sized 12-3/4 inch.
- **N Flint:** Steel main between a point approximately 140 feet north of N Broadway and N Tillamook; attached to the N Flint overcrossing bridge of I-5.
- **N Russell:** Steel main within the length of the Project Area.
- **N Borthwick:** Steel main between N Russell and N Knott.
- **N Knott:** Steel main from west of N Borthwick to east of N Kerby and continuing east within the vacated ROW of N Knott.
- **N Kerby:** Steel main from N Knott to north of N Graham.

NW Natural's mains of 4-1/2 inch and smaller sizes, of either steel or poly materials, are on the following roadways:

- **East-West Roadways:**
 - NE Lloyd, between NE Martin Luther King Jr. Boulevard and NE Grand
 - NE Oregon, between N Interstate and NE 1st
 - NE Weidler
 - N Wheeler to N Williams
 - NE Victoria eastward, to outside the Project Area
 - N Dixon, N Wheeler westward, to outside the Project Area
 - N Hancock, N Gantenbein to N Flint
 - NE Hancock, NE Victoria eastward to outside the Project Area

- N Tillamook, N Flint eastward to outside the Project Area
- N Graham, N Kerby for a short distance westward
- **North-South Roadways:**
 - NE 1st, from NE Oregon toward the south a short distance, providing service to the Convention Center
 - N Interstate/N Williams (formerly NE Wheeler), from NE Oregon to NE Holladay
 - N Williams (formerly NE Wheeler), North of N/NE Multnomah to the Moda Center
 - N Wheeler, N Weidler to N Dixon
 - N Benton, N Broadway to N Dixon
 - N Ross, N Broadway to N Dixon
 - N Flint
 - N Broadway north 140 feet to the main sized 6-5/8 inch
 - N Tillamook northward to outside the Project Area
 - N Vancouver
 - N Weidler to south of NE Broadway
 - Northern end of I-5 bridge overcrossing, northward to outside the Project Area
 - N Williams
 - N Weidler toward the south
 - North of NE Broadway, northward to outside the Project Area
 - NE Victoria, NE Weidler to NE Hancock
 - NE 2nd, from mid-block south of NE Weidler, northward to outside the Project Area
 - N Commercial, for a short distance south of N Russell

5.1.7 Oregon Department of Transportation Electrical

ODOT Electrical is identified on the Oregon Utility Notification Center ticket. Facilities generally located by ODOT through the one-call ticket include infrastructure associated with traffic signals, interconnects, ramp signals, intelligent transportation, and street lighting.

The affected environment, environmental consequences, and avoidance, minimization, and mitigation measures of ODOT facilities are not addressed in this technical report.

5.1.8 PacifiCorp (Pacific Power)

PacifiCorp is the primary power service provider within the vicinity of the Project Area and is identified on the Oregon Utility Notification Center ticket as "Pacific Power." PacifiCorp's facilities include power transmission (69-115 kilovolt [kV] lines), power distribution (lines less than 13 kV), and associated pole, vault, and pad mount infrastructure. PacifiCorp's two transmission line routes are aerial, whereas distribution lines occur both overhead and underground. PacifiCorp's poles commonly include attachments of other utility providers.

PacifiCorp's southernmost transmission lines (69-115 kV) have the following route through the Project Area:

1. North on NE 6th at NE Everett, crossing I-84 at the edge of the Project Area
2. Turns west on NE Lloyd, entering and exiting the Project Area
3. Turns north on NE 1st
4. Turns east on NE Multnomah, exiting the Project Area
5. Turns north on NE 3rd
6. Turns west on NE Broadway, entering the Project Area
7. Turns north on NE 1st
8. Turns west on NE Hancock
9. Turns north on N Williams, continuing to the Russell Substation on NE Russell between N Williams and NE Rodney Avenue

PacifiCorp's northernmost transmission lines (69-115 kV) have the following route through the Project Area:

1. West on NE Russell, from the Russell Substation, entering and exiting the Project Area and crossing I-5
2. Turns north on N Albina, entering and exiting the Project Area, crossing over the I-5/I-405 interchange between two tall steel poles, then continuing north

PacifiCorp's power distribution lines (less than 13 kV) are on almost every roadway within the Project Area and are therefore not itemized herein but are shown on Figures 1-1 through 1-8 in Appendix A. The roadway segments with multiple parallel distribution lines, the interstate crossings, and segments outside the ROW that may have Prior Rights are summarized below.

- **East-West Roadways:**

- **NE Lloyd:** Overhead distribution may have Prior Rights, from mid-block east of NE Martin Luther King Jr. Boulevard northward across private properties, and away from the Project Area
- **NE Holladay:** Overhead distribution may have Prior Rights where it crosses outside the ROW between N Multnomah/N Interstate intersection to N Williams (formerly NE Wheeler), over the light rail tracks

- NE Multnomah:
 - Multiple parallel distribution lines between N Williams (formerly NE Wheeler) and NE 2nd
 - Underground crossing of I-5
 - Both underground and overhead distribution from NE 1st eastward
- N/NE Weidler:
 - Multiple parallel distribution lines, including both underground and overhead, between N Larrabee Avenue and NE 1st
 - Aerial crossing of I-5, with one pole at the intersection of N Williams and the other pole at the intersection of NE Victoria
 - Underground crossing of I-5 could be by bridge attachment
- **N Hancock:** Potential Prior Rights for overhead distribution beginning at a property on the eastern side of N Vancouver at the northeastern quadrant of the existing N Vancouver overcrossing, continuing along the eastern side of I-5 through private property to N Hancock
- **N Tillamook:**
 - Aerial crossing of I-5, with one pole at the top highway slope on the western side of I-5 near a building corner and the other pole at the intersection of N Tillamook with N Flint
 - Potential Prior Rights for distribution on the western side of the highway, outside ODOT's ROW
- **N Russell:** Underground crossing of I-5
- **N Graham:** Underground facilities begin at N Mississippi, head west to the I-405 off-ramp to N Kerby before turning south across N Graham and out of public ROW.
- **North-South Roadways:**
 - **N Williams (formerly NE Wheeler):**
 - Both underground and overhead distribution from NE Holladay to NE Multnomah
 - Multiple parallel underground distribution lines to service the Moda Center from NE Multnomah
 - **NE 1st:**
 - Multiple parallel distribution lines between NE Oregon and the cul-de-sac north of NE Multnomah
 - Multiple parallel distribution lines between NE Weidler and NE Hancock
 - Segments include both underground and overhead distribution

- Infrastructure in the vacated ROW north of NE Multnomah, which extends north and routes across private property to NE 2nd at NE Clackamas, may have Prior Rights
- **N Commercial:**
 - Aerial crossing of I-5, with the eastern pole on N Commercial and the western pole in the vicinity of the highway sign bridge at N Page
 - The western pole may be on private property and could qualify for Prior Rights
- **I-5/I-405 Interchange:**
 - Overhead distribution under I-5 and the I-405 interchange ramps
 - Along N Graham, appearing to service street lights under the highway
 - Extending north from N Albina at N Graham, through the gated maintenance facility under the I-5 highway, until the former N Stanton alignment, then turning east and continuing along the vacated N Stanton Street ROW
 - Distribution within the vacated N Stanton ROW could qualify for Prior Rights
 - Along N Mississippi entering the Project Area near N Graham and terminating at a joint pole just north of the I-5 SB on-ramp

5.1.9 Portland General Electric (PGE)

Portland General Electric (PGE) ties to PacifiCorp's Russell Substation, discussed in Section 5.1.8. PGE has two corresponding transmission lines that are routed through the Project Area to the substation.

PGE has aerial 115 kV transmission lines that are routed as follows:

1. North on NE 3rd, towards NE Broadway outside of the Project Area
2. Turns west on NE Broadway, entering the Project Area
3. Turns north on NE 1st, exiting the Project Area
4. Turns east on NE Hancock
5. Turns north on NE Rodney and continues toward the Russell Substation

PGE has aerial 57 kV transmission lines that are routed as follows:

1. Toward NE 1st on NE Schuyler, north of NE Broadway, outside of the Project Area
2. Turns north on NE 1st
3. Turns west on NE Hancock, entering the Project Area
4. Turns north on N Williams, exiting the Project Area, and continues to the Russell Substation

Other PGE existing aerial facilities are routed as follows:

1. Enters the Project Area from N Interstate, south of the I-5/I-405 interchange
2. Continues north over the I-5/I-405 interchange
3. Turns northwest along N Greeley, exiting the Project Area

5.1.10 Portland Bureau of Environmental Services

BES is the stormwater and sanitary service provider within the vicinity of the Project Area. BES's infrastructure within the Project Area includes gravity pipelines, pressurized force mains, a sanitary pump station, manholes, stormwater inlets, and stormwater treatment facilities. BES mapping indicates it owns easements over its infrastructure located outside the public ROW.

This report only addresses the sanitary system, including the combined sewer overflow (CSO) system. The affected environment, environmental consequences, and avoidance, minimization, and mitigation measures of BES's stormwater infrastructure are addressed in the *Water Resources Technical Report (ODOT 2019a)* and are therefore not duplicated herein.

- **I-5/I-84 Interchange:**

- **264-inch Combined Gravity Main at I-84 Interchange:** A 264-inch combined gravity main is routed on the eastern side of I-5 through the interchange to approximately the NE Lloyd at NE 1st intersection, then crosses under I-5 diagonally to the NE Oregon at N Interstate intersection, then continues northwest away from the Project Area.
- **Pump Station and Piping at I-84:** A sanitary pump station is located in the gore area⁹ and under the I-84 WB ramps of the highway interchange. The pump station building includes the pump station and adjacent screen house. The building's basement extends approximately 24 feet below ground and includes the pumping pit, screening, mechanical, and electrical infrastructure. The extents of the basement are larger than the above-ground building footprint (City of Portland 1981). An accessory structure on the site is a lab building associated with the pump station.

Sanitary flows are generally from south to north. Associated infrastructure includes the following:

- 72-inch horseshoe sanitary gravity main inflow, south of the pump station (see Figure 10 for pipe cross section)
- Two, 48-inch sanitary pressure main outflows, north of the pump station (City of Portland 1981, 1993)
- Two special structures, one on each 48-inch outflow pipeline; type of structure is undefined

⁹ Gore area is the space between a through highway and an entrance or exit ramp.

- 68-inch by 70-inch gravity bypass rectangular pipe with a 62-inch by 39 1/2-inch abandoned semicircular pressure pipe directly above, to the west of the pump station (see Figure 11 for pipe cross section)
- **96-inch Gravity Sanitary at I-84 Interchange:** A 96-inch semi-elliptical gravity sanitary main crosses from southeast to northwest under I-5 north of the NE Lloyd undercrossing, but connecting with NE Lloyd on both sides of the highway (City of Portland 1954).
- **72- to 84-inch Gravity CSO at I-84 Interchange:**
 - A 72-inch pipe crosses the I-84 WB to I-5 NB ramp, the I-5 NB lanes, and the UPRR tracks to a point under the I-5 SB lanes.
 - An 84-inch pipe crosses from southeast to northwest under the I-5 SB lanes from the 72-inch pipe to NE Oregon, west of N Interstate.

Figure 10. Pump Station Piping, 72-Inch Horseshoe Sanitary Gravity Main (Source: Portland 1961)

Y SEWERS ON ALDER ST. & 8TH. AVE.

NOTE: - Steel shown in std sections may be varied or omitted entirely by the engineer as may be determined by actual field conditions.

- Location and type of construction joints to be approved by the engineer.

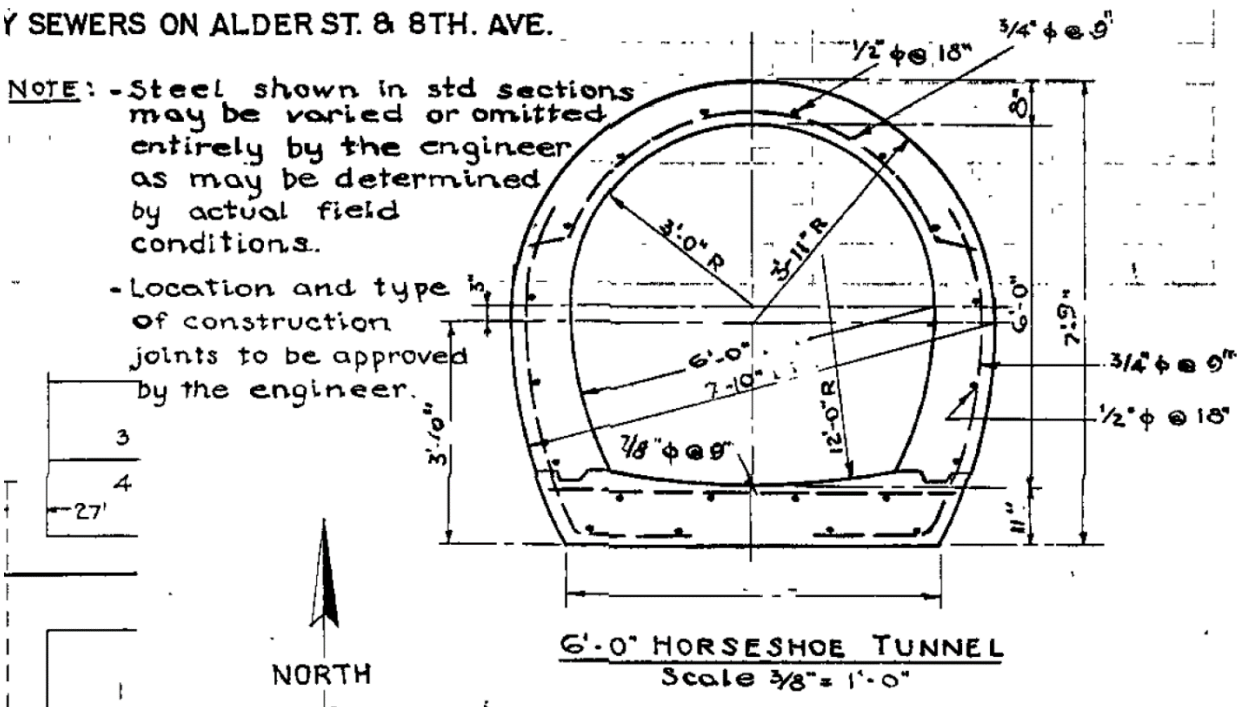
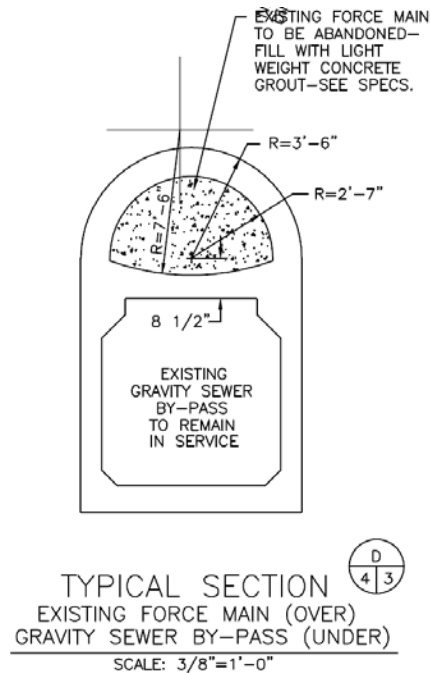


Figure 11. Pump Station Piping, 68-inch by 70-inch Bypass Rectangular Pipe (Source: Portland 1993)



Beyond the interchange, the BES gravity mains sized 24 inches and larger consist of the following:

- **Gravity Sanitary:**
 - NE Lloyd: 38-inch by 66-inch semi-circular pipe east of NE 1st to NE Martin Luther King Jr. Boulevard (see Figure 12 for pipe cross section)
 - N Hancock: 24-inch pipe, from N Wheeler Place to east of N Gantenbein
- **Gravity CSO:**
 - NE Interstate: 84-inch pipe, west of N Interstate at NE Oregon, flows north crossing private property, and crosses N Interstate diagonally through the Rose Quarter Town Center intersection (City of Portland 2006).
 - NE Lloyd: 72-inch, east of NE 1st (see Figure 13 for pipe cross section)
 - NE Holladay:
 - 54-inch pipe, from the 84-inch pipe, east to NE 1st
 - 42-inch pipe, between NE 1st and NE 2nd
 - N Hancock: 62-inch pipe, between N Wheeler and N Gantenbein
 - N Russell:
 - 48-inch pipe, west of N Kerby
 - 36-inch pipe, east of N Kerby

- N Kerby: 42-inch pipe, N Russell to N Graham

Figure 12. BES Gravity Sanitary, 38-inch by 66-inch Semi-Circular Pipe (Source: Portland 1954)

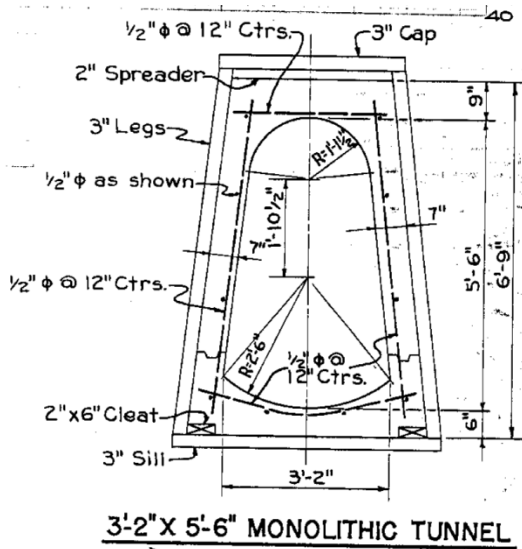
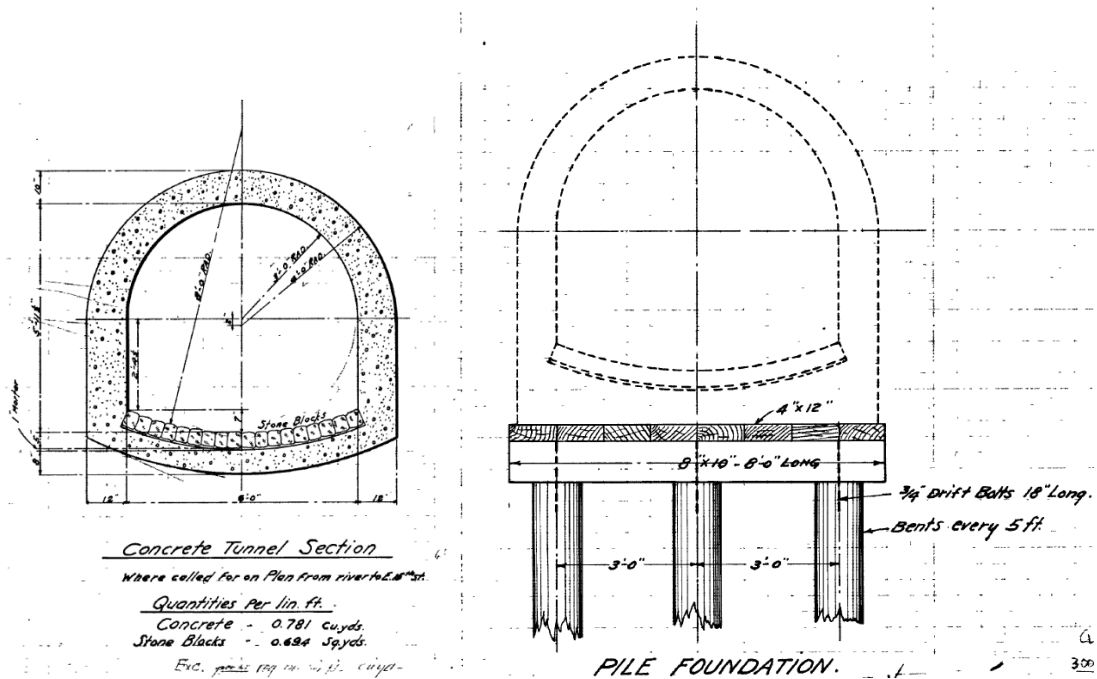


Figure 13. BES Sanitary CSO, 72-inch Semi-Circular (Source: Portland 1911)



- **Combined Gravity Main:**

- NE 2nd: 36-inch pipe, NE Holladay to NE Weidler, within an easement between NE Multnomah and NE Wasco Street
- N/NE Multnomah: 24-inch pipe, west of N Williams (formerly NE Wheeler)
- N Williams (formerly NE Wheeler): 24-inch pipe, north of N/NE Multnomah to the Moda Center
- NE 1st: 24-inch pipe, from NE Weidler to outside the Project Area at NE Schuyler
- I-5 Crossing and N/NE Hancock: 56-inch pipe, from N Gantenbein to N Williams, crossing under I-5. The 56-inch pipe east of I-5 is brick pipe (City of Portland 1905) (see Figures 14 and 15 for the pipe cross sections)
- N Williams: 56-inch brick pipe (City of Portland 1905), from NE Hancock to outside the Project Area at NE San Rafael Street (see Figure 15 for the pipe cross section)
- N Vancouver and easement to NE Hancock: 30-inch pipe, from N Tillamook, along N Vancouver, then southeast through an easement on private property to NE Hancock

Figure 14. Combined Gravity Main, 56-inch Crossing I-5 at Hancock (Source: State of Oregon Highway Department 1960)

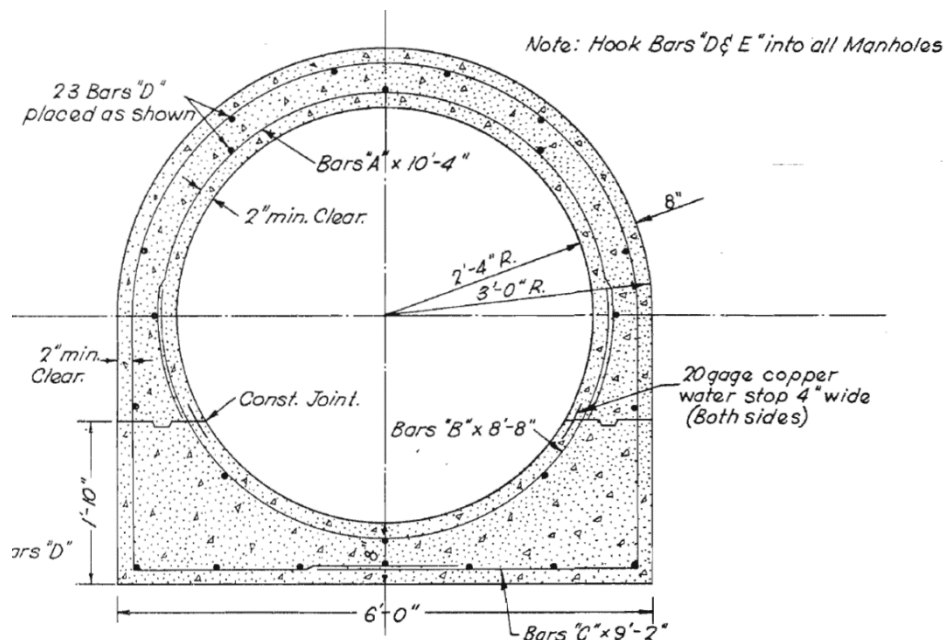
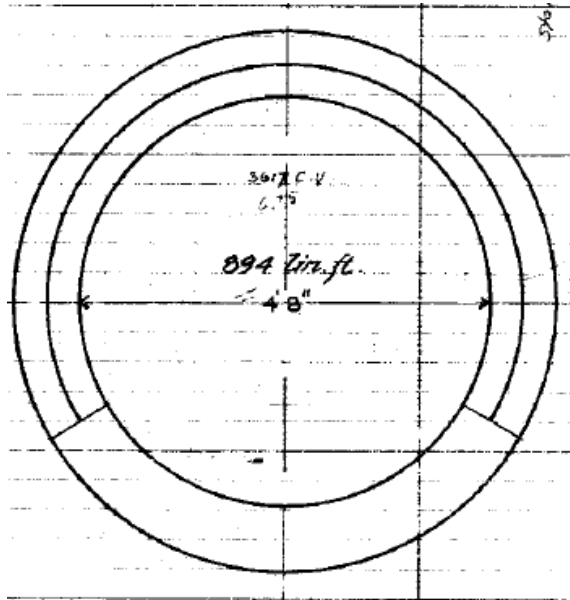


Figure 15. Combined Gravity Main, 56-inch Brick Pipe (Source: Portland 1905)



BES gravity mains with a size of 22 inches and smaller, which may occur parallel to piping described previously, include the following:

- **Gravity Sanitary:**
 - NE Lloyd, east of NE 1st to NE Martin Luther King Jr. Boulevard
 - NE 1st
 - South of NE Oregon
 - North of NE Multnomah, ends south of NE Wasco
 - NE Holladay, the entire length of the Project Area
 - NE 2nd, NE Holladay to NE Weidler, within an easement between NE Multnomah and NE Wasco
- **Gravity CSO:** N Williams (formerly NE Wheeler) through NE Holladay intersection
- **Combined Gravity Main:**
 - N Williams (formerly NE Wheeler) and N Wheeler
 - North of NE Holladay intersection to NE Multnomah
 - Moda Center service lateral, north to N Vancouver
 - N Weidler to N Wheeler Place
 - NE Multnomah
 - N Williams

- N Williams (formerly NE Wheeler) to north of NE Weidler
- NE Broadway north to NE Hancock
- N Vancouver
 - N Williams (formerly NE Wheeler) to the southern side of the N Vancouver overcrossing
- N Broadway, N Benton to N Wheeler
- NE Broadway, N Williams to NE Victoria
- N Flint
 - N Broadway to N Hancock
 - N Tillamook toward the north
- NE Victoria, NE Weidler to NE Hancock
- N Hancock, N Gantenbein to N Flint
- NE Hancock, cul-de-sac to N Williams
- N Tillamook, N Flint to N Vancouver
- N Russell
- N Kerby
- N Borthwick
- N Knott
- N Graham

5.1.11 Portland Bureau of Transportation

City of Portland is identified on the Oregon Utility Notification Center ticket, which includes the City of Portland Bureau of Transportation (PBOT) infrastructure. Facilities generally located by PBOT through the one-call ticket include infrastructure associated with traffic signals, interconnect, intelligent transportation, Portland Streetcar, and street lighting.

The affected environment, environmental consequences, and avoidance, minimization, and mitigation measures of PBOT facilities are addressed in separate transportation-specific technical reports (see ODOT 2019b, 2019c, 2019d, 2019e, 2019f) and are therefore not duplicated herein.

5.1.12 Portland Parks and Recreation

Portland Parks and Recreation is identified on the Oregon Utility Notification Center ticket. Facilities generally located by the Portland Parks and Recreation through the one-call ticket include public fountains and private utilities for park facilities.

The affected environment, environmental consequences, and avoidance, minimization, and mitigation measures of publicly owned parks are addressed in the *Section 4(f) Technical Report* (ODOT 2019g) and are therefore not duplicated herein.

5.1.13 Portland Water Bureau

The PWB is the potable water service provider within the vicinity of the Project Area. The PWB's distribution water mains within the Project Area vary in size. None of the water mains within the Project Area are classified as supply or water transmission mains (pers. comm., Cherri Warnke [PWB], November 16, 2017). The services range in size from 1 to 10 inches and serve buildings, fire lines, and irrigation. Infrastructure includes hydrants, valves, and related appurtenances.

PWB infrastructure on City of Portland's roadways would qualify for Prior Rights. PWB's infrastructure is on almost every City of Portland roadway within the Project Area and is therefore not itemized herein, but is shown on the figures in Appendix A.

The interstate crossings are summarized below.

- **I-5/I-84 Interchange:** Water main is routed north-south under the interchange ramps along NE 2nd and turns east-west to connect with the southern side of NE Lloyd.
- **I-5 Undercrossings:**
 - NE Oregon
 - NE Holladay
 - NE Multnomah
 - N Russell
 - West of N Kerby
 - N Knott
 - N Borthwick
 - N Albina
 - N Stanton: Two parallel mains occur under the interchange ramps.
- **I-5 Overcrossings by Bridge Attachment:**
 - NE Weidler
 - N Williams

5.1.14 TriMet

TriMet is identified on the Oregon Utility Notification Center ticket. Facilities generally located by TriMet through the one-call ticket include the train signal, transit power, and communications for their transit facilities, as well as track drainage.

The affected environment, environmental consequences, and avoidance, minimization, and mitigation measures of TriMet facilities are addressed in separate transportation-specific technical reports (see ODOT 2019b, 2019c, 2019d, 2019e, 2019f) and are therefore not duplicated herein.

5.1.15 Verizon National Fiber Security (MCI)

Verizon National Fiber Security is a communication service provider with a fiber network within the vicinity of the Project Area. They are identified on the Oregon Utility Notification Center ticket as "MCI" and have both aerial and underground fiber network infrastructure.

Verizon National Fiber Security infrastructure is as follows:

- **I-5/I-84 Interchange:** Underground facilities within the UPRR's railroad ROW at the southern end of the Project Area, between the Burnside Bridge and the Steel Bridge. This cable may qualify for Prior Rights.
- **N Wheeler - NE Weidler:** A system of underground and aerial facilities within roadway ROW with the following route:
 1. Aerial facilities at N Wheeler Place, continuing on N Wheeler to north of N Broadway
 2. Transitions from aerial to underground north of N Broadway and continues underground southeast along N Wheeler
 3. Turns east at N Weidler and continues underground through the N Vancouver intersection
 4. Transitions from underground to aerial on N Weidler west of N Williams, crosses I-5 aerially, and continues through the NE Victoria intersection
 5. Transitions from aerial to underground on N Weidler, west of NE 1st, and continues underground to NE 2nd
 6. Turns north on NE 2nd, and continues underground through the NE Broadway intersection, and exiting the Project Area

According to the utility's representative, the N Wheeler–NE Weidler route is a local loop that is easier to deal with during conflicts. The aerial locations are attached to PacifiCorp's poles.

The cable in the railroad ROW at the I-5/I-84 Interchange is a cable with traffic that would take more to work with (pers. comm., Scott Christenson [Verizon National Fiber Security], August 16, 2017).

5.1.16 XO Communications

XO Communications is identified on the Oregon Utility Notification Center ticket. XO Communication's specific infrastructure and location within the Project Area is not known, because, as of this writing, the company has not yet assigned an

engineering representative or provided any mapping information.¹⁰ Facilities are assumed to include communication infrastructure and are likely included in the "Non Level 3" lines shown in Utilities Figures 1-1 through 1-8, included in Appendix A.

5.1.17 Zayo Group

Zayo Group (Zayo) acquired two communication companies in the vicinity of the Project Area: the former companies Abovenet and Electric Lightwave, Inc. Zayo's specific infrastructure and location within the Project Area is not known, because, as of this writing, the company's engineering contact has not provided any information.¹¹ Facilities commonly include communication infrastructure and are likely included in the "Non Level 3" lines shown in Utilities Figures 1-1 through 1-8, included in Appendix A.

5.2 Major Utilities and Special Constraints

5.2.1 Major Utilities

Utilities were classified as "major" or "minor" based on the cost and anticipated complexity of potential relocation. Major utilities include electric transmission lines, underground ductbanks for power or communication, multiple parallel power distribution lines, and sewer pump stations and piping with diameters 24 inches or greater. Factors that could create a complex utility relocation include the following:

- Dependency on Project improvements to be constructed before relocation can begin
- Need for temporary services to stage the relocation, then installation of the final services
- Inability to accommodate even minor service outages (which are needed for cut-overs between existing and new utility alignments)
- Need for specialized equipment and materials that have long lead times for procurement
- Encountering groundwater during underground utility relocation

Table 4 summarizes the major utilities within the API. Utilities Figure 2 in Appendix A shows the location of major utilities within the API. Minor utilities are defined as the remaining utility infrastructure discussed above in Section 5.1.

¹⁰ Communications with XO Communications were attempted in July 2017, August 2017, and November 2017. A representative is expected to be assigned during the design phase and mapping determined at that time.

¹¹ Communications with Zayo's representative were made in July 2017, August 2017, and November 2017. Mapping is expected to be determined during the Project design.

Table 4. Summary of Major Utilities within the API

Utility Owner - Major Utility	Facility Size	Street	From	To
CenturyLink Local - Underground Ductbank	4 - 4-inch	NE Multnomah Street	N Hassalo Street	NE 2nd Avenue
	8 - 4-inch	N Broadway	Project Area West	I-5 Overcrossing
	12 - 4-inch	NNE Broadway	Under I-5	--
	8 - 4-inch	NE Broadway	I-5 Overcrossing	Project Area East
	6 - 4-inch	N Russell Street	Project Area West	Project Area East
	12 - 4-inch	I-5/I-405 Interchange	Under Interchange	--
PacifiCorp - Aerial Power Transmission	69-115 kV (all)	NE Lloyd Boulevard	Project Area East	NE 1st Avenue
		NE 1st Avenue	NE Lloyd Boulevard	NE Multnomah Street
		NE Multnomah Street	NE 1st Avenue	Project Area East
		NE Broadway	NE 1st Avenue	Project Area East
		NE 1st Avenue	NE Broadway	Project Area North
		NE Hancock Street	N Williams Avenue	Project Area East
		N Williams Avenue	NE Hancock Street	Project Area North
		NE Russell Street	Project Area West	Project Area East
N Albina Street	Project Area West	Project Area East		
Portland General Electric - Aerial Power Transmission	115 kV	NE Broadway	NE 1st Avenue	Project Area East
	115 kV	NE 1st Avenue	NE Broadway	Project Area North
	57kV	NE Hancock Street	N Williams Avenue	Project Area East
	57 kV	N Williams Avenue	NE Hancock Street	Project Area North
PacifiCorp - Multiple Parallel Distribution Lines	less than 13 kV each	NE Multnomah Street	N Williams Avenue ¹	NE 2nd Avenue
		NNE Weidler Street	Project Area West	NE 1st Avenue
		N Williams Avenue ¹	NE Holladay Street	Moda Center
		NE 1st Avenue	NE Oregon Street	cul-de-sac
Portland Bureau of Environmental Services 72-inch-diameter and Larger Sewer	264-inch	I-5/I-84 Interchange	South of I-84	NE Oregon Street
	96-inch	I-5 Crossing	NE Lloyd Boulevard	NE Lloyd Boulevard
	84-inch	I-5 Southbound Crossing	72-inch pipe	NE Oregon Street
	84-inch	NE Interstate Avenue	NE Oregon Street	NE Holladay Street
	72-inch	I-5/I-84 Interchange	I-84 Westbound	I-5 Southbound
	72-inch	NE Lloyd Boulevard	NE 1st Avenue	Project Area East



Utility Owner - Major Utility	Facility Size	Street	From	To
Portland Bureau of Environmental Services Sanitary Pump Station and Piping	Building 72-inch inflow 2 x 48-inch pressure mains 2 x special structures 70-inch bypass	I-5/I-84 Interchange	NE 2nd Avenue at NE Everett Street	NE Lloyd Boulevard
Portland Bureau of Environmental Services 24- to 62-inch-diameter Sewer	62-inch 56-inch 56-inch 54-inch 48-inch 42-inch 42-inch 38-inch 36-inch 36-inch 30-inch 30-inch 24-inch 24-inch 24-inch	N Hancock Street I-5 Crossing at Hancock N Williams Avenue NE Holladay Street N Russell Street NE Holladay Street N Kerby Avenue NE Lloyd Boulevard N Russell Street NE 2nd Avenue N Vancouver Avenue Private Easement N Hancock Street NE Multnomah Street N Williams Avenue ¹ NE 1st Avenue	N Wheeler Avenue N Gantenbein Ave NE Hancock Street 84-inch pipe Project Area West NE 1st Avenue N Russell Street NE 1st Avenue N Kerby Avenue NE Holladay Street N Tillamook Street N Vancouver Avenue N Wheeler Place Project Area West NE Multnomah Street NE Weidler Street	N Gantenbein Ave N Williams Avenue Project Area North NE 1st Avenue N Kerby Avenue NE 2nd Avenue N Graham Street NE MLK Jr Boulevard Project Area East NE Weidler Street I-5 Overcrossing NE Hancock Street N Gantenbein Ave N Williams Avenue ¹ Moda Center NE Schuyler Street

Notes: Ave = Avenue; I = Interstate; kV = kilovolt; MLK Jr = Martin Luther King Jr.

¹ Formerly NE Wheeler Avenue

5.2.2 Special Constraints and Design Considerations

Special constraints are identified as utilities that cross at bridges, utilities located within the UPRR ROW, and/or those utilities that may not be able to withstand service interruptions. Special constraints also include "minor" utilities that could influence the Project staging or scheduling due to the complexity of relocation, even when the cost itself is not relatively high. Table 5 summarizes the special constraints.

Table 5. Summary of Special Constraints and Design Considerations

Utility Owner	Facility	Constraint or Design Consideration
All	All	TriMet Light Rail Transit System and Portland Streetcar infrastructure are constraints to utility installations and relocations. Areas of power transmission and multiple parallel powerlines, including transit power systems, may interfere with the GPS accuracy of survey equipment and the GPS-enabled excavation and paving equipment.
Comcast	Aerial Cable	NE Weidler Street crossing of I-5 is aerial.
CenturyLink Local	12 - 4-inch Underground Ductbank	Crosses I-5 with its major ductbank underneath the NE Broadway overcrossing structure. CenturyLink does not have redundant system crossings of I-5.
CenturyLink Local	Cell Tower	Construction proximity for effective radio transmission. Interference with short wave radio.
Level 3 Communications	Underground Fiber	Communication facilities are within the UPRR ROW. ¹
NW Natural	6-5/8 inch Gas	Attached to N Flint Street bridge.
NW Natural	12-3/4 inch Gas	Larger diameter steel gas mains are more difficult to relocate.
PacifiCorp	Above- and Below-ground Power	The NE Weidler Street crossing of I-5 is both above and below ground. The underground power could be by bridge attachment.
Portland Bureau of Environmental Services	264-inch Sewer	Piping crosses the UPRR ROW ¹ with curvilinear piping, and long distances between access structures. Piping serves a large part of the City of Portland metro area, and disruptions in service may not be feasible.
Portland Bureau of Environmental Services	Pump Station Piping and 72-inch Sewer	Piping crosses the UPRR ROW ¹ in more than one location. Pump station may not allow for disruptions in service.
Portland Bureau of Environmental Services	56-inch Sewer	Crosses under I-5 at the planned N/NE Hancock Street overcrossing structure.

Utility Owner	Facility	Constraint or Design Consideration
Portland Water Bureau	Water Main	Crosses the UPRR ROW at the I-84 WB to I-5 NB ramp. ¹
Portland Water Bureau	Water Main	Attached to the N Williams Street and NE Weidler Street bridges. Portland Water Bureau has determined that both of the water mains can be taken out of service, but not at the same time. At least one of these crossings must be in service for the duration of the proposed work to meet fire flow requirements. (PWB 2017)
Verizon National Fiber Security	Aerial Fiber	Crosses I-5 aerially at NE Weidler Street as an attachment to PacifiCorp's poles.
Verizon National Fiber Security	Underground Fiber	Communication facilities are within the UPRR ROW ¹ and have a high amount of communication traffic.

Notes: GPS = global positioning system; I = Interstate; NB = northbound; ROW = right of way; UPRR = Union Pacific Railroad Company; WB = westbound

¹Facilities within the UPRR ROW require coordination with the railroad for locating, as well as relocation.

5.2.3 City of Portland Undergrounding District

NE Martin Luther King Jr. Boulevard between approximately I-84 and NE Prescott Street is identified as "District C" in City of Portland's Undergrounding District. Any relocation of an overhead utility that approaches NE Martin Luther King Jr. Boulevard may be subject to Chapter 17.60 Underground Wiring Districts of Portland City Code and Charter. Overhead wires are prohibited within the Underground Wiring District boundary.

6 Environmental Consequences

This section discusses the anticipated adverse impacts of the Project with regard to utilities for the No-Build and Build Alternatives. There are no anticipated beneficial impacts of the Project with regard to utilities for the No-Build or Build Alternatives.

6.1 No-Build Alternative

As described in Section 2.1, the No-Build Alternative consists of existing conditions and other planned and funded transportation improvement projects that would be completed in and around the Project Area by 2045.

6.1.1 Direct Impacts

Under the No-Build Alternative, the proposed I-5 mainline and Broadway/Weidler interchange area improvements would not be constructed, and the current road system would remain in place. Within the Project Area, it is assumed that existing utilities in locations where multimodal improvements are proposed would be relocated during construction of that project. Additionally, unplanned actions, as occurs with private development or emergency utility maintenance, may require installation of new utilities or adjustment or relocation of existing utilities in other limited locations. There are no known planned utility relocation projects that would occur within the Project Area under the No-Build Alternative.

6.1.2 Indirect Impacts

No indirect impacts to existing utilities are anticipated as a result of the No-Build Alternative because the proposed improvements that would occur under the Build Alternative would not be implemented, and any associated redevelopment in the area would not occur.

6.2 Build Alternative

Utilities generally occupy existing ODOT and City of Portland roadway ROW. Utility locations vary within the ROW and may occur under the pavement or above-ground where they do not impede vehicular, pedestrian, or transit traffic. Where City of Portland utilities located within City of Portland's ROW require relocation, they are considered compensable relocations and would add to the cost of the Project. The other utilities are allowed to be sited in the City's ROW by permit and would be non-compensable relocations; all costs for relocation would be borne by the utility owner.

Some utilities are located on private property, including those within the UPRR ROW, easements over vacated ROW, and acquired easements. Relocation of these utilities is assumed to be compensable until a full Prior Rights assessment is performed.



The API for the Build Alternative extends beyond the footprint of the proposed improvements, often to the Project Area limits. Roadways within the API are listed in Table 6 and depicted on Utilities Figure 3 in Appendix A.

Table 6. Roadways within the Utilities API

Street	From	To
I-5/I-84 INTERCHANGE		
NE Martin Luther King Jr. Blvd	NE Grand Ave	NE Martin Luther Jr Blvd
North-South UPRR Route	Eastbank Esplanade	I-5 NB, south of the UPRR
I-5 SB & I-5 to I-84 EB Ramp	NE Oregon St	I-84 WB to I-5 SB Ramp
I-5 AND NE 1ST AVENUE RAMP		
NE Lloyd Blvd	NE 1st Ave	Project Area East
N Interstate Ave	NE Lloyd Blvd	NE Oregon St
NE 1st Ave	NE Lloyd Blvd	NE Holladay St
NE Oregon St	Project Area West	NE 1st Avenue
N Interstate Ave	NE Oregon St	N Williams Ave (formerly NE Wheeler Ave)
N Williams Ave (formerly NE Wheeler Ave)	N Interstate Ave	NE Holladay St
I-5: NE HOLLADAY STREET TO NE MULTNOMAH STREET		
N Williams Ave (formerly NE Wheeler Ave)	NE Holladay St	NE Multnomah St
NE Holladay St	N Williams Ave (formerly NE Wheeler Ave)	NE 1st Ave
NE 1st Ave	NE Holladay St	NE Multnomah St
NE Multnomah St	N Williams Ave (formerly NE Wheeler Ave)	NE 1st Ave
I-5 AND WEIDLER RAMPS		
N Williams Ave (formerly NE Wheeler Ave)	NE Multnomah St	N Williams Ave
NE 1st Ave (Including Vacated)	NE Multnomah St	South of Weidler
N Williams Ave	N Williams Ave (formerly NE Wheeler Ave)	N Weidler St
N Williams Ave (formerly NE Wheeler Ave)	N Williams Ave	N Vancouver Ave
N Vancouver Ave	N Williams Ave (formerly NE Wheeler Ave)	N Weidler St
N Ramsey Way (previously N Winning Way)	N Flint Ave	N Williams Ave (formerly NE Wheeler Ave)

Street	From	To
BROADWAY/WEIDLER/WILLIAMS HIGHWAY COVER		
N Weidler St/NE Weidler St	N Benton Ave	NE 2nd Ave
N Broadway/NE Broadway	N Benton Ave	NE 2nd Ave
N Wheeler Ave	N Weidler St	N Dixon St
N Vancouver Ave	N Weidler St	N Broadway
N Williams Ave	NE Weidler St	NE Hancock St
NE Victoria Ave	NE Weidler St	NE Hancock St
NE 1st Ave	NE Weidler St	Project Area North
NE 2nd Ave	NE Weidler St	NE Broadway
N VANCOUVER/NE HANCOCK HIGHWAY COVER		
N Wheeler Ave	N Dixon St	N Hancock St
N Dixon St	N Ross Ave	N Wheeler Ave
N Hancock St	N Wheeler Ave	N Flint Ave
N Flint Ave	N Broadway	N Hancock St
N Vancouver Ave	N Broadway	NE Tillamook St
N Williams Ave	NE Hancock St	Project Area North
Private Easement	NE Hancock St	N Vancouver Ave
NE Hancock St	Cul-de-sac/Private Easement	NE Victoria Ave
N Flint Ave	N Hancock St	N Tillamook St
N Tillamook St	N Flint Ave	N Vancouver Ave
I-5: N TILLAMOOK ST NORTH TO I-405 INTERCHANGE		
N Commercial Ave	N Page St	N Russell St
N Russell St	Project Area West	N Commercial Ave
N Kerby Ave	N Russell St	N Knott St
N Knott St	N Albina Ave	N Kerby Ave
N Albina St	N Graham St	N Stanton St
N Stanton St	N Mississippi Ave	N Borthwick Ave
N Borthwick Ave	N Knott St	Project Area North
N Graham St	N Mississippi Ave	N Borthwick Ave
N Graham St	N Borthwick Ave	Project Area East
N Mississippi Ave	N Graham St	N Monroe St
N Interstate Ave	N Knott St	N Greeley Ave

Notes: Ave = Avenue; EB = Eastbound; SB = southbound; St = Street; UPRR = Union Pacific Railroad Company; WB = westbound



6.2.1 Short-Term (Construction) Impacts

Both above- and below-ground impacts are assumed to occur for every utility within the API until design is sufficiently detailed to show where avoidance or protection is feasible. Utility relocation prior to and during construction may result in interruptions of service. Potential disruptions are expected to be minimal for most of the utilities, with utility providers scheduling outages to accommodate cut-overs. Temporary connections would likely be established before relocating the minor utility conveyances.

Potential disruptions for the BES major utility infrastructure listed in Table 4 could pose a design challenge due to the conveyance volumes involved. Temporary connections may not be feasible for the pump station or the 264-inch combined gravity sewer pipe. Service disruptions to these facilities could affect a large part of the City of Portland metro area. Where feasible, mitigation measures, including avoiding the facilities through design modifications, would be implemented to avoid or minimize impacts to these facilities.

Construction activities associated with the Build Alternative that could potentially impact utilities are summarized in Table 7 by Project component (proposed improvement). Short-term (construction) impacts are summarized in Table 8.

Table 7. Construction Activities and Potential Utility Impacts

Proposed Improvement	Construction Activity/Potential Utility Impacts
Widening I-5 Structures	<p>New foundations or their temporary construction requirements for excavations could impact underground utilities.</p> <p>Settlement from new loads could impact nearby utilities.</p> <p>Construction equipment, such as cranes, that require clear work areas to operate safely could impact utilities.</p> <p>Excavation and installation of lateral underground elements such as tie-back anchors, soil-nails, and micropiles could impact existing underground utilities in proximity to these elements.</p>
New I-5 Auxiliary Lanes	<p>New retaining walls could impact parallel or perpendicular utilities, both overhead and underground.</p> <p>New stormwater conveyance or treatment facilities could impact underground facilities.</p> <p>Revised roadway profiles and widened road prism could affect overhead crossings.</p> <p>Revised clear zone for the new lane edge could impact utilities.</p>

Proposed Improvement	Construction Activity/Potential Utility Impacts
Removal of Existing Local Street Overcrossing / Replacement with Highway Cover	<p>Utilities attached to bridges could be impacted by bridge removal.</p> <p>New foundations or their temporary construction requirements for excavations could impact underground utilities.</p> <p>Settlement from new loads could impact nearby utilities.</p> <p>Construction equipment, such as cranes, that require clear work areas to operate safely could impact utilities.</p> <p>Raised profiles that fill over utilities could result in an un-maintainable depth or to a depth that exceeds pipe material allowances.</p>
Surface Street Modifications	<p>New traffic signals and street lighting could have foundations that impact underground utilities. Poles and luminaire attachments could impact overhead utilities.</p> <p>Relocation of transit facilities, if required, could impact utilities, both overhead and underground.</p> <p>Roadside stormwater treatment, if used, could require utilities to be cleared of the treatment facility location.</p> <p>New stormwater conveyance could impact utilities.</p> <p>Widening and realignment of roadways could impact utilities both vertically and horizontally.</p> <p>Raised profile fill over utilities could result in an un-maintainable depth, or to a depth that exceeds pipe material allowances.</p> <p>Raised profile fill could impose an adverse surcharge over existing utilities and induce ground deformation, settlement, and utility distress.</p>
New Bicycle and Pedestrian Facilities	<p>Compliance with ADA, including sidewalk ramps, minimum width, and turning radius could impact utilities.</p> <p>New bicycle facilities could impact utilities.</p>
All	<p>Accidental impact by construction equipment could occur.</p> <p>Phased improvements, such as occur when construction is designed and bid under several contracts, could require multiple relocations of the same utility segment.</p>

Notes: ADA = Americans with Disabilities Act; I = Interstate

Table 8. Build Alternative Short-Term (Construction) Impacts

Utility Owner	Potential Impact	Type
COMMUNICATIONS AND POWER		
CenturyLink Local	5,630 feet 1,840 feet	Underground Communications Overhead Communications
CenturyLink National	420 feet 1,330 feet	Underground Communications Overhead Communications
Comcast Cable	3,280 feet 3,640 feet	Underground Communications Overhead Communications
Level 3 Communications	4,480 feet 1,940 feet	Underground Communications Overhead Communications



Utility Owner	Potential Impact	Type
PacifiCorp	3,740 feet 6,100 feet 12,610 feet	Transmission Power Underground Power Overhead Power
Portland General Electric	1,680 feet	Transmission Power
Verizon National Fiber Security	1,480 feet 1,190 feet	Underground Fiber Overhead Fiber
Unresponsive Utilities (AT&T, Comcast, Zayo, and XO Communications)	Unknown	Unknown
PIPING		
NW Natural	1,200 feet 3,530 feet 450 feet 1,560 feet 5,220 feet 210 feet	12-5/8 inch gas 6-5/8 inch gas 4-1/2 inch gas 4-inch gas 2-inch gas 1-inch gas
Portland Bureau of Environmental Services	1 2 900 feet 650 feet 200 feet 86 feet 550 feet 480 feet 860 feet 350 feet 550 feet 590 feet 320 feet 750 feet 750 feet 390 feet 285 feet 70 feet 660 feet 310 feet 990 feet 350 feet 260 feet 1,870 feet 1,320 feet 950 feet 1,490 feet 50 feet 11	1 Pump Station 2 Special Structures 264-inch combined 96-inch sanitary 84-inch CSO 72-inch sanitary 72-inch CSO 70-inch bypass 56-inch combined 54-inch CSO 48-inch pressure 48-inch CSO 38-inch sanitary 36-inch combined 30-inch combined 24-inch combined 20-inch sanitary 18-inch CSO 18-inch combined 16-inch combined 15-inch combined 15-inch sanitary 14-inch combined 12-inch combined 10-inch combined 8-inch sanitary 8-inch combined 6-inch combined Roads with Rim Adjustments Only
Portland Water Bureau	19,850 feet	Water Main

Notes: CSO = Combined Sewer Overflow

Cost estimates for utility relocation have been requested from the utility representatives; however, estimated unit costs were only provided by CenturyLink Local. Conservative relocation unit costs were assumed in order to include other utility features and appurtenances that are not quantified. The estimated relocation or adjustment costs are summarized in Table 9 and do not include engineering and contingencies. The quantities associated with the cost estimate in Table 9 are maximum impact values and would be refined as Project design progresses. The supporting calculations are included in Appendix C.

Table 9. Estimated Utility Relocation Costs

Utility Owner	Compensable	Not Compensable
COMMUNICATIONS AND POWER		
CenturyLink Local	\$30,000	\$1,950,000
CenturyLink National	\$0	\$325,500
Comcast Cable	\$0	\$1,530,000
Level 3 Communications	\$135,000	\$1,530,000
PacifiCorp	\$249,000	\$5,342,500
Portland General Electric	\$0	\$840,000
Verizon National Fiber Security	\$114,000	\$508,500
Unresponsive Utilities (AT&T, Comcast, Zayo, and XO Communications)	Unknown	Unknown
PIPING		
NW Natural	\$235,000	\$1,970,400
Portland Bureau of Environmental Services	\$22,580,800 ¹	\$1,113,200
Portland Water Bureau	\$4,199,050	\$267,200

Notes: Engineering and contingencies are not included and would increase the estimated costs shown.

¹Includes \$18,000,000 for the 264-inch pipe and \$1,097,600 for the pump station and associated piping installed prior to the highway construction.

The estimated utility relocation costs shown in Table 9 represent an approximated cost for relocating and adjusting utility facilities. Although a cost has been included for direct impacts to these utilities, the final Project design would avoid and minimize these direct impacts by incorporating the recommendations in Section 7. The estimated costs in Table 9 represent a preliminary budgetary amount for the additional measures that may be required to avoid direct impacts and protect existing utilities in place. The costs are intended to represent a worst-case scenario to assist in ODOT's funding, based on the conceptual layout information available during this phase.

6.2.2 Long-Term (Operational) Direct Impacts

The permanent removal of the bridge on N Flint could have a long-term direct impact upon NW Natural. NW Natural would not relocate on the same alignment to a location under I-5 (pers. comm., Jodi Wright [NW Natural], August 15, 2017). NW Natural anticipates abandoning the N Flint crossing of I-5 and reinforcing their system redundancy on the local street system. NW Natural's options for replacing the system redundancy do not involve installing on a new overpass or bridge structure at an alternate crossing (pers. comm., Clayton Stahnke [NW Natural], November 13, 2017).

Long-term and operational direct impacts at new bridge attachment crossings would be mitigated as described in Section 7.

6.2.3 Long-Term and Operational Indirect Impacts

Indirect impacts to utilities could include the following:

- Expansion of utility infrastructure to provide services to development parcels
- Additional relocation to accommodate development-related public improvements
- Additional expense to avoid or restore newly constructed infrastructure

Verizon National Fiber Security reports that they are currently designing the expansion of their facilities in the vicinity of the Project Area (pers. comm., Scott Christensen [Verizon National Fiber Security], August 30, 2017). Planning-level coordination with the Project may influence the alignment selection for their new expansion to be outside the Project Area boundary. Proactive coordination could avoid creating new direct impacts by the Project but could have an indirect impact of expanded facilities on non-Project roadways.

6.3 Cumulative Effects

Cumulative impacts are the environmental effects that result from the incremental effect of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes those other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

The analysis of cumulative impacts involves a series of steps conducted in the following order:

- Identify the resource topics that could potentially experience direct or indirect impacts from construction and operation of the proposed project.
- Define the geographic area (spatial boundary) within which cumulative impacts will be assessed, as well as the timeframe (temporal boundary) over which other past, present, and reasonably foreseeable future actions will be considered.

- Describe the current status or condition of the resource being analyzed, as well as its historical condition (prior to any notable change) and indicate whether the status or condition of the resource is improving, stable, or in decline.
- Identify other actions or projects that are reasonably likely to occur within the area of potential impact during the established timeframe and assess whether they could positively or negatively affect the resource being analyzed.
- Describe the combined effect on the resource being analyzed when the direct and indirect impacts of the project are combined with the impacts of other actions or projects assumed to occur within the same geographic area during the established time frame.

6.3.1 Spatial and Temporal Boundaries

The geographic area used for the cumulative impact analysis is the same as the API described in Section 4.1 and shown on Figure 9. The time frame for the cumulative impact analysis extends from the beginning of large-scale urban development in and around the Project Area in the 1950s, beginning with I-5 construction, to 2045, the horizon year for the analysis of transportation system changes.

6.3.2 Past, Present, and Reasonably Foreseeable Future Actions

The past, present, and reasonably foreseeable future actions that were considered in assessing cumulative effects are described in the following subsections.

6.3.2.1 Past Actions

Past actions include the following:

- Neighborhood and community development
 - Historical development of Portland area and accompanying changes in land use
 - Development of local transportation system (including roads, bicycle and pedestrian facilities, and bus transit)
 - Utilities (water, sewer, electric, and telecommunications)
 - Parks, trails, bikeways
- Commercial and residential development in and around the Project Area
 - Veterans Memorial Coliseum (1960)
 - Lloyd Center (1960)
 - Legacy Emanuel Medical Center (1970)
 - Oregon Convention Center (1990)
 - Rose Garden (1995)
- Regional transportation system development

- Marine terminal facilities on the Willamette River
 - Port of Portland (1892)
 - Commission of Public Docks (1910)
 - Port of Portland (1970; consolidation of Port of Portland and Commission of Public Docks)
- Freight rail lines (late 1800s and early 1900s)
- Highways
 - I-84 (1963)
 - I-5 (1966)
 - I-405 (1973)
- Rail transit system
 - MAX light rail (1986)
 - Portland Streetcar (2001)

6.3.2.2 Present Actions

Present actions include the ongoing operation and maintenance of existing infrastructure and land uses, including the following:

- Ongoing safety improvements for bicycles and pedestrians
- Local and regional transportation system maintenance
- Utility maintenance

6.3.2.3 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions were identified collaboratively with the City of Portland and consist of the following:

- Redevelopment of existing urban areas in the Project Area and vicinity
- Ongoing maintenance and development of existing urban infrastructure in the Project Area and vicinity

These actions include private redevelopment, public development and infrastructure projects, as well as combined public/private redevelopments. Specific projects and the plans identifying reasonably foreseeable future actions are described in detail in Appendix D. Given the highly developed nature of the Project Area and vicinity, the reasonably foreseeable future actions are not expected to substantially change the types or intensities of existing land uses.

6.3.3 Results of Cumulative Impact Analysis

As described in Section 6.2, the Build Alternative has the potential to impact utilities within the API. Utility relocations prior to and during construction could result in

interruptions of service. For most of the utilities, potential disruptions are expected to be minimal, with utility providers scheduling outages when they are required. Potential disruptions for major utility infrastructure would be more disruptive and temporary connections more difficult and costly to establish. Similar impacts to utilities within the API could be expected to result from reasonably foreseeable future actions. However, the incremental contribution to cumulative impacts on utilities from the Build Alternative could be substantial due to the magnitude of potential relocations occurring during construction as shown in Table 8. The contribution of the Build Alternative to cumulative impacts would, however, be minimized through avoidance and mitigation measures, as described in Section 7.

6.4 Conclusion

The magnitude and duration of direct impacts upon utilities (both short-term construction impacts and long-term operational impacts) would vary by the type of utility and are summarized in Table 10. Potential impacts to the major utilities listed in Table 4 (Section 5.2.1) would incorporate the avoidance, minimization, and mitigation recommendations of Section 7 to address identified potential impacts. Likewise, the avoidance, minimization, and mitigation recommendations of Section 7 would be applied to anticipated impacts due to minor utilities requiring functional replacement.

Through incorporating the avoidance, minimization, and mitigation recommendations identified in Section 7, the Build Alternative would not be expected to result in significant impacts on utilities. It is noted that substantial impacts could occur for several utilities, but by incorporating the avoidance, minimization, and mitigation recommendations, the impacts would be similar in context and severity to other complex highway improvement projects in urban areas.

Table 10. Summary of Anticipated Direct Impacts (Short-Term and Long-Term)

Utility Owner	Impact Level	Reasoning
COMMUNICATIONS AND POWER		
CenturyLink Local	Substantial Impact	Impacts to the underground ductbank, a major utility, are assumed to be unavoidable due to the bridge removal and replacement at NNE Broadway. Constraints per Table 5 would need to be addressed. Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.
CenturyLink National	Less than Substantial	No major utilities. Anticipated impacts are primarily to overhead infrastructure. It may be feasible to avoid or minimize impacts to underground infrastructure by incorporating recommendations of Section 7.

Utility Owner	Impact Level	Reasoning
Comcast Cable	Less than Substantial	No major utilities. Special Constraints per Table 5 would need to be addressed. It may be feasible to avoid or minimize impacts to underground infrastructure by incorporating recommendations of Section 7.
Level 3 Communications	Less than Substantial	No major utilities. As stated in Section 5.1.5, Level 3 Communications should be able to manage its relocation moves. Special Constraints per Table 5 would need to be addressed.
PacifiCorp	Substantial Impact	<p>Impacts to the 69 -115 kV aerial power transmissions, a major utility on N Williams Street and NE Hancock Street, is assumed to be unavoidable due to impacting poles with a new traffic signal and likely crane safety for a new bridge overcrossing at NE Hancock Street.</p> <p>Impacts to the 69-115 kV aerial power transmissions, a major utility on NE 1st Avenue, is assumed to be unavoidable for the western side poles for highway widening.</p> <p>Impacts to the 69-115 kV aerial power transmissions, a major utility on NE Russell Street and N Albina Avenue, is assumed to be unavoidable due to impacting poles with highway widening.</p> <p>Impacts to the multiple parallel distribution lines, a major utility, is assumed to be unavoidable due to the bridge removal and replacement at N/NE Weidler Street. Special Constraints per Table 5 would need to be addressed.</p> <p>Impact to other roadway segments with multiple parallel distribution lines could also occur.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>
Portland General Electric	Substantial Impact	<p>Impact to the 57 kV aerial power transmission, a major utility on N Williams Street and NE Hancock Street, is assumed to be unavoidable due to impacting poles with a new traffic signal and likely crane access for a new bridge overcrossing at NE Hancock Street.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>
Verizon National Fiber Security	Potential for Substantial Impact	<p>No major utilities; however, facilities are located within the UPRR ROW and have a high amount of communication traffic. Special Constraints per Table 5 should be addressed to avoid schedule impacts to the Project.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>
Unresponsive Utilities (AT&T, Zayo, and XO Communications)	Potential for Substantial Impact	<p>Unknown infrastructure; no determination of magnitude or duration of potential impacts.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>

Utility Owner	Impact Level	Reasoning
PIPING		
NW Natural	Less than Substantial	<p>Permanent removal of the N Flint Street bridge would not result in any long-term and operational direct impacts to this minor utility infrastructure. The pipeline would be abandoned. Constraints per Table 5 would need to be addressed.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>
Portland Bureau of Environmental Services	Substantial Impact	<p>The piping external to the pump station at I-84 could be impacted by interchange ramp construction. Pump station may not allow for disruptions in service.</p> <p>The 96-inch sewer at the I-84 interchange could be impacted by the I-5 widening and the interchange ramp and off-ramp construction.</p> <p>The 72-inch CSO and 38-inch sewer on NE Lloyd Boulevard could be impacted by I-84 interchange ramp and NE 1st Avenue off-ramp construction.</p> <p>The 56-inch sewer crossing I-5 at the planned NE Hancock Street overcrossing structure could be impacted by the new bridge foundation.</p> <p>The 54-inch sewer on NE Holladay Street could be impacted by bridge construction.</p> <p>The 36-inch CSO and 30-inch CSO on N Mississippi Avenue and along the former N Mississippi Avenue alignment could be impacted by I-5/I-405 interchange area stormwater treatment or conveyance.</p> <p>The 24-inch sewer on NE 1st Avenue at NE Weidler Street could be impacted by new traffic signals.</p> <p>The 22-inch sewers on NE 2nd Avenue, a minor utility, could be impacted by the NE Clackamas Street Pedestrian Bridge.</p> <p>Additional impacts to minor utilities within the API are assumed to occur.</p> <p>Recommendations in Section 7 of this report would be incorporated to avoid, minimize, and mitigate the impacts.</p>
Portland Water Bureau	Potential for Substantial Impact	<p>No major utilities, but the N Williams Street and NE Weidler Street bridge attachments together create a looped system for the infrastructure on both sides of I-5. Only one of the two waterlines can be out of service at a time. Standard fire flow cannot be met if both of these water main crossings are out of service at the same time (PWB 2017). It is noted that most of the water infrastructure is reimbursable and impacts would increase the Project cost. Constraints per Table 5 should be addressed.</p> <p>Recommendations of Section 7 would be incorporated to avoid, minimize, and mitigate the impacts.</p>

Notes: API = Area of Potential Impact; CSO = Combined Sewer Overflow; kV = kilovolt; I = Interstate; ROW = right of way; UPRR = Union Pacific Railroad Company

7 Avoidance, Minimization, and Mitigation Measures

This section describes avoidance, minimization, and mitigation measures, including utility-specific mitigation recommendations, that would be implemented to minimize disturbance to system users and impacts to existing facilities during Project construction and operation.

7.1 General Recommendations

Further investigation of utilities and confirmation of anticipated impacts would occur in the final design phases of the Project development process. ODOT would work with the utility owners to develop plans and incorporate design and engineering controls, to either protect or relocate utility facilities within the Project Area.

The action of relocation of utilities can result in impacts at the relocation site. During the final design phase, the relocation sites for affected utilities would be mapped and the effects of these actions confirmed.

Avoiding and minimizing impacts to the major utilities listed in Table 4 and proactively addressing the special constraints and design considerations listed in Table 5 would be important to the success of the Project. In particular, the Project should avoid impacts to the BES's 264-inch sewer, sanitary pump station, and pump station piping, as it is the position of BES that it is not feasible to relocate or allow disruptions in service. Additionally, the Project should avoid or minimize direct impact to BES's 56-inch sewer crossing I-5 at N/NE Hancock. Although a cost has been included for impacts to these facilities, relocation of the utility may not be a viable option. ODOT standard process in these instances is to prepare a "Design Acceptance Package" report in the initial stages of design for Project-critical success factors. For this Project, obtaining vertical and horizontal limits of these key underground utilities should occur very early in design and the recommended actions included as part of the design acceptance package.

Proper coordination and the use of standard construction procedures and techniques would minimize disturbance to system users and avoid damage or impacts to existing facilities that are deemed, during final design, to not require relocation or upgrades. Typically, new facilities such as poles or ducts are installed, and then service is switched over to the new facilities, thereby minimizing any disruption of service to the utility users.

Utility coordination would occur in accordance with the *ODOT Right of Way Manual*, Chapter 10 (ODOT 2016) and is expected to occur early enough in the Project development process to allow new facilities to be brought on-line prior to the Project's effect on the existing facility. The roles and responsibilities of the utility coordination process are briefly summarized as follows:

- ODOT would perform surveying and mapping of utilities.
- The utility owners would confirm ODOT's mapping of their infrastructure, and identify any corrections required.
- ODOT would perform design of its Project improvements, identify resultant potential conflicts with utilities, and provide the conflict list and notification to the utility owner, including public agencies.
- ODOT would provide updated design plans and conflict lists as the Project design progresses and coordinate with the utility owner to determine the resolution of the identified conflicts.
- The utility owner, including public agencies, is responsible for addressing the identified conflicts, which include potholing, relocation design, and relocation construction. This responsibility also includes obtaining permits and approvals from every applicable jurisdiction and review authority.
- The utility owner, including public agencies, may contract with ODOT through a Utility Agreement to have ODOT perform some or all of these responsibilities. A Utility Agreement is also required for ODOT to be able to reimburse a utility owner with prior rights for its reimbursable expenses.
- ODOT would coordinate with the utility owner to determine the timing and requirements associated with its relocation and coordinate schedule for any utility relocations that cannot occur prior to ODOT's construction beginning.
- ODOT is required to certify that all arrangements have been made to resolve the identified utility conflicts and allow the Project improvements to proceed as identified in the construction contract. This certification is required prior to the Project bidding for construction.
- The utility owner is responsible for meeting the agreed-upon relocation timing.
- During construction, the Project contractor would work with utilities to locate their infrastructure and coordinate the construction of improvements with the utility relocations that occur during construction.

By following the *ODOT Right of Way Manual*, Chapter 10 (ODOT 2016), there should be minimal to no disruption in service to the facility owners or users, a mitigation measure to the otherwise substantial impacts to the utility owners. Relocation plans would be prepared and service disruptions approved by affected utility providers before construction begins. Coordination would occur with utility owners to ensure that contingency plans for management of potential utility service disruptions during construction are accommodated.

Facilities within the UPRR ROW require coordination with UPRR for locating and surveying utilities, as well as relocation permitting and construction. Time should be allowed in the Project schedule to accommodate UPRR's schedule and review requirements.

Designers and contractors would be required to develop construction sequence plans and coordinate schedules for utility work to minimize potential disruptions. The contractor and each utility would be required to comply with coordinated and agreed-upon notifications and time requirements for sequencing construction. The plans and coordination would also allow for ample advance notice when service disruptions are unavoidable, consistent with utility owner policies. The contractor would be required to have utilities accessible during construction.

Bridge attachments appear to be a relocation requirement for several of the utility companies. In order to minimize the direct impacts to utilities from highway covers, the Project should incorporate specific utility crossing corridors on the structures, with maintenance access available from the surface. Corridors should allow new utility crossings over I-5 to be installed and functional before the existing bridge infrastructure is removed.

If the Project incorporates phasing of the improvements, direct impacts to utilities could be reduced by minimizing the multiple relocations of the same utility segment. This could be accomplished through design and planning.

7.2 Preliminary Utility-Specific Recommendations

7.2.1 CenturyLink Local

Operationally, CenturyLink Local is required to keep service intact at all times, though some circuits may be cut-over during a scheduled maintenance window, typically between 10 PM and 5 AM. CenturyLink Local requires 24/7 access to all facilities for repairs, as mandated by the Oregon Public Utilities Council. It must additionally meet certain timelines for repairs and outages.

CenturyLink Local anticipates traffic control issues associated with relocation of underground facilities, particularly on N/NE Broadway. Due to the bridge removal and replacement, CenturyLink Local's relocation may be required to occur concurrently with roadway construction. Allowing CenturyLink Local to work in the construction contractor's protected work zone would mitigate this concern.

CenturyLink Local could request attachment to the NE Broadway highway cover. However, the attachment location would depend on the amount of relocation required in advance of removing the existing bridge. Relocation may need to be staged on to another street/overcrossing alignment. CenturyLink Local would perform further review during the preliminary design once the conflicts are more clearly defined.

CenturyLink Local reports that its precast concrete vaults are only designed for 5 feet of fill; older vaults (poured-in-place, brick) may be less. Anything more than 5 feet of fill would require structural analysis (pers. comm., Scott Miller [CenturyLink], August 31, 2017). CenturyLink Local adds that the limiting factor for easy relocation is usually the size and quantity of copper cables within a ductbank. There is no slack built into the copper cables. Moving existing buried facilities up to 3 feet vertically or

horizontally should be achievable without any copper splicing. However, other existing utilities may limit the ability to expose and move a CenturyLink Local facility.

CenturyLink Local would need approximately 6 months after the roadway design is completed to budget and design relocation of their utilities.

7.2.2 CenturyLink National

CenturyLink National is a single-path system. It would have to keep the current facilities operational until it could cut-over to a relocated route that generally follows its existing route. CenturyLink National stated it would coordinate the short outage with its customers (pers. comm., Michael Lopez [CenturyLink], August 15, 2017).

7.2.3 Level 3 Communications

Level 3 Communications serves customers within the vicinity of the Project Area, and it would need to schedule cut-overs and relocation down time. Level 3 Communications stated that with sufficient notice and review of final plans, it could minimize direct impacts resulting from the relocation. A portion of the Level 3 Communication infrastructure is located within the UPRR railroad corridor; Level 3 Communications assumes Prior Rights at this location (pers. comm., Tim Boykin [Level 3 Communications], August 11, 2017).

7.2.4 NW Natural

NW Natural would require coordination prior to the N Flint bridge removal so that it can abandon its attached piping.

NW Natural requires 30- to 36-inches of final cover over its mains, with 12 inches minimum of cover maintained during construction.

NW Natural's approximate duration for planning and obtaining budget for relocation is 6 months. NW Natural requested the Project allow it to provide a "rolling design" due to the Project extents (pers. comm., Jodi Wright [NW Natural], August 14, 2017). A "rolling design" phases the relocation design in the order of construction phasing, such that it is not all performed and submitted at once.

7.2.5 PacifiCorp (Pacific Power) and Portland General Electric

PacifiCorp's 69-115 kV power transmission main on NE 1st is primarily on the eastern side of the roadway, with a couple poles on the western side. Impact to the western side poles is unavoidable due to highway widening, and these poles would relocate to the eastern side. Avoidance of direct impacts to the existing eastern side poles is preferred, as any direct impacts would require the transmission main to relocate onto a different roadway. With adjacent building proximity on NE 1st, temporary relocation of the existing steel transmission main poles does not appear a viable option. PacifiCorp would provide watchers when construction equipment must operate within the powerline's safety clearance zone as a means to mitigate crane safety.

PacifiCorp's 69-115 kV power transmission main on NE Hancock and N Williams is attached to the PGE's 57 kV power transmission poles. PacifiCorp augments its system with distribution poles set underneath the PGE line mid-span in places. The PGE and PacifiCorp's relocation in this area would have to be jointly coordinated.

PacifiCorp's 69-115 kV power transmission main on NE Russell crosses over I-5 at the beginning of the I-5 NB to I-405 WB interchange ramp, with poles on each side of the highway that would be in direct conflict with the highway widening. Proactive coordination with PacifiCorp is warranted to determine whether relocation would remain on the same alignment, but adjusted vertically with safety watchers provided for construction, or whether temporary or permanent relocation to the south would be preferred.

PacifiCorp's NE Weidler crossing of I-5 is both overhead and underground, and the underground power could be provided by bridge attachment. PacifiCorp is likely to request bridge attachment to the Broadway/Weidler highway cover, particularly since overhead crossings if I-5 could be impacted by crane operations for the highway cover construction.

PGE's power transmission main on N Interstate crosses over all I-405 exit and entrance ramps with poles on each side of the highway that could be impacted by excavation for stormwater conveyance or treatment. Avoidance of direct impacts appears feasible, and the designed improvements should work around the existing power transmission at this location.

7.2.6 Portland Bureaus

City of Portland has provided input regarding feasibility of disruptions, protection requirements, and mitigation measures. Utility conflict avoidance and minimization of utility relocations for these primarily reimbursable utilities would be in the Project's best interest.

Since lightweight fill might be considered for Project improvements as a mitigation measure for roadway fill or backfilling new utility trenches, PBOT must approve any areas where lightweight fill is being considered in City of Portland ROW, particularly under pavement. PBOT's approval requirement also applies to utilities, including its own bureaus relocating within the City of Portland ROW.

The City of Portland's consultant selection and contracting process can take up to a year in duration. To minimize the potential for schedule delays, mitigation measures could include potholing and conflict resolution design as part of the Project, with City of Portland's bureaus providing review and reimbursing ODOT for the non-reimbursable components of its infrastructure. In the absence of a Utility Agreement or equivalent interagency means of ODOT performing any of the utility owner's responsibilities, the standard roles and responsibilities bulleted in Section 7.1 would apply. New or relocated utilities installed by ODOT with the Project that are to be owned or maintained by City of Portland after the Project's completion would be designed and constructed in accordance with City of Portland's standards. For

locations where a Portland utility would be located within ODOT's ROW, ODOT's criteria for utility installations within its ROW would also apply.

7.2.6.1 Portland Bureau of Environmental Services

The BES has many major sewers within the Project limits, and close coordination is required to minimize Project risk and overall Project costs due to this primarily reimbursable utility.

Most of the major sewers are combined systems conveying both sanitary and stormwater, with a few major sewers conveying sanitary only. Impacts could occur by foundation construction, load-induced settlement, or increased hydraulic requirements for conveying stormwater with the larger impervious area of the local street system. Any approved connections, pumping, cut-overs, and disruptions in service should have environmental protection measures in place and must be accomplished in a manner that would not allow sanitary sewage overflows to back up onto public streets or private property, or into storm-only piping that outfalls directly to the Willamette River. The BES provided input regarding protection measures, operational constraints, maintenance, and grade changes (pers. comm., Dave Nunamaker [BES], November 27, 2017).

The BES provided the following operational constraints:

- The City of Portland's Sullivan Pump Station at 211 NE Everett is categorized as a "major" pump station in the City's wastewater system. The pump station was constructed in 1952, and it has a large underground storage tank and appurtenances.
 - It operates 24 hours per day, 7 days per week.
 - City of Portland staff access to site is required at all times. Maintenance staff performs daily inspections and maintenance activities at this pump station.
 - Any impacts to the pump station and associated force mains must be avoided.¹²
 - Disruptions in service, of any duration, are not allowable.
- Gravity systems should not have service disruptions during the Project unless those same sewer systems are being relocated or rehabilitated during the Project.

The BES recommended the Project incorporate the following protection measures:

- Pothole to determine precise depths, particularly in locations with a major consequence of failure.
- Use lightweight fill, or other BES-approved method over the BES infrastructure, in any locations where more than 3 feet of fill would be added.

¹² "Any impacts" was understood to mean any short-term direct construction impacts.

- Perform a detailed analysis if new structure footings will be placed in the vicinity of BES sewer infrastructure. The detailed analysis would need to show the sewer infrastructure below would not be adversely affected by the additional loading from the support columns and footings above. (Note: A similar analysis may be required for load-bearing construction equipment, such as beam-setting cranes, particularly in the vicinity of the pump station's underground storage tank.)

The BES anticipates items such as deep foundations would be required to transfer new structure loads below the 56-inch sewer main at NE Hancock. Design and engineering controls, in accordance with Section 7.1, would be required.

The BES provided the following input regarding maintenance:

- Routine maintenance schedule can be adjusted and coordinated during Project construction to avoid potential conflicts.
- Maintenance access locations would need to be examined closely during design to ensure new manholes are added to offset for any manholes that need to be removed.
- Manhole locations for maintenance access versus the highway travel lanes must be closely reviewed, particularly if manhole lids are not allowed in the travel lanes. Per BES, when I-84 was widened in the 1980s, some of the manholes were modified to have a substantial offset. The offset was so extreme that they can no longer access the manholes properly for maintenance.
- The two highway covers could make future rehabilitation or replacement of any sewer mains underneath especially difficult in the future. BES identified the 56-inch sewer main crossing I-5 at N/NE Hancock as requiring a closer look to see if it needs rehabilitation before constructing the Flint/Hancock highway cover.

The BES anticipates that the 15-inch sewer main at NE Broadway/N Williams would require relocation in order to construct the Broadway/Weidler/Williams highway cover. The BES anticipates a careful analysis would be needed to ensure all active service connections remain in service during any relocation.

A full Prior Rights assessment has not been performed, but BES mapping shows its infrastructure to be within easements under the I-5/I-84 interchange, including within areas that otherwise appear to be ODOT's ROW for I-5. No "X" Permits¹³ have been issued by ODOT within the Project Area, but BES facilities are assumed to be reimbursable in the BES-indicated easement areas. Additionally, many of the existing sewer facilities were constructed prior to I-5 construction and would be reimbursable even without any ODOT-issued permit (see Section 4.2.2). A full Prior Rights assessment would be performed during the Project preliminary design phase.

¹³ See Notes under Table 3 (Section 4.2.2) for description of the "X" Permit.

7.2.6.2 Portland Water Bureau

The PWB has published *Guidelines for Utility Protection* (PWB 2012), which provides minimum horizontal and vertical clearances and construction requirements for temporary and permanent improvements in the vicinity of its existing infrastructure. The guidelines provide protection requirements for the different size water mains and should be used during preliminary design to identify potential conflicts. The PWB infrastructure is primarily reimbursable due to its location on City of Portland streets.

The PWB's water mains attached to the N Williams and NE Weidler bridges together create a looped system, tying together the waterline systems on both sides of I-5. Attachment to the new highway cover is anticipated and may be required in more than one alignment to replace the existing looped system.

The Build Alternative would construct the Broadway/Weidler highway cover with bridge beams perpendicular to the highway below, requiring both attached water mains to be taken out of service. The PWB has performed a hydraulic modeling analysis and concluded that only one of the two waterlines could be out of service at a time. Standard fire flow cannot be met with both of these water main crossings out of service at the same time (PWB 2017). Additionally, a temporary 2-inch domestic water service would be required for the property at 15 NE Broadway during the staging of the waterline reconstruction at the Broadway/Weidler highway cover.

PWB maintenance needs may be flexible, and PWB would work with the Project to address any maintenance access requirements during and after construction. PWB stated that part of its plan review process is noting where existing water facilities need to be renewed or upsized and providing that information to PWB Maintenance and Construction so that work can be prioritized prior to construction of the Project improvements (pers. comm., Cherri Warnke [PWB], October 10, 2017).

7.2.6.3 Verizon National Fiber Security (MCI)

Verizon National Fiber Security crosses I-5 aurally at NE Weidler, as an attachment to PacifiCorp's poles. Verizon National Fiber Security is likely to request bridge attachment to the Broadway/Weidler highway cover, particularly since overhead crossings of I-5 could be impacted by crane operations for the highway cover construction.

Verizon National Fiber Security is also underground within the UPRR ROW, in a single-route fiber facility with a high amount of communication traffic. Verizon National Fiber Security may qualify for Prior Rights at this location.

8 Contacts and Coordination

Table 11 provides a summary of persons or entities who were contacted to provide information regarding existing utilities within the API.

Table 11. Summary of Contacts

Entity/Agency	Name and Contact Information
Oregon Utilities Notification Center	800.332.2344 or 811 http://callbeforeyoudig.org/oregon/index.asp
Oregon Department of Transportation	Jane Estes (503) 731-8515 Jane.EESTES@odot.state.or.us
AT&T Corporation	Customer Service (800) 252-1133
CenturyLink (Local)	Scott Miller CenturyLink 8021 SW Capitol Hill Rd, Rm 110 Portland, OR 97219 (503) 242-4144 scott.miller4@centurylink.com
CenturyLink (National)	Michael Lopez CenturyLink Comm, LLC National Construction West 6101 S 180th St Tukwila, WA 98188 (916) 769-9940 CenturyLinkNationalOSPRelocations@centurylink.com Caleb King Business Analyst – OSP Relocations 100 South Cincinnati Ave, Suite 1200 Tulsa, OK 74103 (918) 547-0007

Entity/Agency	Name and Contact Information
Comcast	<p>Richard Maroney (971) 801-5695 Richard_Maroney@cable.comcast.com</p> <p>Michael Fling Michael_Fling@cable.comcast.com;</p> <p>Frank Zabel Frank_Zabel@cable.comcast.com;</p> <p>James Haines James_Haines@cable.comcast.com;</p> <p>Kevin Kopp (971) 777-0974 Kevin_Kopp@comcast.com</p>
Electric Lightw ave, Inc.	See Zayo
Level 3 Communications	<p>Patrick Provost Level 3 Communications 1025 El Dorado Blvd Broomfield, CO 80021 (720) 888-4686 patrick.provost@level3.com</p> <p>Tim.Boykin@level3.com</p> <p>relo@level3.com</p> <p>Also see CenturyLink (National)</p>
MCI	See Verizon National Fiber Security
NW Natural	<p>Jodi Wright, PMP (503) 226-4211 x6745 Jodi.Wright@nw.natural.com</p> <p>Clayton Stahnke, EIT (707) 779-2507 Clayton.Stahnke@nw.natural.com</p>



Entity/Agency	Name and Contact Information
PacifiCorp (Pacific Power)	<p>Daren Dixon (503) 280-2702 Daren.Dixon@pacificorp.com</p> <p>Alisa M. Dunlap (503) 813-6756 Alisa.Dunlap@pacificorp.com</p> <p>Yui Miyata (503) 813-6006 Yuichiro.Miyata@pacificorp.com</p>
Portland General Electric	<p>Julie Goodrich Portland General Electric Company 121 SW Salmon St, 3WTC0406 Portland, OR 97204 (503) 464-2243 Julie.Goodrich@pgn.com</p>
Portland Bureau of Environmental Services	<p>Dave Nunamaker BES Development Engineering (503) 823-7266 Dave.Nunamaker@portlandoregon.gov</p>
Portland Water Bureau	<p>Cherri Warnke Portland Water Bureau Interagency Liaison 1120 SW 5th Avenue Room 600 Portland, OR 97204 (503) 823-6036 Cherri.Warnke@portlandoregon.gov</p>
Verizon National Fiber Security	<p>Scott Christenson Verizon 11311 NE 120th Street Kirkland, WA 98034 (425) 636-6046 Scott.Christenson@verizon.com</p> <p>Rod Clemmer (503) 969-8941 Rod.Clemmer@verizon.com</p>
Zayo	<p>Bob Davidson (503) 708-0510 Robert.Davidson@zayo.com</p>
Zayo FNA Abovenet	See Zayo

9 Preparers

Name	Discipline	Education	Years of Experience
Tina Adams, PE, Casso	Civil Engineering, Report Author (excluding Sections 1, 2, and 6.3) ¹	B.S. Engineering	21
Cory Burlingame, PE, Casso	Civil Engineering, Report Quality Control Reviewer	B.S. Engineering	10
Seth Bergeson, AECOM	GIS Specialist, Prepared the GIS Figures	B.S. Geography	19

¹ Sections 1, 2, and 6.3 authored by HDR/AECOM Project team in coordination with ODOT.

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